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# POCOMOKE RIVER MANAGEMENT PLAN



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## Preface

*This combined report was a joint effort by the United States Department of Agriculture (USDA) and the Maryland Department of Natural Resources (DNR). It is a combination of the special river basin study developed by USDA and the scenic river plan developed by DNR. Both plans are formulated to stand alone; however, planning efforts were coordinated between the two agencies to avoid duplication of work and conflicts among recommendations.*

*The two plans are complementary and both support the sponsor's main objective to develop a comprehensive resource management plan for the Pocomoke River.*

*This report provides the sponsors with details needed to make decisions on water and related land resource problems and makes specific recommendations that will contribute to national economic development and environmental quality.*

# POCOMOKE RIVER MANAGEMENT PLAN

Prepared by UNITED STATES DEPARTMENT OF AGRICULTURE

in Cooperation with

SOIL CONSERVATION SERVICE  
ECONOMIC RESEARCH SERVICE  
FOREST SERVICE

MARYLAND DEPARTMENT OF NATURAL RESOURCES  
POCOMOKE RIVER ADVISORY COMMITTEE

JUNE 1982

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## Introduction

The Pocomoke River Basin Study initiated through the request of the Pocomoke River Advisory Committee has been conducted by the United States Department of Agriculture under the authority of Section 6 of Public Law 83-566 as amended and supplemented. Principal USDA participants were the Soil Conservation Service (SCS), Economic Research Service (ERS), and the Forest Service (FS). Other key participants included Maryland's Department of Natural Resources, USDI, Fish and Wildlife Service, the Pocomoke River Advisory Committee and the Worcester Environmental Trust.

The Department of Natural Resources developed concurrently a scenic river management plan (*The Pocomoke—Planning for its Scenic, Wild and Recreational Resources*) which is included as Appendix B in this report. There was close coordination between the two studies to avoid duplication of effort and conflicting recommendations.

Current management of the river's resources has caused the citizens in the basin to be concerned about its future use. This study addressed that concern, developed several alternatives, and through state, federal, and local participation, recommendations were made that contributed to the resolution of that concern.

The Soil Conservation Service had overall responsibility for coordinating the study. Those responsibilities included the physical appraisals of the water resource problems and needs, formulation of alternative plans, coordination of alternative plans and measures with other groups and agencies to determine the selected plan, and providing the leadership for the development of the basin report.

The USDA Forest Service had the responsibility of providing data, inventories, recommendations, analyses, and projections pertaining to forest resources. Their major responsibility was to determine impacts from proposed alternatives on future forest communities.

The Economic Research Service had the responsibility of providing benefit-cost analyses, summarizing and assessing data from the Delmarva River Basin data files, and preparing projections of land use and agricultural production.

The Pocomoke River Advisory Committee, appointed by the legislative bodies of Worcester and Wicomico Counties Maryland,

served in an advisory capacity and provided technical input for those two counties during the planning process and made recommendations for inclusion in the final report.

The basin area includes portions of Worcester, Somerset, and Wicomico Counties, Maryland; Accomack County, Virginia; and Sussex County, Delaware. The Soil Conservation Districts and County Commissioners from the Maryland and Delaware counties will act as sponsors and assume responsibility for project implementation.

Close coordination between federal, state, and local agencies along with local groups within the study area provided the input needed for the development of this study report. The report covers existing and projected land and water resource problems and needs; alternatives for solving them, including the selected alternative plan; the impact of such alternatives on other resources; and the identification of programs and agencies that are available for both technical and financial assistance.

Reports were made to the Pocomoke River Advisory Committee on a regular basis pertaining to study progress. The general public was kept informed through the news media and through information meetings. At the very end of the study a public information meeting was held to present alternatives developed during the planning process and to obtain their views on what plan elements should be included in the selected plan. Following that meeting, the Pocomoke River Advisory Committee sponsored a tour of the Pocomoke River for elected officials and other planners, to view proposed project measures.

This report will be used by the Pocomoke River Advisory Committee to carry out a total management program for the river. It will be used as a management tool for decision making and scheduling. Specifically, it will be used to develop operation and maintenance guidelines for the river and its tributaries including the debris dam and oxbows.

This plan will also be used to supplement and complement recommendations made under Pocomoke River scenic management plan (see *Appendix B*).

There were a number of agencies instrumental in assisting with data-gathering for this report. They are:

National Aeronautics and Space Administration at Wallops Island, Virginia provided both technical and financial assistance for the collection of cross-sectional data using their LIDAR Process.

Pennsylvania State University, School of Forestry developed a LANDSAT flood plain and wetland classification map. Their demonstration project provides a means to monitor environmental effects after project action.

Salisbury State College remote sensing group extended the previous Penn State work by providing assistance in a pilot project for Rehobeth Branch Watershed. Potential areas of environmental conflict were identified.

NASA's Eastern Regional Remote Sensing Applications Center provided overall coordination and assistance to the River Basin Study for LANDSAT application to long-range planning.

In addition to the agencies actively involved in this study, appreciation is hereby expressed to the following for their assistance and cooperation:

#### **LOCAL**

Wicomico, Worcester and Somerset Counties, Maryland and Sussex County, Delaware

#### Municipalities:

Pocomoke City, Salisbury, Snow Hill

Soil Conservation Districts of Maryland and Delaware  
Salisbury *Daily Times*

#### **PRIVATE**

Environmental Trust  
The Nature Conservancy's Maryland Chapter

#### **STATE**

##### **State of Maryland**

##### DEPARTMENT OF NATURAL RESOURCES:

Fisheries Administration  
Land Planning Services  
Tidewater Administration  
Water Resources Administration  
Wildlife Administration

##### DEPARTMENT OF AGRICULTURE:

State Soil Conservation Committee

##### UNIVERSITY OF MARYLAND:

Cooperative Extension Service  
State Climatology Office

##### DEPARTMENT OF STATE PLANNING

##### SALISBURY STATE COLLEGE

#### **FEDERAL**

##### Independent Federal:

National Aeronautics and Space Administration

##### U.S. DEPARTMENT OF THE INTERIOR:

Geological Survey  
National Park Service

##### U.S. DEPARTMENT OF COMMERCE:

National Oceanic and Atmospheric Administration



# Executive Summary

## Purpose of Study

The purpose of this study is to evaluate the water and related land resource problems and needs. This evaluation allowed for the development of a comprehensive resource management plan that outlines the seriousness of problems, the effect of existing programs on meeting current and future needs, alternative plans that can fulfill future needs, recommendations for solutions to problems using a cost effective and environmentally sound approach, and the identification of programs that can provide technical and financial assistance for implementation.

## Description of Study Area

The Pocomoke River is a tributary of the Chesapeake Bay. There are 316,100 acres draining into the Pocomoke River which include lands from three states (Maryland, Delaware, and Virginia) and five counties: Worcester, Somerset, and Wicomico Counties, Maryland; Sussex County, Delaware; and Accomack County, Virginia (see map, Appendix B, page 6 ). The Water Resources Council's hydrologic unit number for this watershed is 02060009.

There are approximately 95,700 acres of crop and pasture, 4,200 acres of idle land, 195,000 acres of forest land, 3,600 acres of herbaceous wetlands, and 13,400 acres of rural-residential, urban, and commercial areas. Fresh water areas account for 4,200 acres. Drainage is impaired on 37,200 acres of the total cropland acreage. The basin is estimated to have 20,900 acres of interior wooded wetland included in the forest land.

Agriculture and related industry account for a large portion of the total income and total employment of the basin. Principal crops are corn and soybeans with some high value truck crops. Cash-grain and poultry production are the two major farm types, representing over 80 percent of all farms.

The 195,000 acres of forest land in the basin support several mills and associate industries. Approximately 193,000 acres are considered commercial forest. However, only 8,600 acres of total forest lands are well stocked with desirable trees. About 50,300 acres have fair stocking, and 134,100 acres or 69 percent is poorly stocked. The net annual growth of desirable species on these acres is approximately half of the potential growth. Even under these conditions the basin is expected to meet its share of the OBERS<sup>1</sup> projected demand for forest production through the year 2000.



The basin has a generally humid temperate climate. The proximity of the Chesapeake Bay and the Atlantic Ocean has a moderating effect on temperatures but there are no physiographic features that cause any major climatic variation. The average annual temperature is about 47 degrees F. The warmest period of the year is during the second half of July when the average daily maximum temperature is about 79 degrees F. The coldest time is late January and early February when the average daily minimum temperature is about 38 degrees F. The growing season ranges from 230 days in tideland areas of Somerset County to 180-190 days in the northern part of the basin. Mean annual precipitation ranges from approximately 42 inches to about 48 inches.

<sup>1</sup> OBERS projections are a nationally consistent set of projections of populations, commodity production, and other factors prepared by the Department of Commerce and the Department of Agriculture for the U.S. Water Resources Council. (OBERS is acronym for Office of Business Economics and Economic Research Service.)

The major cities in the basin are Snow Hill and Pocomoke City, Maryland. However, the City of Salisbury, a major employment area, lies to the west of the basin in Wicomico County; and Ocean City, which attracts thousands of visitors and offers employment through the summer months, lies to the east on the Atlantic shore. Many of the basin's smaller towns utilize the amenities, goods and services of these towns.

There are several major agricultural and forest related industries in or near the basin that have a measurable effect on its economic activity. Crown Cork and Seal Company, Koppers Company, Inc., J.V. Wells, Inc., Glatfelter Pulp Wood Company, Chesapeake Bay Plywood Corporation, Campbell Soup Company, Procine Farms, Perdue Incorporated, Holly Farms Poultry Industries, Inc., and Chesapeake Foods are some industries that contribute greatly toward providing employment and income to basin residents.

Population for the basin is expected to increase at a moderate rate during the next decade. Projections by the Department of State Planning and county comprehensive plans indicate that population is expected to increase from 38,800 (1975) to 45,300 by 1990. These figures include the expanded area used in the *Pocomoke River Basin—Water Quality Management Plan*. A land area of 430,200 acres was used which includes other populated areas such as Crisfield, Princess Anne, and additional rural population.

Because of its unique scenery, vegetation, and wildlife, the Pocomoke River has been designated as a Scenic River by the State of Maryland. It is also on the U.S. Department of Interior's list of rivers having potential for inclusion in the National Wild and Scenic Rivers System. The wetlands along the river have one of the most northern stands of bald cypress. Some white cedar trees are also found. The mixed habitat of croplands, forests, swamps, and streams supports a fairly wide variety of wildlife.

## Problems and Concerns

The overall concern in this study area is the lack of maintenance on the river and its tributaries and the effect this will have on the future use of the total resource system. There are three principal concerns associated with the multiple use of the river system that were addressed in this study. They are: (1) soil wetness and flooding, (2) erosion, and (3) sediment.

Inadequate drainage, excess floodwater and the lack of application and maintenance of land treatment measures is causing the

resource system to deteriorate. Sediment bars, windfalls in the channel and the existing spoil piles along both sides of the river reduce the hydraulic storage capacity of the river and floodplains. A pile of fallen trees and other debris has formed a natural dam or weir in the Pocomoke River below the end of the portion of the channel which was excavated by a project in the early 1940 decade. This creates a backwater condition upstream causing water levels to average 2.0–3.0 feet higher than normal thus impeding draining resulting in periodic flooding to agricultural land uses. The cropland area affected by the backwater condition on the mainstem is about 20,500 acres.

The cropland area affected by poor drainage conditions in the Rehobeth watershed is about 1,100 acres. Relief to these acres and the other 36,100 acres, basinwide, requires 449 miles of outlet ditches and 3,455,300 linear feet of on-farm ditches.

Erosion and the resulting sedimentation in farm ditches and outlet channels is contributing to the existing maintenance problem and could potentially create water quality and fish habitat problems by reducing the volume of water available for fish habitat and reducing available dissolved oxygen.

*Soil loss in the basin is estimated to be 402,600 tons per year. Erosion varies greatly between land uses. They range from 0.01 tons per acres per year on forest land to 19.4 tons per acre per year on critical areas (D&E slopes, gullies, borrow pits, etc.). Wet cropland without erosion control treatment is eroding at a rate of 4.69 tons per acre per year while wet cropland with erosion control treatment accounts for 2.56 tons per acre per year. It is also estimated that 20,100 tons of sediment reaches the mouth of the Pocomoke River during normal conditions yearly.*

## Management Opportunities

Several opportunities exist throughout the basin to improve or enhance economic and environmental resources. This study addresses (1) forest resources, (2) recreation, (3) water quality, (4) biological resources and ecosystems, (5) areas of natural beauty, and (6) cultural resources.

The overall quality of the timber grown in the basin has been declining for years due to poor management and inferior logging practices. These conditions have left the timber stands poorly stocked or stocked with trees of low economic value. If forestry production is to increase, management practices such as stand improvement,

establishment and reinforcement tree planting and others must be implemented. There is an opportunity to improve softwood timber production with 13,035 acres of establishment and reinforcement tree planting, and 143,500 acres of timber stand improvement.

Recreation opportunities can be improved by providing trails, boat launching facilities, and multiple use areas. The development of these facilities should be compatible with the wild and scenic characteristics of the river. Appendix B and Alternative 5 (Chapter IV) give a description of these and other facilities.

An increasing competition among people for existing wildlife resources, a declining wildlife resource base, and a limited access to these resources are causing future availability to appear bleak. Unwise human encroachment on habitat is lending to its destruction and only its prevention will give a chance to the improvement of wildlife resources.

Fishery resources for the basin should sustain no significant change in the near future under the present ongoing maintenance and drainage problems. Relative volumetric and physical relationships will be retained even though sediment is deposited in the streams. However, in the long run, as areas such as the 14.4 miles of channelized Pocomoke main aggrade in sediments or become inundated due to decreased outlet efficiency, the fishery will change in species composition and reduce in biomass. There is an opportunity to enhance fishery resources in the long run through improved channel maintenance and reduced sedimentation.

Present legislation or policy and an awareness will aid in the protection of wetlands, oxbows and threatened and endangered species.

The need to recognize, protect and preserve cultural resources is very evident, but the local public's awareness and ability to finance the protection of these resources will largely determine whether they are protected or not. Federal agencies are legally bound not to actively participate in the destruction of an archaeological or cultural site without a proper evaluation of the potential loss.

The scenic integrity of the river should be maintained while at the same time serving another purpose of the river and that is the conveyance of water. Therefore, it becomes essential that multiple management objectives be established to insure that both economic and environmental concerns are met.

## Selected Plan

The selected plan suggests those measures that will contribute to both economic development and environmental quality. Specifically, it focuses on improving drainage conditions for the upper part of the basin. However, structural improvements are suggested for one of the lower watersheds (Rehobeth Branch). Plan elements to improve, protect, and enhance fish and wildlife, water quality, scenic values, and other environmental concerns are included for the entire basin.

A brief summary of planned measures are listed below:

- (1) Channel bank modification on 14.4 miles along the upper Pocomoke main.
- (2) Channel modification on 9.0 miles in the Rehobeth Watershed.
- (3) An estimated 117,400 linear feet of associated on-farm ditches.
- (4) Land treatment measures to reduce erosion and resulting sedimentation and maintain water quality.
- (5) Plant 978 acres of critical eroding areas to permanent cover.
- (6) Install 15 miles of hiking and nature trails, a 1-mile canoe trail, and two boat launch ramps.
- (7) Improve wildlife habitat on 2,695 acres and 11 miles of roadside areas.
- (8) Provide 14.4 acre feet of fish habitat in new sediment traps outlet channels.
- (9) Provide 441 acres of ponds for improved fish habitat.
- (10) Improve standards and education to reduce bank erosion and sediment deliveries from on-farm and district drainage ditches.

Total installation cost to implement the structural measures in the selected plan is estimated to be \$2,536,300. The estimated average annual cost of implementing the economic development elements is \$67,100 with economic benefits estimated to be approximately \$87,300. The total costs and benefits of land treatment and environmental quality elements were not evaluated. Table E-1 displays average annual costs and benefits for economic development.

**Table E-1—Benefits and Costs of Selected Plan**

	(Dollars)
<b>Average Annual Benefits</b>	
Net value of increased production	\$87,300
<b>Average Annual Costs</b>	
On-farm ditches	\$ 9,200
Structural measures	57,900
Total	\$67,100
<b>NET BENEFITS</b>	<b>\$20,200</b>

**Table E-2—Effects of Selected Plan—1990 Pocomoke River Basin**

Area of Concern	Unit	Future Without Plan	Selected Plan	Selected Plan Effects
<b>I. Soil wetness and flooding</b>				
A. Excessive flooding and soil wetness on crop pasture land	Acres	32,800	31,700	(-) 1,100
B. Improved drainage efficiency on 13,400 acres	Percent	(76)	(98)	(+) (22)
C. Net income <sup>1</sup> from improved drainage and efficiency	Avg. Ann. (dollars)	1,474,500	1,494,700	(+) 20,200
<b>II. Erosion</b>				
A. Gross erosion from cropland	Tons/Yr.	376,000	308,800	(-) 67,200
B. Gross erosion from critical areas	Tons/Yr.	22,100	700	(-) 21,400
C. Critical areas (changed to permanent cover)	Acres	106	1,084	(+) 978
D. Total Gross Erosion	Tons/Yr.	402,600	309,500	(-) 93,100
<b>III. Sediment</b>				
A. Total sediment discharge from Basin	Tons/Yr.	20,100	15,500	(-) 4,500
B. Sediment deposition in Basin <sup>2</sup>	Tons/Yr.	382,500	294,000	(-) 88,600
<b>IV. Biological resources and ecosystems</b>				
A. Enhance and protect wetlands	Acres	16,740	20,900	(+) 4,160
B. Retain and rejuvenate water regimes (oxbows)	Miles	0	11.4	(+) 11.4
<b>V. Wildlife habitat disturbance</b>				
A. Permanent	Acres	0	74.1	(+) 74.1
B. Temporary	Acres	0	95.5	(+) 95.5

<sup>1</sup> See Economic Impact Table IV-3.

<sup>2</sup> Based on 5 percent delivery ratio.

(continued)

## Plan Effects

The early action plan will have an immediate effect on improving cropland drainage for the upper watersheds above the debris dam and the Rehobeth Branch Watershed.

Other major effects include the improvement of fish and wild-life habitat, and a reduction in erosion rates and resulting sedimentation.

Table E-2 compares the future without plan conditions to the selected plan.

## Opportunities for Implementation

A willingness to implement the selected plan by 1990 has been expressed by the local sponsors.

USDA programs such as Public Law 83-566, and the Resource Conservation and Development Program can provide both technical and financial assistance for installing the suggested drainage improvements, critical erosion and recreation facilities. Public Law 74-46 can provide technical and financial assistance for the installation of certain conservation measures. There may also be an opportunity to obtain assistance from the National Park Service recreation program. Other measures in the selected plan can be installed through various federal, state, and local programs. All of these require a

**Table E-2---Effects of Selected Plan--1990 Pocomoke River Basin (continued)**

Area of Concern	Unit	Future Without Plan	Selected Plan	Selected Plan Effects
<b>VI. Fish habitat disturbance</b>				
A. Temporary	Acres	0	9.0	(+) 9.0
<b>VII. Wildlife habitat improvement</b>				
A. Permanent cover	Acres	106	1,084	(+) 978
B. Hedgerow planting	Acres	128	538	(+) 410
C. Roadside Shrubs	Miles	0	11	(+) 11
D. Ditchbank herbaceous (filter strips)	Acres	404	1,583	(+) 1,179
<b>VIII. Fish habitat improvement</b>				
A. Sediment traps and channel outlet	Acres/Feet	0	23.4	(+) 14.4
B. Fish pond management	Acres	124	565	(+) 441
C. Aquatic vegetation establishment in on-farm ditches and outlet channels	Acres	43	87	(+) 44
<b>IX. Areas of natural beauty</b>				
A. Protect scenic river	Miles	0	49	(+) 49
B. Recognize and protect unique botanical areas				
Atlantic white cedar areas	Number	1	2	(+) 1
Pitcher plant bogs	Number	0	1	(+) 1
Wetland depressions (Types 7 & 8)	Number	0	125	(+) 125
<b>X. Cultural resources</b>				
A. Recognize selected cultural sites of archaeological, historical and geological importance.				-----AS IDENTIFIED-----

local legal sponsoring agency which is willing and able to provide local funds and administer the construction, operation, and maintenance of the proposed project measures.

Several plan elements listed in Table IV-1 and IV-1A can be installed under various existing programs if funding is available. Local sponsors should make an effort through legislative or political maneuvers to obtain such funding.

### **Other Alternatives**

The selected plan elements were taken primarily from the NED Plan, EQ Plan and Management Plan. It was selected mainly for its immediate impact on improving drainage and its long-term impact on improving the river's total resources. Chapter IV summarizes all alternatives.

### **Conclusions**

Extensive field studies indicate that there are resource problems in the basin and the potential for these problems to compound is imminent. Present on-going programs for conservation of soil and water resources cannot maintain and conserve the resource base of land and water at the current rate of installation. Drainage systems will continue to deteriorate if erosion and resulting sedimentation is allowed to continue. These conditions will impact fish and wildlife habitat, water quality, recreation, scenic values, and the economic base, both agricultural and forest.

This plan will provide local decision makers the input needed to plan for the future of the basin and its resources.

# **Chapter I**

## **Problems and Concerns**

The problems and concerns expressed by the sponsors of this study are based on recommendations outlined in an Ad-Hoc Committee Report<sup>1</sup> prepared in 1968. Their overall concern is that inadequate maintenance of the river will allow further deterioration of the water resource management system, thus reducing the capacity and use of the river and its tributaries. Principal concerns included: (1) soil wetness and flooding, (2) erosion, and (3) sediment. Although not treated as a problem, another important consideration in any contemplated action is the fact that the Pocomoke River, because of its unique, natural and scenic qualities was designated under the State's Scenic and Wild Rivers system in 1971. Any planned activities should be compatible with that legislation and with the scenic river management plan developed concurrently by the Department of Natural Resources.

Table I-1 displays the effect of on-going programs for the principal concerns considered during this study. Chapter II will display the selected plan and its effect on the above concerns. Chapter III discusses implementation opportunities, and Chapter IV will display the effects of all alternative plans.

### **Soil Wetness and Flooding**

Drainage and floodwater damages in an area such as the Pocomoke are inseparable. For this study the emphasis has been on agricultural drainage and its two major components, outlets and on-farm systems.

Field studies indicate that most outlet ditches (major tributaries flowing into the Pocomoke) are in fair to good condition. However, on-farm systems in some watersheds and especially in the upper portions of the basin need some maintenance (see Table I-1). Drainage is impaired on 37,200 of the total 95,700 acres of cropland. The absence of mowing, cleanout, and in some cases the reluctance of some landowners to install on-farm drainage is very evident in the upper part of the basin. Table I-1 indicates the on-going programs will only provide drainage improvement on 4,400 acres by

<sup>1</sup> Pocomoke River, A Preliminary Study and Recommendations for Conservation, Development, Drainage and Other Management Problems, August 1968.

**Table I-1—Summary of Problems and Concerns (Present Conditions and Projected Future Under Present Trends)  
Pocomoke River Basin**

Concern	Units	Quantity	
		Present	1990
<b>I. Soil wetness and flooding</b>			
A. Excessive flooding and soil wetness on crop and pastureland	Ac.	37,200	32,800
B. Decreased drainage efficiency above the debris dam on cropland and pastureland due to deteriorating outlet of the Pocomoke main stem	Ac. (%)	11,200 (82)	13,400 (76)
<b>II. Erosion</b>			
A. Eroding Cropland and pastureland	Ac.	99,900	99,900
Average rate per ac.	Tons/Ac/Yr	3.77	3.77
Total erosion	Tons/Yr	376,800	376,800
B. Erosion on other critical areas	Ac.	1,100	1,100
Average rate per ac.	Tons/Ac/Yr	20.1	20.1
Total erosion	Tons/Yr	22,100	22,100
<b>III. Sediment</b>			
A. Total gross erosion <sup>1</sup>	Tons/Yr	402,600	402,600
B. Total discharge from Basin <sup>2</sup>	Tons/yr	20,100	20,100
C. Deposition within Basin	Tons/Yr	382,500	382,500

<sup>1</sup> Includes 3,700 tons per year from forest land and urban, rural-residential, and commercial.

<sup>2</sup> Based on 5 percent delivery ratio from total gross erosion.



*Inadequate on-farm ditches impede drainage on 37,000 acres of cropland.*



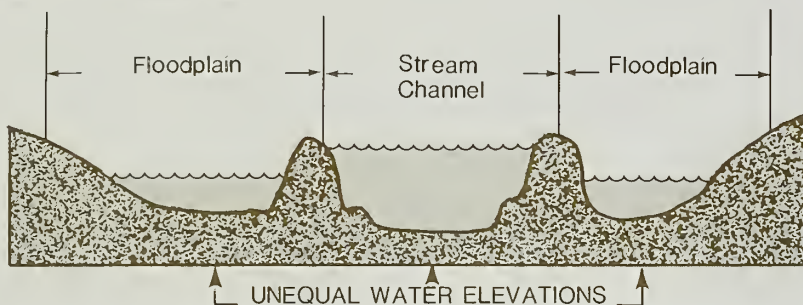
*Windfalls clog the Pocomoke main creating temporary debris dams, thus causing a rise in normal water that restricts drainage for upland tributaries.*

1990 (37,200–32,800). The lack of maintenance and construction may be partly related to the impaired outlet conditions.

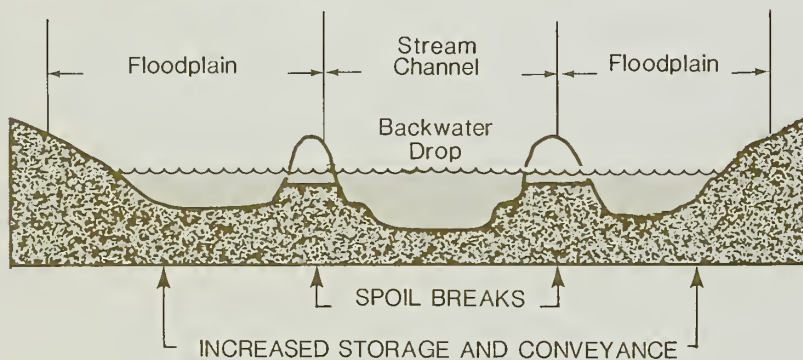
The upper Pocomoke River main stem is rapidly becoming more of a serious problem for upstream watersheds. The upper main stem was last modified between 1939 and 1947. Due to inadequate maintenance, a debris dam was created approximately 1 mile downstream of the excavated channel below Whiton's Crossing. This dam rose from a base elevation of 2.4 feet between 1942 to 9.0 feet in 1979. This 7.4 foot rise is critical to agricultural drainage for the upper watersheds. This debris dam projects a backwater condition upstream which averages 2.0–3.0 feet higher than normal water levels when the channel was constructed in the 1940s. This condition coupled with sediment bars and windfalls within the stream (extensively between Purnell's Crossing and Route 50) and the existing spoil piles along both sides of the river restricts the hydraulic storage capacity of the river and its floodplain. The backwater from this constriction aggravates the periodic flooding to agricultural land uses. Exhibit 1 indicates how these conditions affect water elevations in floodplains and on the Pocomoke main. The potential effect of opening spoil breaks on water elevation during a major storm period is illustrated by the lower graphic in Exhibit 1. There are times during local small storms and dry periods when water levels in the floodplain are higher than flow levels in the stream channel. The bottom of the proposed spoil breaks will be kept high enough to maintain the existing wetland conditions in the floodplains.

## Exhibit I—Pocomoke Main Stem Flooding Conditions

### EXISTING CONDITION



### EFFECT WITH SPOIL BREAK



Presently, decreased drainage efficiency<sup>1</sup> is occurring on 11,200 acres of cropland and pastureland above the debris dam due to deteriorating outlet conditions on the Pocomoke main stem. The current average level of outlet efficiency is estimated to be 82 percent for the five completed PL-566 projects above the debris dam.

<sup>1</sup> Drainage efficiency is defined as the ratio of the discharge of water from a drainage area under present or assumed future conditions to the expected discharge under designed conditions (expressed in percent).

As displayed in Table I-1 these acres are expected to increase to 13,400 acres by 1990 with further decreases in efficiency. Table I-2 displays the current outlet efficiency for the five watersheds, their projected future with on-going maintenance and the impact from different levels of improvement. There are other acres above the debris dam with a drainage efficiency problem; however, because of the lack of control data no acreage estimation nor efficiency percentages were evaluated.

The overall long-term effect if the present conditions continue to deteriorate will be reduced crop yields, high production costs and less efficient farming operations.



*Flooded fields reduce crop yields as well as operating efficiency.*



**Table I-2—Drainage Outlet Efficiency for Completed Watersheds Above Debris Dam Pocomoke River Basin**

Description	Green Run	Aydelotte	Franklin	Timmons-town	Nine-pin
	(percent*)				
(A) Current level of efficiency sustained	87	86	74	68	80
(B) Future without maintenance beyond current efforts (1990)	84	80	69	63	75
(C) Selective snagging	89	88	76	70	80
(D) Debris dam modification	87	86	74	68	82
(E) Breaks in spoil banks	99	97	96	84	97
(F) Spoil breaks and selective snagging at Purnell to Route 50	100	100	100	88	98
(G) Spoil breaks, clearing and snagging included sediment bar removal	100	100	100	96	98
(H) Channel widening in designated localities	100	100	100	96	98
(I) Option F with weir removal	100	100	100	91	100
(J) Redredge	100	100	100	100	100
(K) Option F, less lower oxbows	100	100	100	88	89
(L) Option K with debris dam modification	100	100	100	91	93

\*Measured by design elevation and present discharge.

**Table I-3—Erosion, Future Without Plan Condition Pocomoke River Basin, Present**

Source	Acres Eroding	Annual Soil Loss (Tons)	Rate Tons/Ac./Yr.
<b>Sheet and Rill</b>			
Urban-rural-residential-commercial			
Residential	12,300	1,700	0.14
Critical areas (roads, gullies, borrow pits, etc.)	1,100	22,100	20.1
Idle Land	4,200	800	0.18
Forest land	195,000	2,000	0.01
<b>Cropland and Pasture</b>			
Wet without erosion control treatment	37,200	174,500	4.69
Wet with erosion control treatment	32,100	82,200	2.56
Dry	24,775	54,000	2.18
Critical areas (D and E slopes)	1,625	31,500	19.4
<b>Wind</b>			
Cropland	16,900	33,800	2.0
<b>Total</b>	<b>—</b>	<b>402,600</b>	<b>—</b>

## Erosion

Wind and water erosion is a problem for cropland areas throughout the basin. There are 16,900 acres subject to high wind erodibility and 1,625 acres of cropland on steep slopes subject to severe rill and sheet erosion. These acres account for 33,800 and 31,500 tons of soil loss per year, respectively (see Table I-3).

Sheet and rill erosion is severest on cropland and represents the highest sediment source in the basin. There are 37,200 acres of wet cropland without erosion control treatment representing soil loss of 174,500 tons per year. Wet soils with erosion control treatment averages 2.56 tons per acre per year or 82,200 tons per year of soil loss on 32,100 acres. Dry soils are eroding at a rate of 2.18 tons per acre per year on 24,775 acres, accounting for 54,000 tons per year.

Throughout the basin several other types of critical areas exist in the form of gullies, borrow pits, and road areas. These 1,100 acres are eroding at a rate of 19.4 tons per acre per year, representing 22,100 tons of soil loss per year.

Pastureland and forest land only account for a small amount of gross erosion. As indicated in Table I-3 only 2,800 tons per year can be attributed to those acres. See Table I-3 for complete details of present soil losses from erosion.

There are 37,200 acres of cropland in the basin that exceed the long-term tolerance level, but the seriousness of this soil loss does not pose an immediate hazard to soil productivity.



Wind erosion results in sand-burned crops, filled ditches, and loss of nutrients.



*Improperly graded or seeded roadside ditch results in a severe erosion and sediment problem.*

## **Sediment**

Erosion of cropland does not pose an immediate hazard to soil productivity but it is causing sediment deposits to build-up in drainage laterals and stream channels. Presently, based on recent SCS sediment surveys, the delivery ratio approaches 5 percent of total gross erosion. This means that only 0.083 tons per acre per year or 20,100 tons per year of eroded soil reaches the mouth of the Pocomoke River. Most of the remaining sediment is deposited along field borders, in drainage ditches, and in the Pocomoke River or its tributaries.

If this situation continues without significant change, the capacity of the Pocomoke main and its principal tributaries will eventually be reduced to the swamp-like conditions prior to the 1940 construction. This will impede flow, thus, reducing the recreational potential, limit fish migration, and cause on-farm drainage efficiencies to decrease.

Another source of sediment in the basin is channel erosion that occurs primarily during construction. Construction channels become fairly stable 1-3 years after construction. Total sediment from this source was not quantified in this study.

## **Management Opportunities**

There are several management opportunities throughout the basin which are related to the problems and concerns addressed in this study that will contribute to national economic development and environmental quality. This Chapter identifies some of these opportunities in narrative form only, and Chapters II and IV display plan elements for some of those categories. Categories identified include: (1) forest resources, (2) recreation, (3) water quality, (4) biological resources and ecosystems, (5) areas of natural beauty, and (6) cultural resources. Plan elements are included for forest resources, recreation, biological resources and ecosystems.



*Total forest management will increase timber production.*

## **Forest Resources**

According to periodic resurveys made by the USDA Forest Service in cooperation with Maryland and Delaware, the overall quality of the timber grown in the forests of the basin has been declining for years. This quality decline is caused by poor management and inferior logging practices which have left the timber stands poorly stocked or stocked with trees of low economic value.

In the Pocomoke River Basin, as well as the rest of the Delmarva Peninsula, loblolly pine is receiving the most attention from a management standpoint. This is primarily due to its fast growth rate as well as usefulness for sawtimber, poles, piling, and pulpwood. From the late 1940s thru the mid 1960s more pine was being cut than was being grown. When this trend became known in the mid 1960s, corrective actions were initiated by forest industries, private landowners, and the Maryland Forest Service. As a result of these actions, overcutting was stopped, and growth began to exceed removals. By 1979, volume had increased by about 17 percent over the 1964 volume.

From the standpoint of timber production, many areas are too "wet" to produce the most marketable products. In the Pocomoke Basin, this means primarily pines. Many areas are so wet that establishment, growth, and harvest of pines are either prohibited or restricted to the point that it is not possible to reap an economic benefit. Nevertheless total production demands are projected to be met through the year 2000. This condition is not restricted to pines, however, it is just as difficult in many cases to reestablish stands of desirable hardwoods either through planting efforts or natural regeneration. Cypress, a species associated with wet soils, has historically demonstrated strong marketability and as such holds promise for sites restrictive to pine and hardwoods.

Adequate markets could provide the emphasis needed to better manage the hardwoods. The establishment of "pallet mills" to utilize some of the smaller diameter hardwood trees has improved the market situation.

If forestry production is to increase, past trends in application of forest management practices must be changed. Presently, there is an opportunity to improve forest yields through 13,035 acres of establishment and reinforcement tree planting, and 143,500 acres of timber stand improvement and other practices.

## Recreation

As population and leisure time increases so does the demand for more recreational activities. The basin is experiencing an increased demand for recreation from a local standpoint as well as from nearby population centers. Data compiled by Milburn and Shad Landing State Park indicates that gasoline shortages and prices definitely caused a drop in out-of-state camping during the 1979 season. The higher cost of traveling and the reduced competition for space has probably encouraged more Marylanders to use recreation facilities within the state.

The Pocomoke has great potential for developing recreation that is compatible with its wild and scenic characteristics. The main concern is that careful planning be initiated to insure that a balance between recreation users and available resources are maintained. There is an opportunity to provide cleaner, safer, and more dispersed recreation access along the Pocomoke River by providing launching ramps for small boats and canoes, multiple use areas, hunting, hiking trails, nature trails and associated parking areas. A detailed summary of existing and proposed recreation features is displayed in Appendix B.



*Under proper management drainage channel maintenance roads can be utilized as trails.*

## Water Quality

Water quality concerns in the Pocomoke River Basin can be attributed to both point and/or non-point sources of pollution. The most widespread concerns are bacterial contamination, low dissolved oxygen, sediments, and excess plant nutrients. Water quality data shows pH levels lower than present freshwater stream standards throughout most of the basin. However, this is considered to be a natural phenomenon, due to the large marshy areas in the basin and not the result of a man-induced pollution source. The *208 Water Quality Management Plan* for the Pocomoke River Basin details water quality conditions, summarizes the known sources of pollution (point and non-point) and sets forth a program of controls for state and local government to follow.

The 208 Study identified several land uses and activities that should be evaluated for their contribution to basin waters. They are:

- (1) Failing septic systems
- (2) Agricultural erosion
- (3) Agricultural animal wastes
- (4) Sediment from construction sites
- (5) Silvicultural land clearing
- (6) Storm runoff
- (7) Marsh/swamp areas
- (8) Solid waste disposal

These concerns will be addressed through existing programs at the state and local level as indicated in the 208 Plan Section IV-D.

High numerical bacteria counts, sediments, and nutrient enrichment are the three concerns in the Water Quality Plan which are most directly connected to non-point source pollution. However, there are no estimates of the amount that comes from non-point sources. Studies conducted around Maryland indicated that non-point source investigations are complex, expensive, and because of so many variables require several years to complete.

Sediment resulting from farming, drainage, and other management practices is the concern of local sponsors. There is no doubt that proposed agricultural programs can reduce sedimentation, but the need for an organized systematic approach is evident, not only as related to ditch construction and channel modification but also for associated measures such as cover crops, buffer strips, waterways and sediment traps.

Animal waste treatment facilities are being installed at an increasing rate. To date there are no apparent problems associated with this type waste treatment. Poultry waste as in the past will continue to be incorporated into the soil for cropping benefits. Hog waste lagoons are perhaps the most commonly applied treatment systems with approximately 15 units installed since 1970. Only six other type treatment facilities were installed during this period (two dairy lagoons and four temporary hog holding pits).

With application of proper management practices and the on-going technical and financial assistance, animal waste should not be a serious problem. The enforcement of present legislation and the application of efficient buffer strips, lagoon systems, and exclusion fencing are presently the most cost effective tools in reducing animal waste pollution.

With the possible exception of erosion and sediment control, the ongoing programs for financial and technical assistance provide the needed opportunity to address these water quality concerns. Their effectiveness depends on voluntary actions by landowners.

## Biological Resources and Ecosystems

### *Wildlife Resources*

The existing supply of wildlife resources within the Basin is inadequate to meet the demand for consumptive and non-consumptive purposes. The demand placed on wildlife resources is expected to increase in future years. Reasons for the predicted increase in demand include: growth in regional population, increased demand from metropolitan areas, increases in demand as a result of greater environmental awareness, and a reduction of the available competitive resources.



*To meet the challenge of an increasing demand for wildlife resources care should be taken to utilize every resource opportunity available.*

At the same time that demand on wildlife resources is increasing, the supply of wildlife resources is decreasing. Decreases are a result of: conversion of forest land to residential, industrial and recreational areas, conversion of hardwood areas to pine, conversion of cropland and wetlands to more intensive land use and more intensive use of existing cropland (double-cropping), and more intensive harvesting of game species.

The end result of all of the above factors is a decrease in supply of wildlife resources coupled with an escalating demand for the use of the same resources. No definitive government program action to reverse this situation can be identified and projected to be implemented. The future appears to be bleak unless steps are taken to preserve our wildlife legacy. There are several things that landowners in the area can do to improve and protect wildlife habitat. Permanent herbaceous strips, wooded areas, and wet bottomlands can be maintained or established for wildlife. These practices can often be combined with erosion control practices, drainage systems, and windbreaks along farm borders or around farmsteads. The cost of these practices can sometimes be offset by using fruit, nut, berry, or timber producing plant species.

#### ***Fishery Resources***

The basin-wide fishery should sustain no significant change in the near future under the present ongoing maintenance and drainage program. However, sedimentation and aggradation of sediment in streams will occur. In the long run the modified 14.4 miles of Pocomoke main if allowed to degrade will impact future fishery resources as physical characteristics of the drainage system change. As areas aggrade in sediments or become inundated due to decreased outlet efficiency the fishery will change in species composition and biomass. If fish passage becomes impeded the present use of the tributaries by spring migration of bass, gar, perch and others can be sharply reduced and possibly eliminated. There is an opportunity to prolong the quality of the fishery as a result of proposed channel maintenance and watershed erosion and sediment control practices.

#### ***Wetlands***

Wetlands like most of the basin's other natural resources are affected by drainage practices. If present trends are allowed to continue, the lack of drainage and limited or no maintenance on existing systems will eventually increase wetland acreages. Some wetland types are predicted to convert into Type 7 wooded swamps, or Type 3 (inland shallow fresh marshes). Others will become Type 8 (bogs), Type 2 (fresh meadows) and eventually seasonally flooded wooded basins or flats (Type 1). See Appendix B for a detailed discussion of wetlands. Openings in existing spoil piles offer an opportunity to increase the wetness of some of the bottomland wooded floodplains along the mainstem of the Pocomoke River.

Present wetland policy and studies such as this one will certainly aid in the prevention of needless destruction of wetlands, but the need for protection of wetland acres will always exist.



*Wetlands management and protection is needed on 20,900 acres basin-wide.*

### Oxbows

The oxbows will continue to function relative to water level and duration changes. The oxbows in the upper river watershed will remain relatively constant with little change in the drainage patterns anticipated. The vegetative communities will change relative to woodland management and harvest practices. The species associated with these upper dry oxbows will shift from cypress, blackgum, ash and maple to a species associated more typically dominated by sweet gum and maples. The lower oxbows, especially on the west side of the river, will see increased inundation and a greater area of affected vegetative communities as the outlet degrades and drainage efficiency decreases. The result of this decreased efficiency will cause additional flooding and stress on vegetative communities resulting in a loss of all trees except cypress or those trees which have elevations that place them above the stress limits.

The lower section of the oxbow will complete its successional change to a shrub, herbaceous open water community.

Water quality in the oxbow area will remain about constant with no significant change in dissolved solids or gasses projected. Low oxygen content and high organics will be typical.

### Threatened and Endangered Species

There are several known endangered animal species in the basin area. Although protected by law, their survival will be dependent on the availability of necessary habitat and its management.

According to state records the Southern bald eagle (*Haliaeetus leucocephalus*), the Delmarva fox squirrel (*Sciurus niger cinereus*), the Eastern narrow mouthed toad (*Gastrophryne carolinensis*), the peregrine falcon (*Falco peregrinus*), and the Eastern tiger salamander (*Ambystoma tigrinum*) are known inhabitants. The carpenter frog, redheaded woodpecker, Pileated woodpecker, osprey, Swanson's warbler, and the Eastern bluebird due to special interest, are being protected in the basin. More information on these and other species can be found in *Appendix B* of this report.

The future existence for those species will depend on management programs that will identify production areas and provide for species reestablishment in areas conducive to habitat viability.

Rare plants or unique vegetative communities do exist in the basin and nondisclosure is perhaps the most effective means of protection. Rare and threatened or endangered species believed to be



Management programs to protect endangered species such as the bald eagle should be enacted.

located in the Pocomoke drainage area are: seaside alder (*Alnus maritima*), dwarf trillium (*Trillium pusillum* var. *virginianum*), *Micranthemum micranthemoides*—a hemianthus, crossvine (*Anisostichus capreolata*), pale green orchis (*Habenaria flava*) and pitcher plant (*Sarracenia purpurea*).

## Areas of Natural Beauty

### *Scenic River*

The Pocomoke River by state designation is a scenic river. It is also on the U.S. Department of Interior's final list of rivers having potential for inclusion in the National Wild and Scenic Rivers System. Therefore, it is essential that management objectives be established to insure that the scenic integrity of the river is maintained. However, the river is also critical in removing storm runoff from existing cropland and planning efforts should be made to accommodate both concerns.

The expected future condition of the river under ongoing programs will not fulfill any of the management needs of the river. Continuation of present trends will mean a continuing deterioration of the river system. The stream above the debris dam will gradually become choked with sediment and debris and become inaccessible. Affected cropland will become less and less productive and fish habitat will gradually change. The problems outlined in this chapter are all associated with the environmental and economic values of the river and only with proper planning can we insure that the proper balance between these values be achieved.

Maryland's Department of Natural Resources has developed a scenic river plan for the Pocomoke River concurrently with this study. The coordinated effort between agencies insured that potential conflicts between the two plans were resolved. The implementation of the scenic river plan in Appendix B by state, local agencies, and local landowners would help to maintain the natural beauty of the area, maintain the fishery, provide improved recreational experiences, and still allow the maintenance required for adequate drainage of agricultural lands upstream.

### **Unique Botanical Areas**

There are several unique botanical areas located within the basin. Atlantic white cedar is sparsely dispersed through the watershed and two distinct areas of significant uniqueness are documented. A pitcher plant bog area and 124 wetland depression areas (Types 7 and 8—bogs) were mapped during a detailed wetland survey conducted under this study. The wetlands along the river support some of the most northern stands of bald cypress trees. The need to preserve these areas now and in the future becomes more important as competition between land uses increases. Presently, the Nature Conservancy's Maryland Chapter is in the process of acquiring 3,500 acres for a nature sanctuary along Nassawango Creek.

Other areas have been identified in the basin under state wildland classifications and other state lands. See Appendix B for more details.

## Cultural Resources

Cultural resources within the basin and surrounding areas are as plentiful as early history suggests. The preservation of these areas whether they be historical, archaeological or geological will depend on the local community's awareness and ability to finance the protection of the findings. Historical societies seem very active in the protection of historical sites. If cultural resources are discovered during the planning or implementation of planned improvements, the State Archaeologist and Historic Preservation Officer will be notified in accordance with SCS procedures for the protection of archaeological and historic properties (Federal Register—7 CFR Part 656).



*Known unique botanical areas should be protected and guidelines developed to manage future discoveries.*

# Chapter II Selected Plan

## Introduction

Prior to the public meeting on May 21, 1981, the Pocomoke Coordinating Committee, the Pocomoke River Advisory Committee (PRAC), the Fish and Wildlife Work Group, the Pocomoke Scenic River Advisory Board, and Maryland's Department of Natural Resources (DNR) met on several occasions to discuss alternatives for the Pocomoke River Basin. Those meetings were as follows:

\*Pocomoke Scenic River Advisory Board met monthly.

\*Fish and Wildlife Work Group field trip on January 15, 1981.

\*Fish and Wildlife Group meeting on January 26, 1981.

Pocomoke River Advisory Committee meeting on March 5, 1981.

Pocomoke River Advisory Committee meeting on March 13, 1981.

\*Met with representatives of DNR and PRAC on March 18, 1981.

FAC/Coordinating Committee meeting on March 26, 1981.

During the public meeting on May 21, 1981, six (6) alternative plans including a suggested plan were presented. The basic difference between the plans involved proposed plan elements that emphasized varying degrees of drainage improvement and management of the constructed portion of the river. The proposed management of other resources was almost identical in all alternatives.

Summary documents were distributed at this meeting displaying each alternative plan and its effects (beneficial and adverse). Comments and recommendations were discussed during the meeting and written comments were requested for inclusion in the first review draft.

Attendance at the meeting included federal, state, and local planners, farmers, public drainage association managers, representatives from environmental groups, politicians, and other interested citizens. Total number of participants was 35.

\*Representatives from Worcester Environmental Trust were in attendance.

The suggested plan was well received by the group. With the exception of minor changes the suggested plan presented at the public meeting is the same as the Selected Plan in this report.

Recognizing that the sponsors' overall concern was one of management and that the river is designated scenic, it became obvious that plan elements selected should be compatible with those purposes.

It was apparent from field studies that drainage is a problem in the basin. It was also stressed that the problem was localized and measures other than all-out dredging would be effective for improving the overall drainage efficiency in the upper watersheds above the debris dam (see Table I-2). Drainage problems in watersheds below the debris dam are just as serious, but several key factors prohibit their inclusion in the selected plan except for the Rehobeth Branch Watershed. Those factors are as follows:

- (1) Unfavorable benefit/cost ratios
- (2) Lack of interest
- (3) Known adverse environmental impacts.

There are 14 subwatersheds in the basin, six of which have utilized PL-566 funds for drainage. Only two of the remaining eight watersheds have favorable benefit/cost ratios for watershed drainage projects: Rehobeth and Middle Pocomoke. Several watersheds have isolated areas that would justify under smaller group jobs. The Middle Pocomoke and Rehobeth Watersheds are the only drainage projects included in the selected plan.

Even though the entire Pocomoke River in Maryland is designated scenic, it still serves as a major water outlet for the tributaries within the basin. In order to maintain the existing agriculture base, it is necessary that the flow capacity for high flows in this waterway be increased. This plan proposes structural measures that will maintain excellent drainage efficiency with minor adverse effects on the environment.

In Maryland this plan focuses on the 14.4 miles of channel from the debris dam below Whiton's Crossing to the Delaware line and the Rehobeth Branch for structural type improvements (Exhibit 2). Non-structural plan elements affecting the entire basin are developed for erosion, sedimentation, recreation, biological resources and ecosystems, and forest resources.



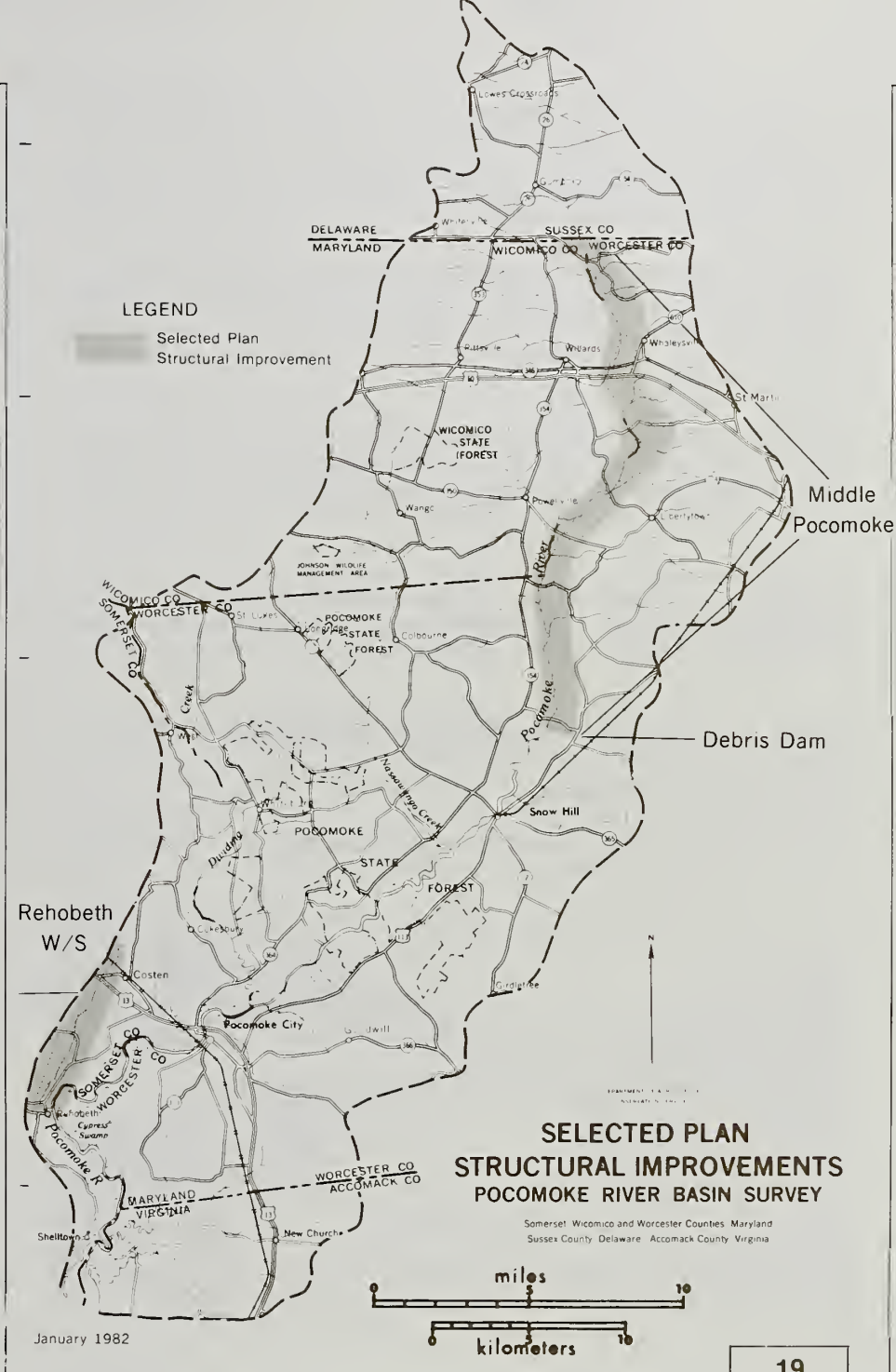


*On-farm ditch managed for drainage, erosion, and wildlife habitat.*

This proposed selected plan combines features that will contribute to both the national economic development (NED) and the environmental quality (EQ) objectives. It is concerned with the basin problems from a broad viewpoint. Solutions to drainage problems do not have to be at the expense of environmental quality nor should such solutions be ignored when adverse environmental effects are insignificant. This plan takes into account the future of the river resources and recognizes that existing conditions will not be healthy for the environment if definite management measures are not instigated. It suggests measures that will improve most of the problems outlined in the study and emphasizes those preventive measures necessary for maintaining the total resource base. Table II-1 displays the elements of this plan as compared to applications expected under future without plan conditions. The numbers shown are estimated numbers or amounts of practices installed.

Specifically, from a structural standpoint the plan suggests the following:

A series of spoil break excavations along the 14.4 miles of channelized main and 9.0 miles of channel modification in the Rehobeth Branch Watershed for drainage improvement on 14,500 acres. See Exhibits 1 and 4 for diagrams showing the concepts of proposed spoil breaks.



Associated on-farm drainage is estimated to be 117,400 linear feet.

The management alternative in Chapter IV gives a more detailed description of the measures.

The sediment deposited in various streams throughout the basin resulting from erosion will negate the effect of any structural improvements if it continues to go unchecked. Several key conservation measures are included in Table II-1 that will reduce the effects of wind, sheet, and rill erosion.

In order to maintain or improve the environment and to protect structural improvements, a number of management or enhancement measures are suggested. The environmental quality alternative in Chapter IV describes these measures.

This plan also identifies recreation areas and facilities that can be developed to meet some of the existing recreational needs associated with the river. The recreation alternative in Chapter IV describes those facilities and probable locations for installation.

## **Plan Elements Included in the Selected Plan**

### ***Soil wetness and flooding:***

- (1) Spoil break excavations along 14.4 miles of the previously excavated channel of the Pocomoke River.
- (2) Modification on 9 miles of outlet channels along ephemeral streams in the Rehobeth Branch Watershed.
- (3) Install 117,400 linear feet of associated on-farm drainage ditches.
- (4) Provide land leveling for 4,700 cropland acres.

### ***Erosion and sediment:***

- (1) Establish cover crop and crop residue use on 46,700 acres of cropland for erosion control.
- (2) Shift 900 acres of cropland to pastureland for erosion control.

- (3) Install 114 control inlets.
- (4) Improve pastureland management on 4,759 acres.
- (5) Construct four farm ponds.
- (6) Treat 978 acres of road areas, gullies and borrow pits for erosion control and aesthetics.

### ***Increased recreation:***

- (1) Improve existing boat ramp at Whiton's Crossing and install new boat ramp at Porters' Crossing.
- (2) Establish 16 miles of trails.

### ***Biological resources and ecosystems:***

- (1) Provide 11 miles of roadside shrubs.
- (2) Improve and establish 538 acres of hedgerows for wildlife habitat.
- (3) Create 1,179 acres of ditchbank herbaceous habitat (buffer strips) with on-farm drainage.
- (4) Provide 14.4 acre feet of fish habitat through sediment traps and channel outlets.
- (5) Establish 44 acres of aquatic vegetation.
- (6) Manage 441 acres for fish pond habitat.
- (7) Clearing and replanting of 8.7 acres of woodland at spoil breaks.

**Table II-1—Selected Plan Elements and Comparison  
of Future without Plan—1990  
Pocomoke River Basin**

Plan Elements	Units	Future Without Plan	Selected Plan
<b>Soil wetness and flooding</b>			
Major outlet channels	Miles	0	9.0
Spoil breaks and vegetation management along the Pocomoke main stem	Miles	0	14.4
On-farm drainage and flood control systems on cropland and pastureland	Acres	36,500	37,600
	Thousand		
	Linear Ft.	3,409.5	3,526.9
Land leveling	Acres	0	4,700
<b>Erosion and sediment</b>			
Cover crop and crop residue use	Acres	15,700	46,700
Shift from cropland to pastureland	Acres	0	900
Control inlets	Number	27	114
Improved pastureland management	Acres	250	4,759
Ponds	Number	26	4
Road-areas—treatment	Acres	0	470
Gullies—treatment	Acres	77	111
Borrow pits—treatment	Acres	29	451
<b>Forest Resources</b>			
Reinforcement or conversion	Acres	2,460	0
Stand improvement	Acres	5,800	0
<b>Increased recreation</b>			
Boat launch ramps	Number	0	2
Hiking and nature trails	Miles	0	15
Multiple use areas	Number	0	1
Canoe trail	Miles	0	1
<b>Biological resources and ecosystems</b>			
<b>Wildlife resources</b>			
Roadside shrubs	Miles	0	11
Hedgerow establishment	Acres	90	464
Hedgerow improvement	Acres	38	74
Ditchbank herbaceous habitat	Acres	404	1,179
<b>Fishery resources</b>			
Aquatic vegetation establishment with on-farm and group channels	Acres	43	44
Sediment trap fish habitat	Ac. Ft.	7	10.4
Channel (fish in outlets)	Ac. Ft.	2	4
Fishpond management	Acres	124	441

## Plan Effects

The selected plan will have an effect on economic, environmental, and social values. Some of these effects will be displayed rather generally in tabular form and others in narrative form only. A description of major project impacts by category is presented below. Plan effects as compared to alternative plans are shown in Chapter IV (see Table IV-2). Effects of the plan compared to future conditions under present trends and regional transfer effects are displayed in the tables at the end of this chapter (accounts display).

### Soil Wetness and Flooding

Structural improvements will be limited in this plan. These improvements will benefit 1,100 acres in the Rehobeth Branch Watershed and improve drainage efficiencies for 13,400 acres in five completed PL-566 projects above the debris dam. Dry soils interspersed with wet soils will also benefit from the proposed improved erosion control practices.

More specifically, the implementation of planned structural measures and associated on-farm drainage measures will increase net farm income through increased yields. See Economic Impact Table IV-3.

Other positive effects include improved farm efficiency, reduced road and bridge damage, reduced operation and maintenance costs and some relief to rural homeowners with yards and poorly functioning septic systems. In the Rehobeth Watershed, seven homeowners will have the opportunity to install septic systems for the first time and plant gardens without the risk of prolonged high water after heavy rains.



*Well maintained outlet ditch enhanced wildlife habitat, scenic quality, and water quality.*

### **Erosion and Sedimentation**

Proposed erosion control measures will allow for erosion reduction of 93,100 tons per year. This reduction will be the result of installing conservation land treatment measures such as filter strips, cover crops and residue use, forest management, tree planting, and grazing control (see Tables IV-1 and IV-1-A). These measures will improve the hydrologic condition of the soil thus developing good soil tilth and desirable water infiltration rates which are effective in reducing runoff rates. They also reduce soil detachment by rainfall and wind.

Channel construction is expected to increase sediment loads during and immediately after construction.

The installation of sediment traps, control inlets, and filter strips will reduce sediment leaving the ditches by 90 percent, thus increasing the life of the drainage system and reducing the cost of maintenance.



*No-till management practices reduce erosion and cut production cost.*

### **Water Quality**

Channel modification in the Rehobeth Watershed will cause sediment and turbidity levels to increase significantly during construction. These levels are expected to decrease to values about equal to pre-project conditions in 1-3 years after construction.

Channel modification for the 14.4 miles along the Pocomoke main and associated land treatment measures should reduce the basin's outflow of sediment and increase nutrient exchange with the spoil breaks in place. The land treatment measures should provide better water quality as far as sediment as a pollutant is concerned, while the opening of the spoil breaks may induce a slightly greater oxygen demand due to increased organics.

### **Fish Habitat and Population**

No permanent water is presently associated with the proposed area of construction in the Rehobeth Branch Watershed. The only use of this drainage system by fish is a slight migration during wet periods. Channel modification will be accomplished in 9.0 miles of ephemeral and intermittent streams by the project. This will encourage landowners to install about 91.2 miles of on-farm ditch systems.

The proposed structural improvements in the Rehobeth Branch Watershed will include a water volume of about 2.0 acre feet in the outlet channel and 2.4 acre feet in the sediment traps. These areas will provide habitat for a resident fishery and a reservoir for fish that will use the remaining channel during wet periods.

The fishery in Rehobeth's receiving waters should incur no significant detriment. The construction and maintenance of sediment traps will reduce a sediment load usually associated with construction. Once the stream is vegetated, sediment load will be similar to previous conditions.

The proposed measures along the 14.4 miles of channel modification along the Pocomoke River will have negligible effects on existing or future fish resources. Daylighting from selective tree removal should diversify habitat by allowing aquatic vegetation development, thereby increasing the dissolved oxygen content of the water.

### Wildlife Habitat

The value of wildlife habitat in the Rehoboth Watershed in the proposed construction area has been limited by present land use patterns and management practices. The area to be impacted can generally be considered of low wildlife quality. The proposed project can benefit wildlife with an increase in edge and herbaceous growth. The project will also induce a temporary loss in habitat quality due to the removal of existing hedgerows. No significant land use pattern changes are anticipated due to the project implementation. Overall the project will temporarily reduce the wildlife habitat value, however, the area will return to at least an equivalent habitat quality and in many cases will actually enhance it.

Along the modified Pocomoke main, with the spoil breaks in place, there will be 8.7 acres of site disturbances which will take approximately 34 years to reestablish vegetation of the same type and age. However, existing conditions are being altered by successional change that will have a significant effect on habitat value. Projections show existing habitat conditions declining in approximately 10 years but stabilizing at 10 percent of today's assumed value due to the retention of the edge effect at the water land surface.

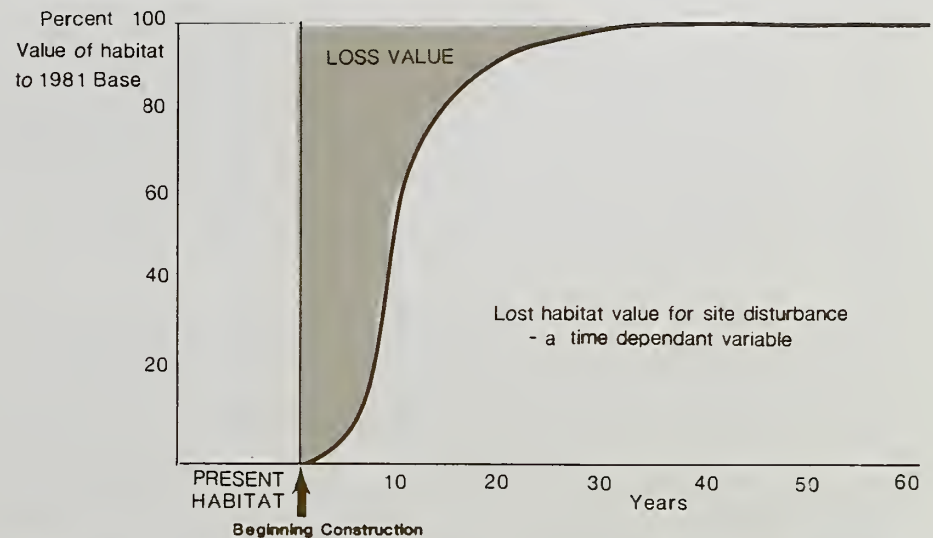
Selective removal of vegetation on existing sediment bars will account for 4.7 acres of habitat loss. The selected plan does not include a proposal to remove the sediment bars themselves.

Figure II demonstrates the total effect of structural improvements assuming that successional changes will have a declining effect on habitat for the 8.7 acres of spoil breaks.



*Improved wildlife habitat through conservation management practices will provide opportunities for hunting ducks and other wildlife.*

### Figure II—Habitat Loss and Recovery Due to Spoil Breaks Pocomoke River Basin

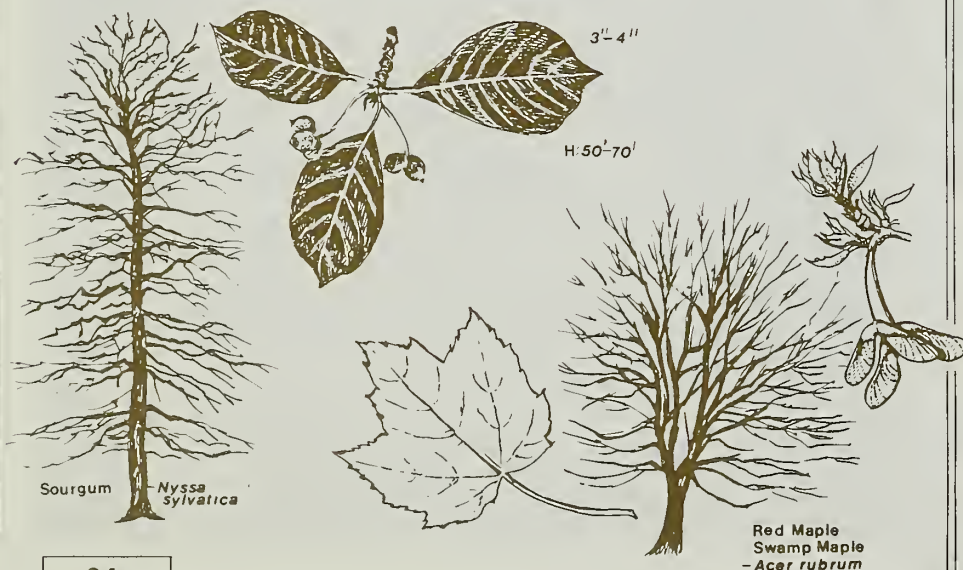


### Wetlands

The proposed 9.0 miles of channel construction in the Rehobeth Watershed outlets into a proposed sediment trap above the wooded swamp (Type 7) wetland. Increases in suspended solids and turbidity during construction will adversely impact the wetland in this area. The installation of conservation measures in the long run will reduce suspended solids and turbidity resulting in favorable impacts on the Type 7 wetland. No other wetlands will be affected.

Along the 14.4 miles of modified Pocomoke main there will be 4,160 acres of woody swamp and bottomland species affected by opening spoil breaks. These breaks will alter the rate and frequency of flooding but will be designed to retain similar duration as in effect today.

The floodplain was divided into compartments (sites) and evaluated using depth and duration of flooding for the 1-, 2-, and 5-year storm to determine the effect spoil breaks have on woodland species. Table II-2 displays depth and duration of flooding before and after structural changes. The data indicates that no appreciable change will occur to existing woodland species from structural improvements. More detail can be obtained from an unpublished report prepared by the Soil Conservation Service and USDA Forest Service titled "Effects of Flooding on Bottomland Hardwoods in the Pocomoke Basin."



**Table II-2—Depth and Duration of Floodplain Storage Before and After Spoil Breaks  
Floodplain Compartments (1-2-5 Year Storm Event) Pocomoke River Basin**

Comp. No.	1 Year Storm				2 Year Storm				5 Year Storm			
	Before		After		Before		After		Before		After	
	Depth (Ft.)	Dur. (Days)	Depth (Ft.)	Dur. (Days)	Depth (Ft.)	Dur. (Days)	Depth (Ft.)	Dur. (Days)	Depth (Ft.)	Dur. (Days)	Depth (Ft.)	Dur. (Days)
1-A	0.1	2	0.1	2	1.8	11	1.8	11	2.5	12	2.5	12
1-B	0.4	33	0.4	33	0.4	33	0.4	33	1.7	147	1.8	150
2-A	0.2	7	0.2	7	0.5	42	0.5	42	0.5	42	0.5	42
2-B	0	2	0	2	0	6	0	6	0	6	0	6
3	0.3	25	0.3	25	0.5	42	0.5	42	0.5	42	0.5	42
4	0.3	25	0.3	25	0.5	42	0.5	42	0.5	42	0.5	42
5	<.1	10	<.1	10	0	0	0	0	0	0	0	0
6	0	4	0	4	0	10	0	10	0	10	0	10
7	<.1	0	<.1	0	0	0	0	0	0	0	0	0
8 & 9	0.4	4	0.4	4	0.5	4	0.5	4	0.6	4	0.6	4
10	0	2	0	2	0	9	0	9	0	9	0	9
11	<.1	0	<.1	0	0	0	0	0	0	0	0	0
12	0	1	0	1	0	9	0	8	0	9	0	9
13	0.7	63	1.2	100	1.2	100	1.2	100	2.1	175	1.2	100
14	0	4	0	4	0	8	0	8	0	8	0	8
15 & 18	1.0	83	1.0	83	1.0	83	1.0	83	1.0	83	1.0	83
16	0.7	58	0.7	58	0.8	67	0.8	67	0.9	78	0.8	67
17	<.1	0	<.1	0	0	0	0	0	0	0	0	0
19 & 20	0.7	58	0.7	58	0.8	67	0.8	67	0.8	67	0.8	67
21	<.1	0	<.1	0	0	0	0	0	0	0	0	0
22	0	1	0	1	0	8	0	8	0	8	0	8
23	0	1	0	1	0	8	0	8	0	8	0	8
24	0	1	0	1	0	8	0	8	0	8	0	8
25	0	1	0	1	0	8	0	8	0	8	0	8
26	<.1	0	<.1	0	0	0	0	0	0	0	0	0
27	0.3	25	0.3	25	0.5	42	0.5	42	0.8	67	0.5	42
28	0.2	17	0.2	17	0.2	17	0.2	17	0.4	35	0.2	17
29	0	1	0	1	0	8	0	8	0	8	0	8
30	<.1	1	<.1	1	0	0	0	0	0	0	0	0
31	0.3	28	0.3	28	0.5	42	1.7	141	0.8	67	1.7	141
32	0	1	0	1	0	8	0	8	0	8	0	8
33	0	1	0	1	0	8	0	8	0	8	0	8
34	0.1	7	0.1	7	0.2	7	0.9	7	0.3	7	0.9	7
35	0	3	0	3	0	7	0	7	0	7	0	7



*Manage to maintain scenic values.*

### **Scenic River**

The Pocomoke River is designated scenic by the Maryland Department of Natural Resources. Their recommendations for maintaining the river's scenic resources are included in Appendix B of this report.

The Rehobeth Watershed structural improvements will have no effect on scenic river resources.

As indicated in *Appendix B* the modified portion of the Pocomoke main is considered modified scenic. Structural improvements will be limited in this area in accordance with recommendations outlined in Part II of Appendix B. Plan effects will be as mentioned earlier with only a short-term minor effect on existing scenic values. In the long run, the scenic value along the river banks should be enhanced by the uniform growth of trees and lack of debris and windfalls.

The river is also designated under the state's Critical Areas Program. This program identifies and highlights those areas whose future use or development is important to the citizens of the state. The Pocomoke designation is based primarily on its scenic values and unique wetlands. Plan effects will be the same as above.

### **Cultural Resources**

No attempt was made to address probable impacts on cultural resources. However, before any project measure can be installed, the requirements specified by legislation pertaining to the protection of cultural resources must be satisfied.

### **Relationship to Land Use Plans and Policies**

The Pocomoke River Basin lies within the recently completed Delmarva River Basins Survey (October 1978). Resource data developed in that study was used in the Pocomoke study to develop alternative plans and the effect such plans have on land use and development in the project area. The Selected Plan included in this report does not include any proposed elements that will conflict with the policy of planned land use within the project area.

Closer coordination with county planners and a review of their comprehensive plans have increased support from the counties and their desire to implement proposed plan elements.

### **Short-Term vs. Long-Term Use of Resources**

Drainage measures will have some temporary negative short-term environmental impacts during construction. Long-term effects will include positive environmental consequences such as better fish and wildlife management, reduced erosion and sedimentation, wetland enhancement, and improved water quality.

From an economic standpoint, both structural improvements and land treatment measures are essential in order to preserve the quality of the land resource base for use in meeting long-term needs. Short-term effects will show an immediate increase in crop production due to increased yields and more efficient farming operations due to improved drainage conditions.

The plan elements along the 14.4 miles of channelization will have a minimum adverse short-term effect on scenic appeal but the long-term scenic value will be enhanced by structural improvements and management of the vegetation along the river banks.



## Irreversible and Irretrievable Commitment of Resources

The proposed measures if implemented will cause some irreversible and irretrievable commitment of resources such as energy, capital, and labor for project installation; lost production from acreages taken out of production along channel rights-of-way; and 74.1 acres of habitat lost.

### Alternatives

There were six major alternatives evaluated. The Selected Plan was based primarily on the NED, EQ and management plans. Chapter IV addresses all alternatives and their specific plan elements.

## Accounts Display

In accordance with the *Principles and Standards for Water and Related Land Resources Planning* the Selected Plan has been developed into a system of accounts to display beneficial and adverse effects. The accounts display the distribution of national economic development, environmental quality, regional development, and other social effects to regions. These accounts reflect the level of planning, benefits realized, and the environmental sensitivity of the area within the scope and significance of the study. The following pages display the above mentioned accounts.

	Selected Plan	National Economic Development Account <sup>1</sup>	Pocomoke River Basin	
	Components Beneficial Effects:	Measure of Effects (Average Annual \$) <sup>2</sup>	Components Adverse Effects:	Measure of Effects (Average Annual \$)
	The value to users of increased outputs of goods and services.		The value of resources required for a plan.	
	Added value of agricultural production from land treatment systems and structural measures		Land Treatment	\$ 9,200
			Structural Measures <sup>3</sup>	\$57,900
	Total Beneficial Effects (Cropland Only)	\$87,300	Total Adverse Effects (Cropland Only)	\$67,100
	<b>Net Effect</b>	<b>\$20,200</b>		
	<sup>1</sup> WRC interest rate for fiscal year 1981 is 7-3/8 percent. <sup>2</sup> WRC 1980 normalized prices were used to calculate value of production. <sup>3</sup> Structural measures costs are those incurred for construction, installation services and maintenance. Installation services are estimated as 40 percent of construction cost; annual maintenance is estimated as 3 percent of construction.			

	Selected Plan	Environmental Quality Account	Pocomoke River Basin
	COMPONENTS	MEASURES OF EFFECTS	
	<b>BENEFICIAL AND ADVERSE EFFECTS</b>		
<b>A. Areas of natural beauty</b>	<ol style="list-style-type: none"> <li>1. Enhance and protect 49 miles of scenic river.</li> <li>2. Enhance and protect one known white cedar area.</li> <li>3. Enhance and protect one known pitcher plant bog area.</li> <li>4. Enhance and protect 125 wetland depressions (Types 7 and 8).</li> <li>5. Improve visual resource qualities by converting 978 critical eroding areas to per-</li> </ol>	<p>manent cover.</p> <ol style="list-style-type: none"> <li>6. Approximately 14.4 miles of stream altered by clearing and snagging.</li> <li>7. Approximately 9.0 miles of intermittent streams altered by excavation.</li> <li>8. Channel construction will replace 14.1 acres of existing hedgerows with expanded stream channel and grass.</li> <li>9. Temporary loss of vegetation on 8.7 acres of spoil banks.</li> </ol>	
<b>B. Quality considerations of water, land and air resources</b>	<ol style="list-style-type: none"> <li>1. Increase noise and air pollution on site during construction.</li> <li>2. Increase in streams' base flow after construction.</li> <li>3. Temporary increase in stream sedimentation during and immediately after construction.</li> <li>4. Induce a greater oxygen demand due to increased organics.</li> <li>5. Water temperature will have a slight in-</li> </ol>	<ol style="list-style-type: none"> <li>crease during construction.</li> <li>6. Conservation measures will reduce nutrient and pesticide.</li> <li>7. Reduce annual gross erosion by 86,500 tons per acre per year on cropland, pastureland, and forest land by 1990.</li> <li>8. Reduce turbidity and sediment in the basin streams in the long-run.</li> <li>9. Shift 978 acres of marginal cropland to pastureland.</li> </ol>	
<b>C. Biological resources and selected ecosystems</b>	<ol style="list-style-type: none"> <li>1. Disturbs 9.0 miles of ephemeral and intermittent streams.</li> <li>2. Replaces 14.1 acres of existing hedgerow with expanded stream channel and grass.</li> <li>3. Install 14.4 acre feet of sediment traps and channel outlets for fish habitat.</li> <li>4. Provide fish pond management on 441 acres.</li> <li>5. Improve wildlife habitat on 2,695 acres.</li> <li>6. Temporary disturbance of 95.5 acres of wildlife habitat.</li> </ol>	<ol style="list-style-type: none"> <li>7. Permanent loss of 74.1 acres of wildlife habitat.</li> <li>8. Enhance and protect 20,900 acres of wetlands.</li> <li>9. Retain and rejuvenate 11.4 acres of old oxbow areas.</li> <li>10. Provide 11 miles of roadside shrubs for wildlife habitat.</li> <li>11. Temporary loss of vegetation on 8.7 acres of spoil bank.</li> </ol>	
<b>D. Irreversible or irretrievable commitments</b>	<ol style="list-style-type: none"> <li>1. Lost production for acres taken out of production along rights-of-way.</li> <li>2. Permanent loss of 74.1 acres of wildlife habitat.</li> </ol>	<ol style="list-style-type: none"> <li>3. An unqualified amount of energy, capital and labor will be committed during project installation.</li> </ol>	

	Selected Plan		Regional Development Account <sup>1</sup>		Pocomoke River Basin		
	Components	Measure of Effects		Components	Measure of Effects		
	Income:	Pocomoke	Rest of Nation	Income:	Pocomoke	Rest of Nation	
	Beneficial Effects:			Adverse Effects:			
		(Average Annual \$) <sup>2</sup>			(Average Annual \$)		
	The value of increased out-put to users residing in the region.			The value of resources contributed from within the region to achieve the out-put.			
	Added value of agricultural production from land treatment systems and structural measures.	\$87,300	—	Land Treatment	\$ 9,200	—	
				Structural Measures <sup>3</sup>			
				Installation	\$11,300	\$33,900	
				Maintenance	12,700	—	
	Total Beneficial Effects	\$87,300	—	Total Adverse Effects	\$33,200	\$33,900	
				<b>Net Effects</b>	<b>\$54,100</b>	<b>— \$33,900</b>	
	<sup>1</sup> WRC interest rate for fiscal year 1981 is 7-3/8 percent. <sup>2</sup> WRC 1980 normalized prices were used to calculate value of production. <sup>3</sup> Structural measures costs are those incurred for construction, installation services and maintenance. Installation services are estimated as 40 percent of construction cost; annual maintenance is estimated as 3 percent of construction.						
							September 1981

	Selected Plan		Regional Development Account		Pocomoke River Basin		
	Components	Measure of Effects		Components	Measure of Effects		
	Employment	Pocomoke	Rest of Nation	Employment	Pocomoke	Rest of Nation	
	Beneficial Effects:			Adverse Effects:			
	Population Distribution			Population Distribution			
	Beneficial Effects:	No Effect	No Effect	Adverse Effects:	No Effect	No Effect	
	Regional Economic Base and Stability			Regional Economic Base and Stability			
	Beneficial Effects:	Increased income to region by \$54,100 per year.	No Effect	Adverse Effects:	No Effect	No Effect	
							September 1981

Selected Plan	Regional Development Account		Pocomoke River Basin	
Components	Measure of Effects		Measure of Effects	
Employment	Pocomoke	Rest of Nation	Pocomoke	Rest of Nation
Beneficial Effects:			Adverse Effects:	
Increase in number and type of jobs.			None	None
1. Employment for project construction	Create 3 skilled and 9 semi-skilled jobs for two years.	---		
	Create 6 skilled jobs for 1 year.	---		
2. Employment for Structural O&M	Create 1 skilled and 2 semi-skilled permanent full time jobs.	---		
Total Beneficial Effects:	Create 3 skilled and 9 semi-skilled jobs for 2 years, create 6 skilled jobs for 1 year, create 1 skilled and 2 semi-skilled permanent full time jobs.	---	None	None
			Total Adverse Effects:	
			Net Beneficial Effects:	Create 3 skilled and 9 semi-skilled jobs for 2 years, create 6 skilled jobs for 1 year, create 1 skilled and 2 semi-skilled permanent full time jobs.
			September 1981	



# Chapter III Implementation

There are several existing programs administered by a number of federal, state, and local agencies that provide technical and financial assistance for the development of water and related land resources. This chapter identifies agencies and their programs for implementing most of the elements outlined in the selected plan.

## USDA Programs

### **Soil Conservation Service (SCS)**

Public Law 74-46, through the Soil Conservation Service can provide technical assistance for planning and installing land treatment measures for individuals and groups. An acceleration of technical assistance plus financial assistance can be provided under the Small Watershed Program (Public Law 83-566) and the Resource Conservation and Development Program (RC&D).

Public Law 83-566, the Small Watershed Program, and RC&D both have provisions for providing technical and financial assistance for the implementation of flood prevention, drainage, recreation, critical erosion and sediment reduction, and fish and wildlife measures. Implementation through these programs requires a willing, able, and legal local sponsoring agency to initiate a project, provide for the local share of costs, provide land rights, assist in administering the construction, and accomplish the long-term maintenance of the project.

### **Agricultural Stabilization and Conservation Service (ASCS)**

The Agricultural Conservation Program (ACP), administered by ASCS can provide cost sharing for carrying out soil, water, woodland, and wildlife conservation measures. Also among the major objectives of ACP is the prevention and abatement of agricultural-related pollution of water. Measures eligible for cost sharing are determined by each county based on the approved national list of measures.

The Forestry Incentives Program (FIP), Public Law 91-524, can provide cost-sharing assistance to owners of woodlands, for planting trees and/or improving stands of forest trees to assure a future supply of timber products.

### **Farmers Home Administration (FmHA)**

The Farmers Home Administration can make loans to assist local sponsors in implementing measures for a variety of reasons. Drainage, land and water development, pasture improvement, recreation, pollution control and pollution abatement, are only a few eligible measures.

### **Forest Service**

Programs administered by the USDA Forest Service provide a means to intensify and improve forest management and increase production through reforestation, tree planting, and timber stand improvement. The Cooperative Forestry Assistance Program, Public Law 95-313 provides financial, technical and other assistance in the following six areas:

1. Rural forestry assistance
2. Forestry incentives
3. Insect and disease control
4. Urban forestry assistance
5. Rural fire prevention control
6. Management assistance, planning assistance, and technology.

These programs are carried out through and in cooperation with state foresters or equivalent state officials.



*Advisory Committee in session.*

## Programs Other Than USDA

There are several state and federal agencies that provide both technical and financial assistance for elements listed under the selected plan. These agencies are also responsible for policy and establishing guidelines for implementing differing programs.

### ***Maryland Department of Natural Resources and Delaware Department of Natural Resources and Environmental Control***

These state agencies have several programs that encourage and regulate proper management of wetlands, enhancement of fish and wildlife habitat, protection of endangered species, protection and preservation of unique natural areas, and cultural resources.

### ***Maryland Department of Agriculture***

Maryland Agricultural Article 25, Section 52-95 allows county governments to create Public Drainage Associations (PDAs) to allow benefited landowners to divide cost proportionally for drainage projects. Agricultural Article 8, Section 601-602 allows the Maryland Secretary of Agriculture, as appropriated in the annual state budget, to provide up to 50 percent of the costs of maintaining drainage outlet systems constructed by PDAs.



*View of Nassawango Creek.*

### ***U.S. Department of Interior***

The U.S. Fish and Wildlife Service has authority for fish and wildlife restoration, technical assistance and grant programs under the Fish and Wildlife Coordination Act, Public Law 85-624 as amended; Fish and Wildlife Act of 1956; Sport Fish Restoration Act of 1950; Wildlife Restoration Act of 1937; and the Endangered Species Act of 1973, Public Law 93-205.

The U.S. Department of Interior can provide both technical and financial assistance through various land acquisition and management programs for preserving unique natural areas. Provisions for providing state and local governments cost-sharing assistance, for developing or improving recreation facilities is also available.

The National Park Service can provide both technical and financial assistance to states in the form of cost-sharing as well as grants for developing or improving recreation facilities. Assistance can be for both state and locally owned developments.

### ***Nature Conservancy's Maryland Chapter***

This organization has directed their efforts toward the preservation of natural diversity by protecting lands containing the best examples of all components of our natural world. They are presently in the process of acquiring 3,500 acres in the Nassawango Creek Watershed for that purpose.

### ***FEMA***

The Federal Emergency Management Administration is responsible for guiding the federally supported flood insurance program. One goal of this program is to prevent unwarranted increases of flood damages in urban areas. An approach to this goal is taken by encouraging local governments to restrict housing and other developments in floodplains.

### ***Cooperative Extension Service***

The extension agents in the area can provide assistance and education relating to agricultural practices. Some of these agricultural practices can be implemented by landowners to offset the costs of installing farm drainage and erosion control systems.

# Chapter IV Alternative Plans

## Introduction

In accordance with the Water Resources Council's Principles and Standards (P&S), emphasis during the planning process was directed toward improvement in the quality of life through contributions of the objectives of national economic development (NED) and environmental quality (EQ).

Elements of the NED objective in this study that will enhance national economic development by increasing the value of the nation's output of goods and services and improving national economic efficiency, are associated directly with drainage and flood control. To enhance the quality of the environment, elements associated with cultural resources, biological resources and ecosystems, areas of natural beauty, and erosion and sedimentation were addressed.

## Formulation of Alternative Plans

In order to address the concerns identified in this study, six alternatives were evaluated using 1990 as the basis for the early action plan. Economic impacts were evaluated only for areas that had potential for drainage or where drainage efficiency could be restored. The future without plan is included as one of the alternatives and used as a baseline to compare the effectiveness of each of the other alternatives.

Each plan represents a different combination of plan elements except for the NED and the recreation alternatives. Land treatment at various degrees was included in four of the six alternatives. The management alternative contains measures that contribute to all of the objectives outlined in the study. A non-structural alternative was developed to show what impact such measures would have on meeting basin concerns with the least adverse effects. Environmental quality was the other alternative. A summary of each alternative plan elements are displayed in Tables IV-1 and IV-1A and plan effects are displayed in Table IV-2. Tables are displayed at the end of this chapter.

## Alternative 1—Future Without Plan

This alternative describes the ongoing programs with more emphasis on land treatment than structural improvements. No acceleration of land treatment is expected to occur by the year 2000, but certain land treatment measures are expected to be installed as a result of sound economics. Based on past trends, on-farm drainage systems will show only a slight improvement without improved drainage outlets.

Table I-2 shows the effect the debris dam (option D) has on improving drainage efficiency. As the table indicates, only a minor increase in efficiency can be attributed to the Ninepin watershed due to modifications of the debris dam. This increase is because Ninepin is located immediately upstream from the debris dam. Continuing maintenance will allow the debris dam to remain stable with drainage efficiency remaining approximately the same.

Total land use is expected to remain relatively stable although some shifts will take place among land uses at specific sites. Total production levels on cropland will probably increase due to an increase in double cropping and improved technology. Deterioration of existing drainage systems is expected to continue and will have an adverse effect on crop production as total efficiency decreases.

Past trends indicate present forestry management practices will supply forestry needs by the year 2000. Management practices such as stand improvement, establishment and reinforcement tree planting, and others must be implemented to sustain production beyond the year 2000.

The fishery should sustain no significant change in the near future given the ongoing maintenance and drainage programs. However, in the long run the 14.4 mile Pocomoke main if allowed to degrade will adversely impact species composition and biomass. As areas aggrade in sediment and fish passage is impeded, the present use of the tributaries by spring migrations of bass, gar, perch, and others could be sharply reduced and possibly eliminated.

Future wildlife habitat is dependent on the concern and knowledge of the land managers of today. As land uses shift and competition between uses increase, the need to preserve and improve wildlife habitat becomes a necessity. If present trends continue, wildlife habitat enhancement or establishment will remain as a low priority item until beneficial incentives and management techniques are instituted.

Flood damages in the Snow Hill and Pocomoke City areas, estimated to be \$35,300 annually, will continue to rise as costs for replacement continues to increase. However, it is assumed that the flood insurance program administered by the Federal Insurance Administration and land use planning by all levels of government will continue to design programs that will minimize non-agricultural floodwater damage.

Ongoing programs for wetland preservation, federal cost-sharing for waste treatment facilities, forestry incentive programs, wildlife enhancement programs and others will further increase the protection of the environment, economic and human resources, recreation resources, and cultural resources.

Traditional soil and water conservation and erosion control programs of the soil conservation districts, with the technical assistance provided by USDA are assumed to continue. These programs along with research from universities, colleges, private enterprise, and USDA experiment stations are expected to sustain the present agricultural production, but as the demand for food and fiber increase so must production.

Table I-1 displays the impact of present trends on future conditions assuming that present programs will continue to exist.

### **Alternative 2—NED (National Economic Development)**

The elements of the NED alternative are based primarily on economic development irrespective of their impact on environmental quality. Because of the relationship between the mainstem of the Pocomoke and its tributaries and their dependence on drainage, measures are included to improve the drainage efficiency of the total system. Major measures include outlet ditches and on-farm ditches. In addition channel modification by means of clearing of sediment bars and snagging, sediment traps, and opening spoil piles to utilize the existing floodplain would be of major importance. There are 14 subwatersheds in this basin, six of which have utilized PL-566 funds for drainage. Only two of the remaining eight watersheds, Rehobeth and the Middle Pocomoke, have estimated benefits exceeding costs for drainage and are included in this alternative.

This alternative consists of 23.4 miles of outlet ditches and 392,300 feet of associated on-farm ditches costing \$1,185,100. Improved drainage benefits will occur on 14,500 acres of cropland with a wetness limitation. Annual net benefits would be \$21,300. See Table IV-3 at the end of this chapter for economic impacts.

### **Alternative 3—EQ (Environmental Quality)**

This alternative deals with the total study area. It emphasizes those measures that will enhance the natural environment. Specifically, it will address sediment and erosion, critical erosion areas, land treatment, wildlife habitat, protection and enhancement of wetlands and other biological resources, animal waste, threatened and endangered species, the preservation and enhancement of natural areas and cultural resources. Most of the elements for this alternative will be displayed in Tables IV-1 and IV-1A. However, a number of management or enhancement suggestions will be expressed in narrative form only.

- I. Erosion and Sedimentation
  - A. Install sediment traps in all water courses that contribute to major sediment loading problems.
  - B. Cropland soils susceptible to wind and water erosion should have effective conservation measures such as cover crop, minimum or no-till, and residue management. In addition, a few areas of erodible soils should be reforested.
  - C. To avoid gully formations in fields, grass waterways, control inlets, critical area planting, and other measures should be installed to reduce erosion rates.
  - D. To reduce erosion include crops which provide winter cover in the crop rotation.
  - E. New drainage channels should be constructed with more stable side slopes to reduce slumping and erosion.
- II. Wildlife Habitat
  - A. Existing habitat can be enhanced and new habitat created by establishing woody buffer strips (hedgerows), windbreaks, selective landscape planting, and grass buffer





Bald Eagle



Carpenter Frog



Peregrine Falcon



Fox Squirrel

strips. These measures can be installed separately and together for various land uses to obtain a diverse vegetative community supporting a wide range of wildlife. In addition, reverse berms in wooded areas that had been swamps prior to channel modification will create habitats that are structurally similar to those before channel work.

### III. Threatened or Endangered Species

Although protected by law, threatened or endangered species should have action-oriented management programs enacted to prevent population decline through habitat protection and enhancement.

#### A. Bald Eagle

The Pocomoke management program for bald eagles will be limited to areas where present and future nesting occurs. The main goal is to incorporate management agreements with the landowners to assure land use status retention and management of the woodland to assure nest trees will be available.

#### B. Carpenter Frog

The carpenter frog is not on the endangered list but has been given special interest. The protection of the carpenter frog is basically a protection of habitat that can be achieved by protection of all wetlands as proposed. Upland depressions which pond water should be investigated

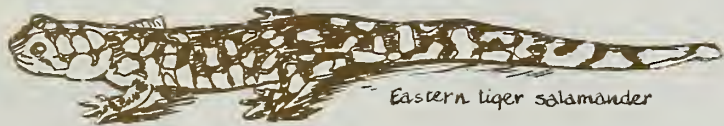
to determine presence of the carpenter frog. In areas where the frog is found, a management plan should be developed incorporating provisions to assure retention of the hydrologic properties conducive to habitat viability.

#### C. Fox Squirrel

The fox squirrel reestablishment program has grown from initial attempts in the area surrounding the Nassawango Country Club to two additional undisclosed sites this year. A local committee composed of qualified interested people including landholders, should form to identify habitat areas conducive to reestablishment. Management agreements should be developed with landowners outlining provisions for reintroduction attempts. Cooperation with the established recovery team should initiate the reintroduction. The results should be monitored to identify resources for successful or unsuccessful attempts.

#### D. Peregrine Falcon

The peregrine falcon's habitat management should have emphasis along the coast and should be the retention of every undeveloped acre. Present activities, including reintroduction through establishment of hacking stations, should be accelerated. Reestablishing a breeding population should include a continuation of the ban on pesticides such as DDT.

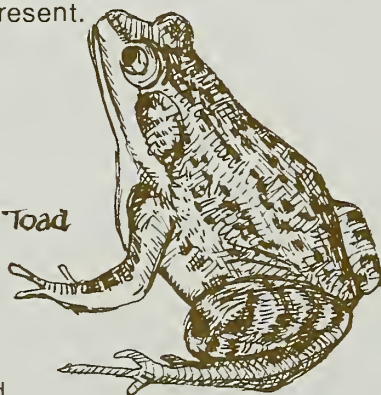


*Eastern tiger salamander*

E. Eastern Tiger Salamander

The Eastern tiger salamander is a species which needs further study to develop a total management program. The present knowledge suggests a limited management program which should protect the sites where they breed. Additional research needs to be accomplished to determine range and habitat requirements. Relocation of egg or larval stages to some of known pothole sites should be considered. Management of this species requires the omission of fish from the breeding hole and protective measures need to be taken to assure that fish are not stocked in these pothole areas. Yearly seine hauls should determine presence or absence of fish before return of the breeding salamanders in early spring and removal should be accomplished if fish are present.

*Narrow-mouthed Toad*



F. Eastern Narrowmouthed Toad

The narrowmouthed toad's management should be accomplished where they exist. Borders of swamps and small streams are areas where protective habitat management should occur. No destruction of swamp or small stream habitat should occur where the toads exist.

G. Habitats for all of these species were mapped and displayed in the Delmarva River Basin Survey main report.

IV. Areas of Natural Beauty

The Department of Natural Resources developed a scenic river plan for the Pocomoke River. Their objective was "to formulate and implement a program that will provide for the wise management of the resources on the land and the preservation of scenic, agricultural and wild qualities."

Unique botanical areas such as the Atlantic White Cedar, pitcher plant bog areas, and wetland depression areas (Type 7 and 8 bogs) were mapped during a detailed wetland survey conducted under this study. Although there is no planned action in these areas their protection is needed. Efforts such as those by Nature Conservancy's Maryland Chapter can be an effective means of insuring that these areas are protected once they are discovered.

V. Cultural Resources

Appendix B lists known cultural resources of concern in the basin. No planned structural activities will affect these resources. As suggested under the problem section, historical societies and man's awareness and ability to finance his findings will play an important role in the protection of these resources.

VI. Wetlands and Oxbows

Wetland Types 1-20 should be retained or enhanced for present and future environmental uses. Such wetland types should be identified and mapped to assure that competition with other uses be dealt with properly. Acquisition by fee simple title and easements should be one method of securing wetland types that are most critical and no practical or feasible means for mitigation is foreseeable. This plan suggests the protection of 20,900 acres of wetlands basin wide.

Woodland species associated with oxbow areas will be going through successional changes. This alternative plan will allow the upper dry oxbows to shift to or maintain more water tolerant species association like cypress, black gum, ash and maple. With no soil breaks in the lower oxbow area, there will be a successional change to a shrub, herbaceous open water community.

VII. Fishery Resources

This plan suggests that: aquatic vegetation be established in existing on-farm ditches and group channels, sediment traps be established, fish ponds become managed, and existing channel outlets be modified to provide habitat to enhance the fishery resources. Structural measurements in this area will certainly aid these measures because they will assure that present passage will not be impeded, allowing for spring migration of several species.

VIII. Retention and use of oxbows for recreational and educational uses should be encouraged.

IX. Forestry Resources

Although the overall quality of timber grown in the basin has been declining, improved management practices through the on-going programs will increase production.

Applicable woodland management should incorporate principles that benefit environmental values. Harvest operations should diversify by incorporating longer rotation, eliminating large clear-cuts, thinning, selective cutting, and species diversification. Drainage and sediment plans should be developed and followed to obtain erosion reduction and retention of drainage systems.

In-stream logging operations should be discontinued. Retention of seed trees and/or replanting should be accomplished on all acreage harvested. Woody edge should be retained to form a buffer strip along all perennial streams.

X. Critical Erosion Areas—should be treated according to needs:

A. Borrow pits should be managed to restrict erosion on site and collect any off-site sediment transport. Methods applied to accomplish this include grading and land shaping followed by revegetation to herbaceous or woody species, construction of the pit to levels forming a permanent pool of water, or spreading top soil and adding nutrients to form viable cropland and other land use possibilities.

B. Roadways should be managed to restrict their contribution to sediment loading. All roadways should have their shoulders protected from gully formation. Shoulders should be gravelled or grassed to prevent erosion. The

present practices of a fall or winter shoulder grading should be altered to spring thus allowing time for revegetation. The formation of large acreages of highly erodible exposed material should be prevented. Road drainage outlets should be constructed in a manner to prevent any associated drainage of wetlands. Drainage outlets should incorporate sediment traps, and where practical, should outlet on upland sites.

XI. Animal Waste Management and Treatment Facilities—should eliminate environmental degradation resulting from domestic animal generated point and non-point pollution. Any new farming operations should be required to incorporate adequate treatment facilities before obtaining operation status. As technology in animal waste treatment advances and provides new techniques it should be applied.

XII. Waterfowl use of cropland fields should be enhanced by incorporating design features into old and new ditch systems allowing water level control (temporary flooding) to be accomplished. This should have additional value by providing irrigation, water storage and creating a more efficient sediment trap when flooded. Organic soils will be protected from additional oxidation during flooding periods.

XIII. Cropland to urban land use changes should be discouraged. Certain areas of cropland should be replanted to herbaceous or forest species in order to prevent erosion, act as a buffer for streams and provide wildlife habitat. Cropland subjected to accelerated erosion should also be treated by conversion to pasture and hay or include more pasture or hay in the cropping rotation.

XIV. Retention of natural tree cavities and the creation of artificial home structures should improve the habitat for many species. Habitat planning activities should be applied basin wide to identify areas for selected species that can benefit from artificial home structures. A coordinated effort to distribute these structures plus instructions on where to place them should be available to private individuals or organizations requesting them. Efforts to educate the public on the value of retaining trees with natural cavities and how to create cavities should be accomplished.

XV. Wildlife observation sites such as those established for waterfowl should be constructed to establish public awareness for other species; education programs should be emphasized at the observation sites. Nature trails and other facilities should be constructed on suitable sites where public use seems probable.

XVI. Ponds should be constructed to develop waterfowl habitat, fish habitat and additional habitats used by numerous species. Each of these ponds should be managed for multiple purposes including fish, waterfowl and scenic. Ponds in pastures should be protected from livestock by exclusion fencing.

XVII. The suggested measures in this plan are displayed in Tables IV-1 and IV-1A; however, some are expressed in narrative form only.

The cost to implement this alternative will vary due to the degree that each measure is carried out. A conservative estimate would be \$1,616,700. Annual net benefits foregone by not including measures for improved drainage are \$21,300.



## Alternative 4—Management

This alternative focuses on the 14.4 miles of channel from below Whiton's Crossing to the Delaware line and the Rehobeth Branch for structural type improvements. Non-structural plan elements affecting the entire basin are developed for erosion, sedimentation, recreation, biological resources and ecosystems, and forest resources.

In order to improve the economic conditions in the basin and enhance environmental quality this alternative combined features that will satisfy parts of all study objectives. This alternative emphasizes those measures that will have an immediate effect on drainage and both immediate and long-term effect on the environment. It recognizes that the future of the river and its many resources is dependent on actions taken today. It evaluates drainage problems and makes suggestions for installation when adverse environment effects are insignificant. Tables IV-1 and IV-1A display a summary of plan elements. Structural improvements for drainage are the same as the NED alternative.

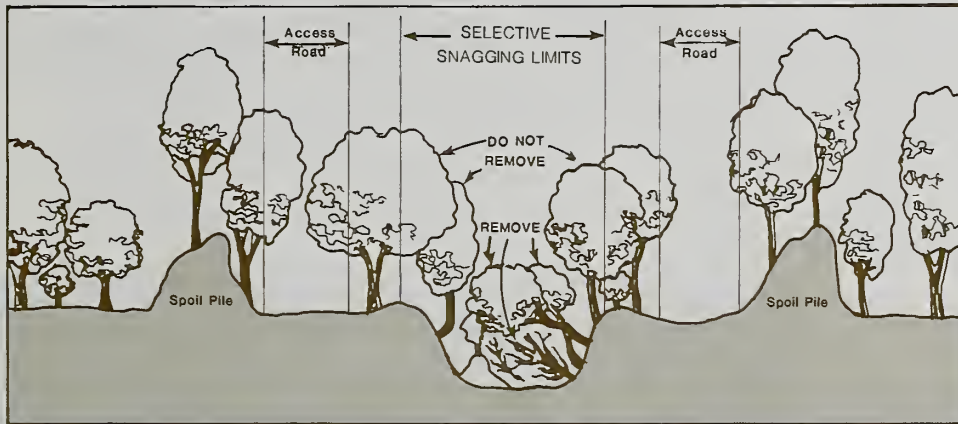
Specifically from a structural standpoint the plan suggests the following:

1. To improve drainage conditions for watersheds above the debris dam a combination of structural and non-structural measures are proposed. These measures include:
  - a. Selective Clearing and Snagging

“Selective Clearing and Snagging—Selective removal of obstructions from the channel and stream banks to increase its capacity to convey water” (Exhibit 3).

Removal operations are performed with hand-operated equipment, water-based equipment, or small equipment used in a manner that will minimize soil and water disturbances. This includes the removal of downed timber, trees likely to fall into the channel at an early date, and the accumulations of debris, sediment or obstructions that will adversely impact on the design flow requirements.” (Based on Channel Modification Guidelines developed between USDI and USDA in 1978).

### Exhibit 3—Selective Clearing and Snagging



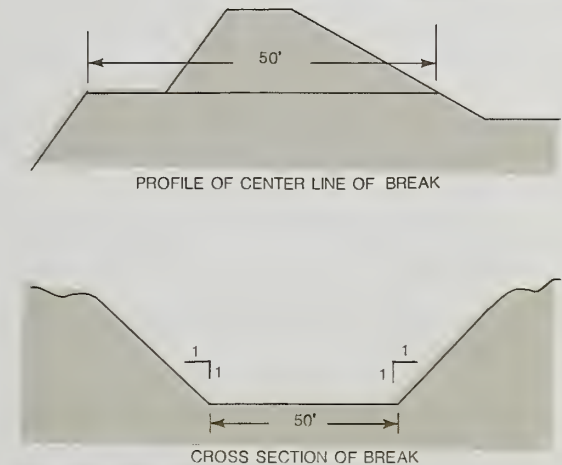
This measure will maintain the present drainage efficiency above the debris dam and will aid in stabilizing the dam elevation. Each additional measure or combination of measures will be evaluated using that established baseline.

#### b. Breaks in Spoil Banks

Selective removal of portions of spoil deposit from each side of the main channel averaging every 1,000 feet to fully utilize the now restricted floodplain. This removal assures unrestricted out-of-bank flow that will reduce the in-channel depths at peak discharge as well as alleviate stability problems in the channel. The work will include clearing for maintenance access and spoil breaks areas, spoil removal, spreading and seeding. Work will be done in a manner that causes the least amount of adverse effect using small equipment or manually.

Each spoil break shall include a 50-foot spillway with a 50-foot control section. The crest elevation should be located approximately 0-1 foot above the floodplain floor to maintain wetland conditions in the floodplains (see Exhibit 4). Final location of break sites should be made to minimize spoil removal amounts and to minimize adverse effects.

### Exhibit 4—Design Data for Spoil Breaks



#### c. Additional selective snagging between Purnell's Crossing and Route 50.

This work requires the selective removal of existing vegetation from sediment bars and the pruning of tree branches in the design flow area along this reach.

#### d. An estimated 26,200 feet of on-farm drainage will be installed along the Middle Pocomoke (to outlet to existing constructed channels).

#### 2. To improve drainage conditions in the Rehobeth Watershed, 9.0 miles of outlet channels and 91,200 feet of associated on-farm drainage ditches will be installed.

This alternative will also include all of the plan elements associated with the EQ and recreation alternative.

Table IV-2 indicates the effect this alternative along with the NED, EQ, non-structural, and recreation alternatives has on environmental quality.

The total cost to implement this alternative would be \$2,470,400. Annual net benefits are estimated to be \$20,200 (benefits to improved drainage).

## Alternative 5—Recreation

This alternative is based on needs expressed by the Ad-Hoc Committee Report of 1968 and those specified in the scenic river plan (Appendix B).

Recreation types and locations have been selected, however, size and cost data are preliminary and subject to changes by the local sponsors at the time of implementation. No cost is included for multiple use of recreation areas. The following is a descriptive narrative of potential recreation measures:

1. Improved parking and launching facilities at Whiton's Crossing.
2. Establishment of launching and parking facilities at Porter's Crossings.
3. Development of a multiple use area at Ninepin Branch.
4. Utilization of maintenance roads as hiking or nature trails along channelized section.
5. Utilization of the lower oxbow (below Whiton Road) as a canoe trail.

This alternative does not address basin-wide recreation. Early records from the State Park (Milburn and Shad Landing) indicate that increased gasoline prices reduced out-of-state attendance especially for camping. Maryland residents have increased their use of the park. Interestingly enough however, camping sites are almost never used to full capacity except for holidays and special events. Worcester County Planning and Zoning is in the process of doing a recreation need inventory. These recommendations can be used as a guide for potential sites and facilities.

Benefits for this alternative were not evaluated. To implement the measures in this alternative a minimum cost of \$85,000 was estimated (excludes multiple use area).

## Alternative 6—Non-structural

The non-structural alternative can satisfy most of the study objectives. However, the degree of drainage improvement would be significantly less than in the selected plan, with planned measures limited to those listed under selective clearing and snagging. With this exception the non-structural alternative is the same as Management Alternative four (4). Tables IV-1 and IV-1A display plan effectiveness and comparisons with other alternatives.

The total cost of this alternative is estimated to be \$1,968,300. Improved drainage benefits foregone are estimated to be \$21,300 annually.



*Maryland residents have increased their use of Pocomoke State Park.*

**Table IV-1—Summary of Alternative Plan Elements—Year 1990<sup>1</sup>**

Principal Area of Concern	Plan Element <sup>2</sup>	Units	Future Without Plan	NED	EQ	Management	Recreation	Non-Structural	Selected Plan
I. Soil wetness and flooding									
A. Excessive flooding and soil wetness on crop and pastureland	Major outlet channels	Miles	365.3	374.3	365.3	374.3	365.3	365.3	374.3
	On-farm drainage systems	Acres L.F. (1000)	36,500	37,600	36,500	37,600	36,500	36,500	37,600
			3,409.5	3,801.8	3,409.5	3,526.9	0	0	3,526.9
B. Decreased drainage efficiency above the debris dam	Modification to improve Pocomoke main	Miles	0	14.4	0	14.4	0	0	14.4
	• Spoil breaks (excavation and grading)	Cubic Yards	0	36,300	0	36,300	0	0	36,300
	• Spoil area clearing	Acres	0	8.7	0	8.7	0	0	8.7
	• Treatment of banks	Feet	0	7,100	0	7,100	0	0	0
	• Temporary culverts	Number	0	37	0	37	0	37	37
	• Clearing maintenance trail	Acres	0	69.4	0	69.4	0	69.4	69.4
	• Seeding and mulching cleared area	Acres	0	97.7	0	78.2	0	0	78.2
	• Selective thinning and pruning	Acres	0	69.8	0	69.8	0	69.8	69.8
	• Five year—return pruning (50 yr. life)	Acres	0	86.8	0	86.8	0	86.8	86.8
	• Sediment bar excavation	Cubic Yards	0	19,000	0	19,000	0	0	0
	• Clearing for construction	Acres	0	19.6	0	19.6	0	0	0
II. Erosion	Land Leveling	Acres	0	0	0	9,450	0	0	4,700
	Cover crop and crop residue use	Acres	39,400	39,400	86,100	86,100	0	86,100	86,100
	Shift from cropland to pastureland	Acres	0	0	1,767	1,767	0	1,767	900
	Control inlets	Number	27	27	141	141	0	141	141
	Pastureland								
	• Improved management	Acres	250	250	5,009	5,009	250	5,009	5,009
	• Ponds	Number	26	26	30	30	26	26	30
	Road acres—treatment	Acres	0	0	470	470	0	470	470
	Gullies—treatment	Acres	77	77	188	188	71	188	188
	Borrow pits—treatment	Acres	29	29	426	426	29	426	426

<sup>1</sup> Each plan shows what will be accomplished above the future without plan.

<sup>2</sup> Expressed as goals.

**Table IV-1A—Summary of Alternative Plan Elements—Year 1990<sup>1</sup>**

Management Opportunities	Plan Element <sup>2</sup>	Units	Future Without Plan	NED	EQ	Management	Recreation	Non-Structural	Selected Plan
Forest resource	Reinforcement or conversion	Acres	2,460	2,460	2,460	2,460	2,460	2,460	2,460
	Stand improvement	Acres	5,800	5,800	5,800	5,800	5,800	5,800	5,800
Increased recreation	Boat launch ramps	Number	0	0	0	2	2	0	2
	Hiking and nature trails	Miles	0	0	0	15	25	0	15
	Multiple use areas	Number	0	0	0	1	1	0	1
	Canoe trail	Miles	0	0	0	1	1	0	1
Biological resources and ecosystems	Wildlife resources								
	• Roadside shrubs	Miles	0	0	11	11	0	11	11
	• Hedgerow establishment	Acres	90	0	554	554	0	554	554
	• Hedgerow improvement	Acres	38	0	112	112	0	112	112
	• Ditchbank herbaceous habitat	Acres	404	0	1,583	1,583	0	1,583	1,583
Biological resources and ecosystems (continued)	Fishery resources								
	• Aquatic vegetation establishment with on-farm and group channels	Acres	43	0	87	87	0	87	87
	• Sediment trap fish habitat	Acres							
		Feet	7	9.4	15	17.4	0	17.4	17.4
	• Channel (outlet fish habitat)	Acres							
	Feet	2	4.0	4	6	0	6	6	
	• Fishpond management	Acres	124	0	565	565	0	565	565

<sup>1</sup> Each plan shows what will be accomplished above the future without plan.

<sup>2</sup> Expressed as goals.



*Canoeing on the Pocomoke near Shad Landing State Park.*



**Table IV-2—Summary of Alternative Plan Effects—1990**

**Pocomoke River Basin**

Area of Concern	Units	Future Without Plan	NED	EQ	Management	Recreation	Non-Structural	Selected Plan
<b>I. Soil wetness and flooding</b>								
A. Excessive flooding and soil wetness on crop and pastureland	Acres	32,800	31,700	32,800	31,700	32,800	32,800	31,700
B. Improved drainage efficiency	Acres (%)	13,400 (76)	13,400 (99)	13,400 (76)	13,400 (98)	13,400 (76)	13,400 (83)	13,400 (98)
C. Net income <sup>1</sup> from improved drainage and efficiency	Avg. Ann. (\$000)	2098.8	2108.1	2098.8	2118.8	2098.8	2081.6	2118.8
<b>II. Erosion</b>								
A. Gross erosion from cropland	Tons/Yr.	376,000	315,400	248,000	292,900	376,000	295,200	308,800
B. Gross erosion from critical areas	Tons/Yr.	20,000	20,000	700	700	20,000	700	700
C. Critical areas (changed to permanent cover)	Acres	106	0	1,084	1,084	0	1,084	1,084
<b>III. Sediment</b>								
A. Total gross erosion	Tons/Yr.	398,000	335,400	248,700	293,600	398,000	295,900	309,500
B. Total deposition <sup>2</sup>	Tons/Yr.	20,000	16,800	12,400	14,700	20,000	14,800	15,500
<b>IV. Biological resources and ecosystems</b>								
A. Enhance and protect wetlands	Acres	16,740	0	20,900	20,900	0	0	20,900
B. Retain and rejuvenate water regimes (oxbows)	Miles	0	0	11.4	11.4	0	0	11.4
<b>V. Wildlife habitat disturbance</b>								
A. Permanent	Acres	0	74.1	0	74.1	0	74.1	74.1
B. Temporary	Acres	0	115.1	0	95.5	0	95.5	95.5
<b>VI. Fish habitat disturbance</b>								
A. Temporary	Acres	0	13.7	0	9.0	0	0	9.0
<b>VII. Wildlife habitat improvement</b>								
A. Permanent cover	Acres	106	0	1,084	1,084	0	1,084	1,084
B. Hedgerow planting	Acres	128	0	538	538	0	538	538
C. Roadside Shrubs	Miles	0	0	11	11	0	11	11
D. Ditchbank herbaceous (filter strips)	Acres	404	0	1,583	1,583	0	1,583	1,583
<b>VIII. Fish habitat improvement</b>								
A. Sediment traps and channel outlet	Acres-Ft.	9	13.4	19	23.4	0	23.4	23.4
B. Fish pond management	Acres	124	0	565	565	0	565	565
C. Aquatic vegetation establishment in on-farm ditches and outlet channels	Acres	43	0	87	87	0	87	87
<b>IX. Areas of natural beauty</b>								
A. Protect scenic river	Miles	0	0	49	49	0	0	49
B. Recognize and protect unique botanical areas								
• Atlantic white cedar areas	Number	1	0	2	2	0	2	2
• Pitcher plant bogs	Number	0	0	1	1	0	1	1
• Wetland depressions (Types 7 and 8)	Number	0	0	125	125	0	125	125
<b>X. Cultural resources</b>								
A. Recognize selected cultural sites of archaeological, historical and geological importance		-----AS IDENTIFIED-----						

<sup>1</sup> See Economic Impact Table IV-3.

<sup>2</sup> Based on 5 percent delivery ratio.

**Table IV-3—Economic Impact of Alternative Plans**

**Pocomoke River Basin<sup>1</sup>**

Items	Future Without Plan	Present Condition Sustained	EQ	Non Structural Plan	NED	Selected <sup>2</sup> Plan
	-----Annual \$1,000-----					
I. Value of crops <sup>3</sup>	4606.1	(+)55.8	0	(+)71.7	(+)283.5	(+)273.3
II. Costs						
A. Crop production cost <sup>4</sup>	3086.6	(+)39.9	0	(+)50.1	(+)192.8	(+)186.0
B. On-farm drainage						
1. Construction	32.3	0	0	0	(+) 6.5	(+) 6.5
2. Maintenance	12.7	0	0	0	(+) 2.7	(+) 2.7
C. Outlet measures						
1. Installation <sup>5</sup>	0	(+)24.3	0	(+)30.4	(+) 46.9	(+) 45.2
2. Maintenance	0	(+) 6.8	0	(+) 8.4	(+) 13.3	(+) 12.7
Total of All Costs <sup>6</sup>	3131.6	(+)71.0	0	(+)88.9	(+)262.2	(+)253.1
<b>Net Effect</b>	<b>1474.5</b>	<b>(-)15.2</b>	<b>0</b>	<b>(-)17.2</b>	<b>(+) 21.3</b>	<b>(+) 20.2</b>

<sup>1</sup> This table displays only partial impacts attributed directly to those acres within the project area receiving relief due to on-farm drainage and outlet measures. Each plan shows changes relative to the going program (Future Without Plan).  
<sup>2</sup> Management alternative is the same for these items.  
<sup>3</sup> Includes corn, grain, soybeans, and small grain crops. WRC 1980 normalized

prices were used to calculate value of production.  
<sup>4</sup> Included purchased input items of seeds, fertilizer and machine operation at 1980 prices. Land and management costs were not included.  
<sup>5</sup> Amortized at 7-3/8 percent for 50 years.  
<sup>6</sup> No cost included for environmental measures.



# Appendix A Basin Resource Base

## Study Area

The 316,100 acre Pocomoke River Basin is the sixth largest among ten on the Delmarva Peninsula. The river headwaters begin in the swamps and woodlands of Sussex County, Delaware. From the Maryland-Delaware line it flows nearly 50 miles to the Pocomoke Sound near Accomack County, Virginia. Through this distance, it etches part of the boundaries of Worcester, Wicomico, and Somerset Counties, Maryland.

Man-made features blend into the upper basin showing well managed farms, a 14.4-mile channelized section along the mainstem of the Pocomoke River, and a floodplain buffer of mixed hardwoods to define the change to upland croplands.

A more vivid description of the study area along with some early historic events leading up to its present development is included in Appendix B.

## Climate

Due to the Pocomoke River Basin's general location between the Chesapeake Bay and the Atlantic Ocean, it experiences a climate change largely due to these large bodies of water. The flow of air from low pressure systems in the Atlantic Ocean tends to influence moderate temperatures in winter, and the ocean air mixes with warm land air masses which provides cool breezes during the summer.

The warmest period of the year occurs during the last half of July with temperatures frequently above 90°F in the afternoons. The coldest period normally occurs during the early mornings of February with minimum temperatures averaging around 20°F. The long-term average of daily maximum temperatures is about 79°F while the average of daily minimum temperatures is about 38°F.

The annual precipitation around the river basin averages about 46 inches. It has ranged from 22 inches in the 1930 drought to as much as 73 inches of rainfall in 1948. During the growing season, the middle of August is wettest while the first part of May is driest.

Though this area does not accumulate snowfall as much as the western part of Maryland, it does have normal annual snowfall of approximately 12 inches varying in extremes from just a trace for the

1948-49 and 1955-56 seasons to 42 inches in the 1966-67 season.

Two-thirds of the average yearly 30 thunderstorms occur during June, July, and August. Usually one or two of these thunderstorms result in a hail storm.

The average frost-free growing season extends from April to the end of October with a range from 230 days in tideland areas to 190 days in the upper part of the basin. This provides 190 days between dates of freezing.

## Land

The Pocomoke River Basin is a part of the Coastal Plain physiographic province. The topography generally depicts a typical gently rolling to essentially flat character of Coastal Plain soils. The elevations within the basin range from sea level at the mouth to 85 feet above mean sea level along "Parsonsborg Ridge" an ancient barrier island located in the northwest area of the basin.

There are approximately 95,700 acres of crop and pasture, 4,200 acres of idle land, 195,000 acres of forest land, 3,600 acres of herbaceous wetlands, and 13,400 acres of rural-residential, urban, and commercial areas. Fresh water areas account for 4,200 acres. Drainage is impaired on 37,200 acres of the total cropland acreage. The basin is also estimated to have 20,900 acres of interior wooded wetland.

## Geology

The soils found in the basin originate from parent material of unconsolidated deposits of sands, silts, clays, gravels, and marls overlying a basement of crystalline rocks. These sedimentary deposits increase in thickness towards the southeast at a rate of 10 to 40 feet to the horizontal mile. The sedimentary formations within the wedge represent an erosional and depositional sequence, which included periods of crustal movement and sea level fluctuation, spanning approximately the past 135 million years. During this period there was a major marine transgression of the seas, which in turn has been followed by a series of relatively minor sea level fluctuations which is continuing at the present time. Sea level rise has been estimated to be at least 1 foot in the past 100 years. These factors are responsible for the wide differences in sediment sizes and types of fossils found within the sedimentary formations.

## Soils

The Soil Conservation Service has prepared soil surveys for the several counties within the Pocomoke River Basin. These surveys describe in detail the various classifications and locations of the basin's major soil associations. A quick overview of soils can be found in Appendix B.

## Water Quality and Quantity

### Surface Water

The United States Geological Survey (USGS) maintains two flow gauges in the river basin. These gauges are located on the Pocomoke main at Willards, Maryland and on the Nassawango Creek near Snow Hill.

Based on the recorded flows of the gauge on the constructed portion of the Pocomoke River the four largest storm peaks since 1951 have occurred in the past 9 years.

On February 27, 1979 both gauges recorded their greatest peaks, the Pocomoke gauge at 2,400 cubic feet per second (cfs) or 40 cfs per square mile (cfm) and the Nassawango gauge at 1970 (cfs) or 44 (cfm). Both flows were greater than the 100-year event.

The only major existing lake in the basin is the Powellville mill pond, however there are approximately 115 smaller ponds.

### Surface Water Quality

The *208 Water Quality Management Plan for the Pocomoke River Basin* details the water quality conditions present in the basin; Appendix B summarizes the findings from that study.

### Ground Water

The principal aquifers underlying the river basin include the Manokin and Pocomoke aquifers of the Upper Miocene series and the sands of the Pleistocene-Pliocene series. These formations are major sources of water for private and municipal wells.

Ground water levels are normally at their maximum elevation during September and October. Seasonal ground water fluctuations normally range from half to a foot to 6 feet depending on soil type and other variables.

## Population

The Pocomoke River Basin is a sparsely populated rural area except for Pocomoke City and Snow Hill, the two major cities. Because of its location some growth pressures from Ocean City seasonal home development and Salisbury expansion has occurred. Population increases are expected to be moderate and less than state average.

## Use of Resource Base

### Land Use

The urbanizing influence of Salisbury and Ocean City, Maryland has not yet affected the rural character of the basin. Agricultural land and forest land represent 93 percent of the total basin area.

The land base for production of agricultural products in the Pocomoke River Basin is expected to diminish slightly over time as more land is converted to urban uses. More pressure will be placed on the remaining acreage to maintain the increased production levels. Idle land may be brought into production and some forest land may be cleared; however, the net effect is expected to be a slight increase in forest land, the dominant land use in this river basin. Estimated land use under general without plan conditions is shown in Table A-1.

Agriculture and related industries such as the poultry industry account for a large portion of the total income and employment of the basin. Corn and soybeans are the principal crops grown in the basin with some high value truck crops. The two major farm types, cash-grain and poultry production represent over 80 percent of all farms. A detailed description of socio-economic data can be found in the *Delmarva River Basins Survey*, Appendix B (see references).

Compared with the entire Delmarva Peninsula, the Pocomoke Basin shows less diversity in agricultural production. Corn and soybean production are the principal contributors to the agricultural economy, with relatively little acreage devoted to pasture, hay, corn silage, vegetables, and specialty crops. Table A-2 summarizes projected production for major crops.

Total small grain acreage is reflected largely by the acreage of land double cropped with soybeans. Projections of small grain production levels did not appear to support a higher level of double cropping acreage implied in the Delmarva land use projections. Projections of double cropped and small grain acreage developed for the Pocomoke Basin therefore reflect more intense double cropping of declining soybean acreage in the future.

**Table A-1—Historical Projected Land Use**

**Pocomoke River Basin**

	1975	FWOP Study <sup>1</sup> Projection		OBERS Based Projection	
		1990	2000	1990	2000
-----thousand acres-----					
<b>Agriculture</b>					
Harvested cropland and pasture	95.8	96.0	94.0	93.5	99.2
Cropland failure	3.8	3.9	3.9	3.8	4.0
Planted cropland and pasture	99.6	99.9	97.9	97.3	103.2
Double cropped	3.9	5.9	5.3	3.3	10.6
Cropland and pasture (net)	95.7	94.0	92.6	94.0	92.6
Idle land	4.2	3.8	3.7	3.8	3.7
Other agricultural uses	2.8	2.8	2.8	2.8	2.8
<b>Total agricultural uses</b>	102.7	100.6	99.1	100.6	99.1
Forest land	195.0	195.8	196.4	195.8	196.4
Herbaceous wetlands	3.6	3.6	3.6	3.6	3.6
Urban land	10.6	11.9	12.8	11.9	12.8
<b>Total land area</b>	311.9	311.9	311.9	311.9	311.9
<b>Freshwater Areas</b>	4.2	4.2	4.2	4.2	4.2
<b>Total Basin Area</b>	316.1	316.1	316.1	316.1	316.1

<sup>1</sup> Chapter IV of the Delmarva River Basin Survey outlines in detail the assumption on which projections of the future without plan conditions are based.

Commercial forest represents 193,100 of the 195,000 acres of forest land. Non-commercial forest land accounts for only 1,950 acres or 1.0 percent of total forest land. Non-commercial forest land is that forest land which is incapable of yielding timber crops because of adverse site conditions, and productive forest land that is withdrawn from commercial timber use through statute or administrative regulations.

About 1,900 acres of the basin's commercial forest land are classed as non-stocked. This includes idle farm land reverting to forest, but still in a brush transition stage, and stands of trees that are very poor in quality because of fire damage or other abuse. The distribution of the remaining commercial forest land is 117,800 acres sawtimber, 42,500 acres poletimber, and 30,900 acres of seedling and sapling size stands.

The most prevalent forest types occurring on the basin are loblolly-shortleaf pine, oak-hickory, oak-pine, oak-gum, and red maple. The cypress-gum forest is not significant in terms of acres but their

presence is one of the reasons the Pocomoke River Basin is unique. These types cover about 99 percent of the forest land. The pine and mixed oak-pine types make up nearly 50 percent of the forest land with the balance in hardwoods, principally oaks, gums, and maples.

**Water Use<sup>1</sup>**

Over 90 percent of the water use is obtained from ground water sources. The surface water though sometimes brackish or salty in the lower part of the basin is not used primarily due to the difficulty and cost of storage on the flat topography. The ground water from underlying aquifers provide adequate quantity, quality and accessibility requiring little or no treatment.

Community and industrial water supply is supplied entirely by ground water resources. Two major aquifers are utilized for water supply, the Manokin and Pocomoke Aquifers. While the towns of Snow Hill, Princess Anne, Willards, and Shad and Milburn Landing State Park use the Manokin, Pocomoke City relies on the Pocomoke Aquifer.

<sup>1</sup> State of Maryland, WRA, DNR, 208 Water Quality Management Plan for the Pocomoke River Basin, VI-1-12.

**Table A-2—Projection Data for Major Crops Pocomoke River Basin**

Major Crops	1975	FWOP Study <sup>1</sup> Projections		OBERS Based Projections	
		1990	2000	1990	2000
<b>Corn (grain)</b>					
Acres harvested (000)	48.0	56.0	55.3	49.1	56.7
Average yield (bu./acre)	86.1	100.7	110.6	106.7	117.2
Production (000 bu.)	4132.8	5639.2	6116.2	5239.0	6645.2
<b>Soybeans</b>					
Acres harvested (000)	37.6	31.0	30.2	38.5	37.2
Average yield (bu./acre)	29.1	38.0	41.8	35.9	38.5
Production (000 bu.)	1094.2	1178.0	1262.4	1382.2	1432.2
<b>Small grains</b>					
Acres harvested (000)	4.9	6.1	5.9	4.4	4.1
Average yield (bu./acre)	40.1	42.8	46.8	49.3	57.8
Production (000 bu.)	196.5	261.1	276.1	216.9	237.0
<b>Vegetable and specialty crops</b>					
Acres harvested (000)	0.4	0.5	0.4	0.5	0.6
Average yield (bu./acre)	N/A	—	—	—	—
Production (000 bu.)	N/A	—	—	—	—
<b>Hay/pasture</b>					
Acres harvested (000)	4.9	2.4	2.2	1.0	0.6
Average yield (bu./acre)	N/A	—	P	—	—
Production (000 bu.)	N/A	—	—	—	—
<b>Total acres harvested</b>	<b>95.8</b>	<b>96.0</b>	<b>94.0</b>	<b>93.5</b>	<b>99.2</b>

<sup>1</sup> Same as Table I-2

## Agricultural Production<sup>2</sup>

The agriculture and associated industries provide a substantial number of employment and income opportunities in the basin. Numerous individuals are employed and receive income directly from agriculture and associated industries for producing, harvesting, and marketing farm products.

Despite the viability of agriculture, a sizeable number of farm operators reported off-farm work, as much as 39 percent. This off-farm work can be due to the seasonality of cash-grain production and the ability to schedule broiler house management and labor.

Changes in the Pocomoke Basin's agriculture reflect the lower shore's farm type changes. While in 1959 the predominate farm types ranked poultry, cash-grain and general farms, the 1974

<sup>2</sup>Delmarva River Basin Report - Appendix B

statistics reveal that cash-grain and poultry have changed positions by a small percentage.

The lower shore and the basin have adopted multiple crop rotations. This is typified by double cropping of winter wheat and barley with vegetable crops and the use of 2-year rotations of corn, winter grain, and soybeans. The general statistics show an increased production of soybeans and wheat, and continuing importance of corn but a declining trend in vegetable production.

The increased specialization of agriculture in cash-grain and poultry production has caused a drastic decrease in some livestock, particularly cattle, calves, and sheep.

The poultry industry by far has grown in leaps and bounds. As a part of the basin, Wicomico County showed a 728 percent increase in chicken production between 1959 and 1974.

The fastest growing segment of the poultry industry is the broiler production. Integrated broiler firms have become established as the dominant force in the industry. These firms exert complete control over the production of their broilers from the breeding flocks that produce eggs for their hatcheries to the advertising that sells their product in Philadelphia, Boston, and New York. Even after chicks are placed with contract broiler producers, the integrated firms supervise their care and feeding to ensure that death losses are minimized and weight gains maximized within established quality standards. The growth and continued viability of the poultry industry can be directly attributable to increased broiler production over the past 15 years.

Delmarva agriculture has continued to grow despite increasing competition for land and labor from alternative uses. Its viability is the direct result of the development of those facets of its productive capacity in which it enjoys a competitive advantage. The total broiler industry has capitalized on the peninsula's location with respect to major urban markets and the capacity of peninsula land to produce feed grains. To date, organizational efficiency has maintained economic growth and allowed other agricultural enterprises to survive.

### Forestry Production

Timber production on the Eastern Shore centers mainly on sawlogs, veneer logs, piling, poles, and pulpwood, with some minor production of barrel staves and plywood particle board. Forest stands capable of growing the previously mentioned wood products are classified as growing stock.

The present volume of growing stock on commercial forest land in the basin is 277.1 million cubic feet. Of the forest land 52 percent is

stocked in sawtimber stands, 33 percent in pole stands, and 15 percent in seedling-sapling stands.

Growing stock is measured by the net volume, in cubic feet, of sawtimber and poletimber trees from stump to a minimum 4-inch top outside bark diameter. Net volume equals gross volume less deduction for rot. If the forest is better managed, the percentage of land with sawtimber components will increase.

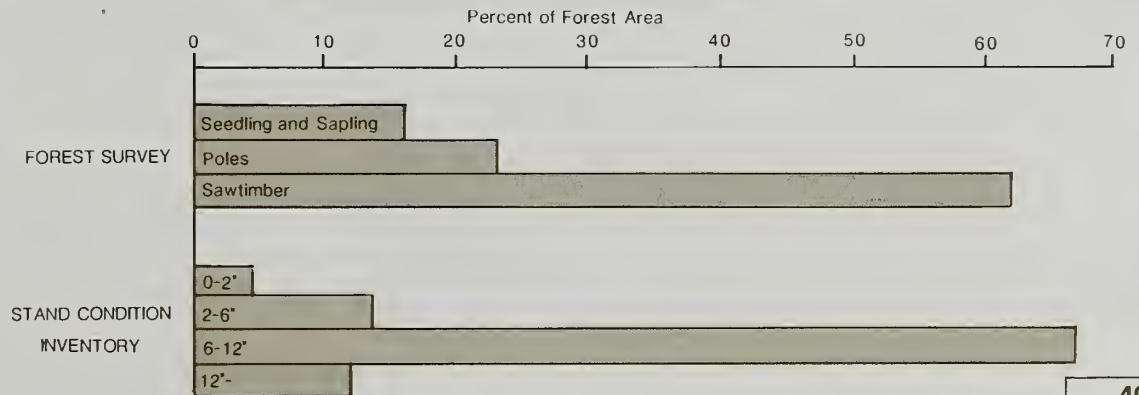
Hardwood species account for 46 percent of the sawlog and poletimber volume, while softwoods make up the other 54 percent. To better describe the forest stands on the basin, data on timber types and size classes from the land use and management condition survey conducted on the peninsula was used. Exhibit 5 shows the percent of area of forest land broken in size classes according to Forest Survey and the above mentioned study for the Pocomoke Basin.

If forest management is not improved, the annual growth is projected to decrease from 43.80 cubic feet per acre in 1980 to 43.40 cubic feet per acre by 1990 and 42.00 cubic feet per acre by the year 2000.

OBERS Series E Projections have estimated a demand for wood products for this region through the year 2020. An interpolation of the OBERS estimate for this basin's forest area translates to a net cut of only about 21.2 cubic feet per acre by 1990 and 30.2 cubic feet per acre by the year 2000. This is much less than the anticipated growth rate as well as this study's estimate of the rate of cut based on a continuation of present trends. This would indicate a long-range forecast of depressed market conditions for the basin's wood products.

### Exhibit 5

#### —Stand Size Classes by Forest Survey and Stand Condition Inventory, Pocomoke River Basin

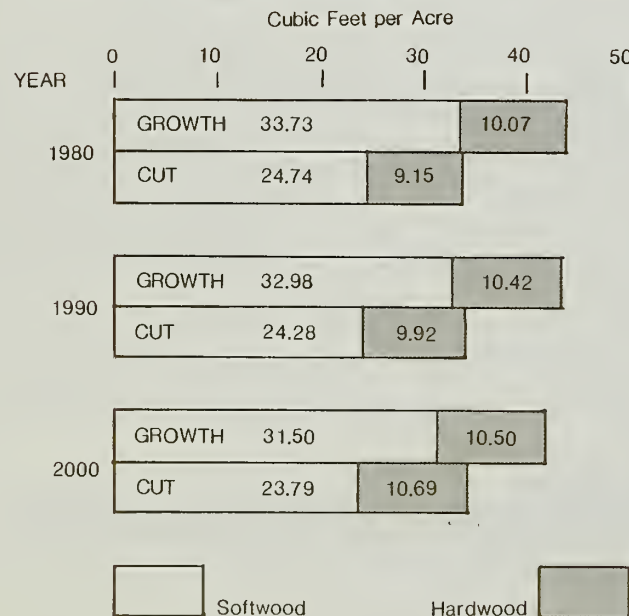


However, the OBERS projections did not differentiate between hardwoods and softwoods and probably were based largely on anticipated needs for softwood products. The OBERS projections did not forecast a demand for firewood. The actual expectation of a continued demand for firewood offers land owners a chance to reclaim some of the costs of good forest management. Good forest management can improve the quality, quantity, and the selling price of mature sawtimber.

Net volume of growing stock on the basin's forest land is projected to increase from about 277.1 million cubic feet in 1980 to 286.5 million cubic feet by 1990 and to 295.3 million cubic feet by the year 2000.

Annual cut and growth per acre for 1980 with projections to 1990 and 2000 are shown in Exhibit 6.

**Exhibit 6—Roundwood Cut and Growth Per Acre for Future Without, Pocomoke River Basin, 1980 and Projected 1990 and 2000.**



SOURCE:  
USFS Timber Resources of Delaware and Maryland, 1966-1979

Recent severe winters have increased the demand for piling. Fence posts and landscaping poles also currently constitute a viable market. There are indications that firewood could be a tremendous market within a short period of time. The majority of the roundwood chipped is used for production of pulp and roofing material. The demand for chips in landscaping is rising and could constitute an important market in the future. The recent installation of the Pittsville Wood Flour Plant in Maryland has increased the demand for sawmill by-products such as planer shavings, sawdust, etc. There is presently an increased interest in purchasing cross-tie material from the peninsula.

The future outlook of markets for low quality hardwoods on the peninsula appears to be somewhat better than in previous years. There is no market data to support quantification of these trends in terms of cubic feet of material or dollar value at the present time.

Employment in the lumber and manufacturing industries on the Delmarva Peninsula dropped from 5,035 in 1950 to 1,662 in 1970, a 67 percent reduction in number of employees. Since 1970 there has been a small increase in the employment rate until 1976 the work force was just over 2,000 employees. As the markets for forest products improve, there will be a corresponding improvement in forest related employment. This improvement is expected to be small and the total employment will remain well below the levels experienced in the 1950's. No data was developed specifically for the Pocomoke River Basin.

### Forest Insects and Diseases

Insects, such as the southern pine beetle, tent caterpillar, fall cankerworm, and diseases, such as fomes annosus, have taken their toll of timber in the past. An aerial survey in 1971 indicated that the southern pine beetle had infected more than 5,000 acres of the loblolly-shortleaf pine forests on the Delmarva Peninsula. The entire pine lumbering industry could be threatened if epidemics such as this were to go unchecked. A recent problem of increasing concern is the occurrence of the Gypsy Moth. Control will be difficult if not impossible.

### Unique or Special Features

Appendix B, Maryland Scenic Rivers: *The Pocomoke—Planning for its Scenic, Wild and Recreational Resources*, covers this item in detail.



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# Appendix B



## Maryland Scenic Rivers: THE POCOMOKE

### Planning for Its Scenic, Wild, and Recreational Resources



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Isedora Ballard



STATE OF MARYLAND  
 Department of Natural Resources  
 Capital Programs Administration  
 Land Planning Services  
 WILD AND SCENIC RIVERS PROGRAM

# Maryland Scenic Rivers: THE POCOMOKE

## Planning for Its Scenic, Wild, and Recreational Resources

Prepared by: Isedora Ballard  
 IN COOPERATION WITH THE POCOMOKE RIVER ADVISORY  
 COMMITTEE AND THE SOIL CONSERVATION SERVICE OF  
 THE U.S. DEPARTMENT OF AGRICULTURE

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# Introduction

The Pocomoke River and its tributaries possess unique natural and scenic resources that are unequaled by those of any other river on the Eastern Shore of Maryland. This uniqueness led to the designation of the river and its tributaries as initial components of the Maryland Scenic and Wild Rivers system in 1971. Pursuant to sections 763-765 of Article 66c cumulative supplement (now Natural Resources Code Sections 8-401 et. seq.) the Secretary of Natural Resources is required to formulate and implement a program that will provide for the wise management of the resources on the land and the preservation of the scenic, agricultural, and wild qualities for all State designated scenic and wild rivers.

This plan is intended to promulgate the State's Scenic and Wild Rivers Act for the Pocomoke River. It provides a holistic approach to river management where future development will be carried out in a planned and orderly fashion and all forms of activity and land use will be compatible with the Scenic and Wild River designation. *Plan preparation* includes some integration of county comprehensive plans and coordination, whenever possible, with all affected agencies and organizations. *Plan emphasis* is upon maintaining the river and its immediate environment in its existing condition except where there are water quality problems which adversely impact the scenic and recreational appeal of the river, or adverse visual impacts. *Plan implementation* is dependent primarily upon the local governing bodies of the counties through which the river flows.

In section one the river corridor is reviewed as one complete scenic unit, but because of a broad variation in the scenic and wild character of the Pocomoke River area the second section of the plan analyzes the river by segments as well. The Department of Natural Resources realizes that drainage problems exist in the upper Pocomoke basin. It is not the intention of the Scenic and Wild Rivers' Program to preclude such activities which are designed to alleviate these problems but to

mitigate, as far as possible, any severe adverse effects that this activity might have, now and in the future, upon the scenic qualities of the river. To accomplish this, a long range plan for drainage and maintenance of the Pocomoke river has been developed by the U.S. Department of Agriculture's Soil Conservation Service (SCS) in cooperation with various agencies of the Maryland Department of Natural Resources and the Scenic Rivers Program. The plan includes recommendations for the management of the scenic resources of the Pocomoke River as part of an overall comprehensive management program.

The recommended plan for the management of the Pocomoke River's scenic resources was derived from three rather broad goals:

- To preserve the outstanding resources of the Pocomoke River in their existing condition;
- To prevent and/or mitigate detrimental influences on the river system; and
- To provide educational and recreational opportunities within the river basin.

Based upon the above goals, the analysis of the resources (Section I of this plan) and resource use (Section II), the Department of Natural Resources and the Pocomoke Scenic River Advisory Board have formulated policies and management strategies for the scenic resources of the Pocomoke River.



## **SECTION I** ——— **Comprehensive Resource Analysis**





*"When on some gilded cloud or flower  
My gazing soul would dwell an hour,  
And in those weaker glories spy  
Some shadows of eternity..."  
Henry Vaughan*

# Environmental Resources

## Scenic and Wild River

Curving softly through relatively flat terrain, past open farmland, cities, small towns and villages, through densely wooded swamps where at low tide grotesque cypress knees peep from murky dark waters and wildlife abounds, then bending and breaking sharply before its entrance into the Sound (a broad expanse of water that empties into the Chesapeake Bay) flows the wild and scenic Pocomoke.

This river, of all the rivers that drain into the Chesapeake Bay, looms large as a unique, mysterious and beautiful waterway. The eerie "dark waters" from which the river gets its name "Pocomoke" (an Indian word meaning *black water*), the stands of bald cypress, and the unique flora and fauna give the Pocomoke a quality unlike any other Maryland river.

Rising in the "Great Cypress Swamp" on the State lines of Maryland and Delaware the mysterious dark waters of the Pocomoke once flowed through an almost impenetrable wilderness where run-away slaves, bootleggers and smugglers once found haven from the law. Now, due to man's encroachment, the swamp occupies only a narrow strip of land along the river and its tributaries. However, parts of this swamp have not been changed significantly, and these areas, mostly along the tidal part of the river, are undoubtedly much like the original forest (Mansueti, 1953). This original forest and the "Great Cypress Swamp" is much like the Dismal Swamp of Virginia in physical characteristics and is the most northern of extensive southern cypress swamps according to Beaven and Oosting (1939). The swamp borders both sides of the river, varying in width from 0.5 miles to nearly two miles wide, and extends five miles into Delaware.

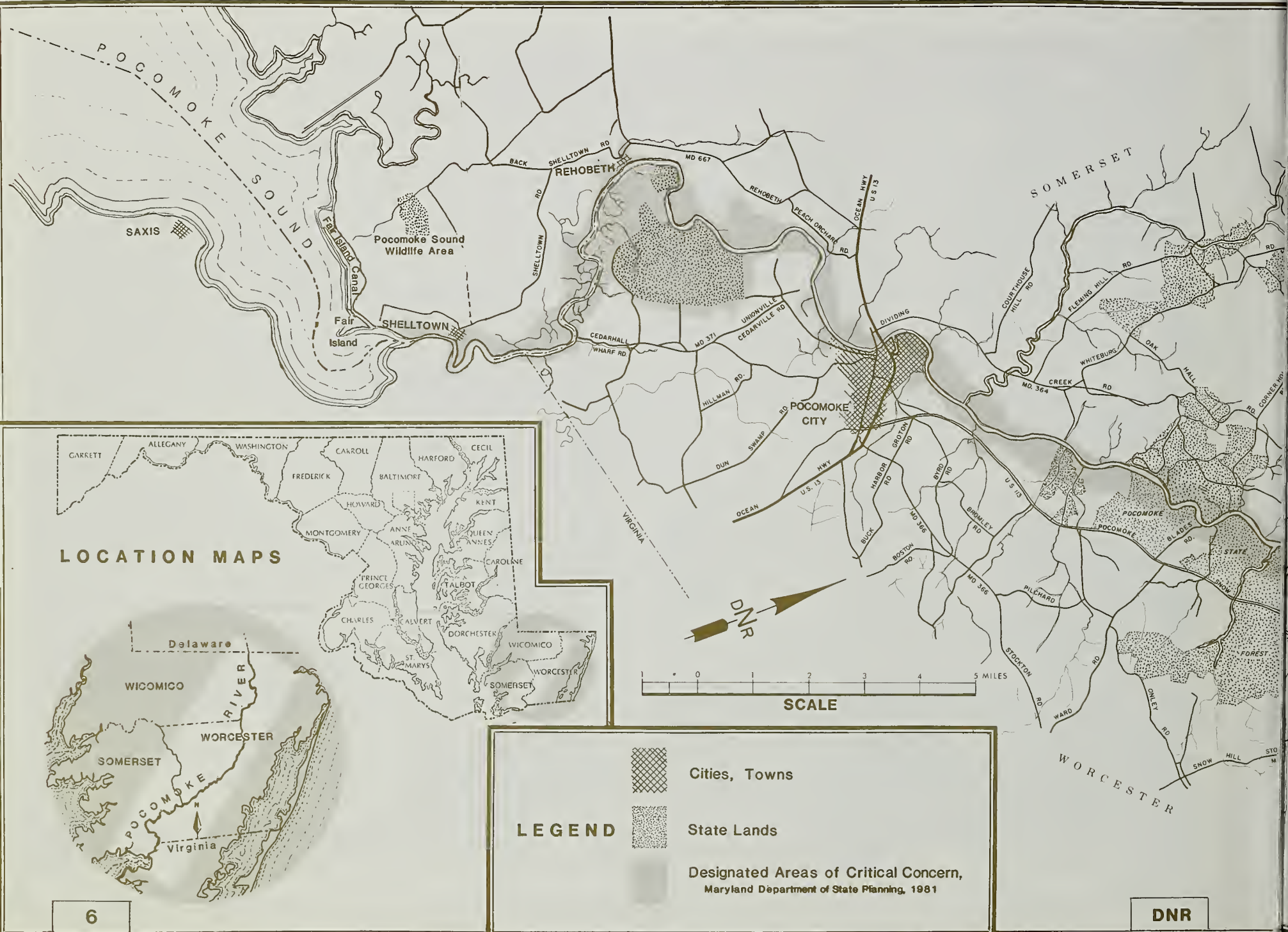
The river watershed is located in the Maryland counties of Worcester, Wicomico and Somerset, the Delaware county of Sussex, and the Virginia county of Accomack. The river flows a distance of about forty-nine miles in Maryland before reaching the Pocomoke Sound. The lower part of the river is brackish and is bordered by a salt marsh that extends several miles upstream to where the swamp begins near Rehobeth. Above Rehobeth, the wooded swamp is continuous except where the wide bends in the river bring it to the margin of the flood plain bordered in places by low, pine-wooded bluffs.

The Pocomoke is believed to be the deepest river in the United States for its width. The uniform width below Snow Hill is 400 feet with an average depth of 15 feet and a range of 7 to 29 feet (Mansueti, 1953). The two longest tributaries are Nassawango Creek (19.6 miles) and Dividing Creek (10.6 miles).

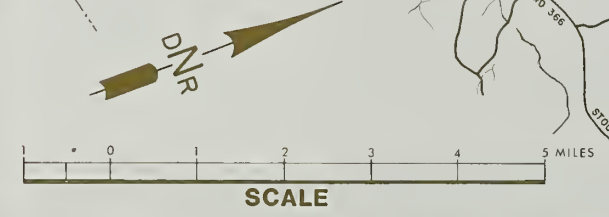
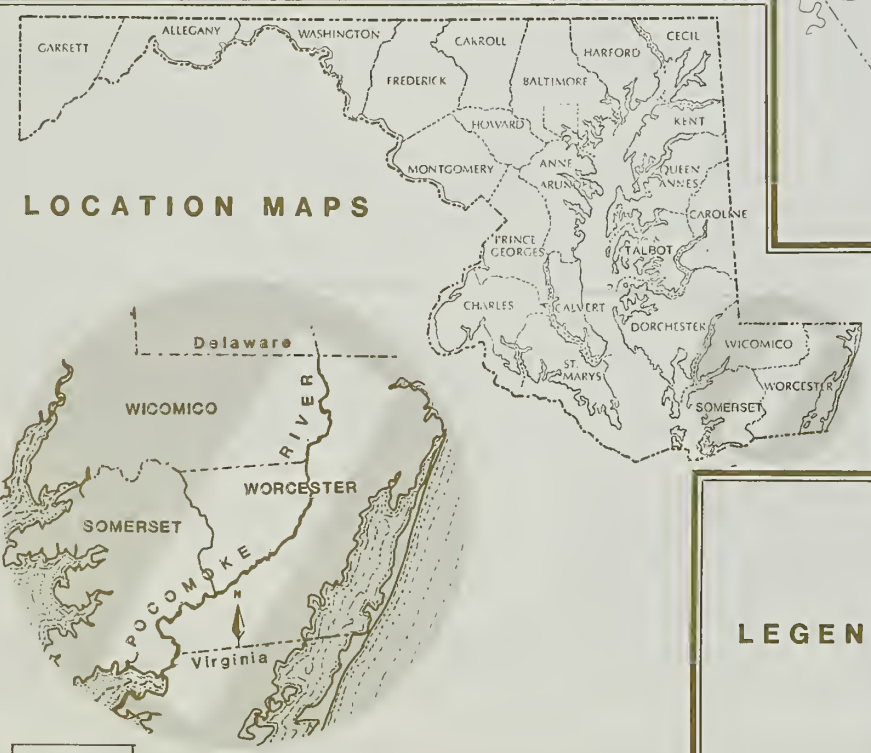
In Maryland the Pocomoke River has been channelized from the Delaware line to approximately one mile below Whiton Crossing. This area is scenic, but channelization is evident. There are, however, several ox-bow cut-offs of the old river meander that are high in natural and scenic value. The scenic character of the river changes at the end of the channel and becomes more wilderness-like in nature. Several swampy islands break up the river below the channel and dense forests along the water's edge leave no earth at all visible at high tide. Cypress knees hover, like small creatures, over the river banks at all but high tides and the forest seems to come alive with wildlife.

Civilization appears upon reaching the town of Snow Hill. Nassawango Creek meanders into the river just below the town. Several houses, Pocomoke River State Forest, which includes the two State Park areas (Shad and Milburn Landing) and Cellar House (historical site) are visible from the river before reaching Pocomoke City. Winding sluggishly in from the north are the black waters of Dividing Creek. Upon reaching Pocomoke City the wilderness is completely shattered and civilization is brought into sharp focus as a bridge, a row of wharves and sheds come into view.

Ten miles on, as the river winds, passing through wooded swamps and fastland, around a "big bend" it comes to the tidy little village of Rehobeth with Cypress Swamp to the south. Below the village the river flows again in wide sweeps through salt marshes and farmland to a low shelf of dry land on which stands the picturesquely neat little hamlet known as Shelltown. The State's biggest and most renowned cypress tree stands in the river at Beverly, an historical site between Rehobeth and Shelltown. From Shelltown, the river flows into the Sound at a left angle and in the pool thus formed lie the infamous "Muds" of the Pocomoke. These muds were caused by centuries of farming under innocent but wateful soil practices, plus thousands of years of natural erosion, where eroded materials were carried downstream and deposited at the mouth of the river. The Sound is a broad expanse of water that stretches westward for fourteen miles before emptying into the Chesapeake Bay.



**LOCATION MAPS**



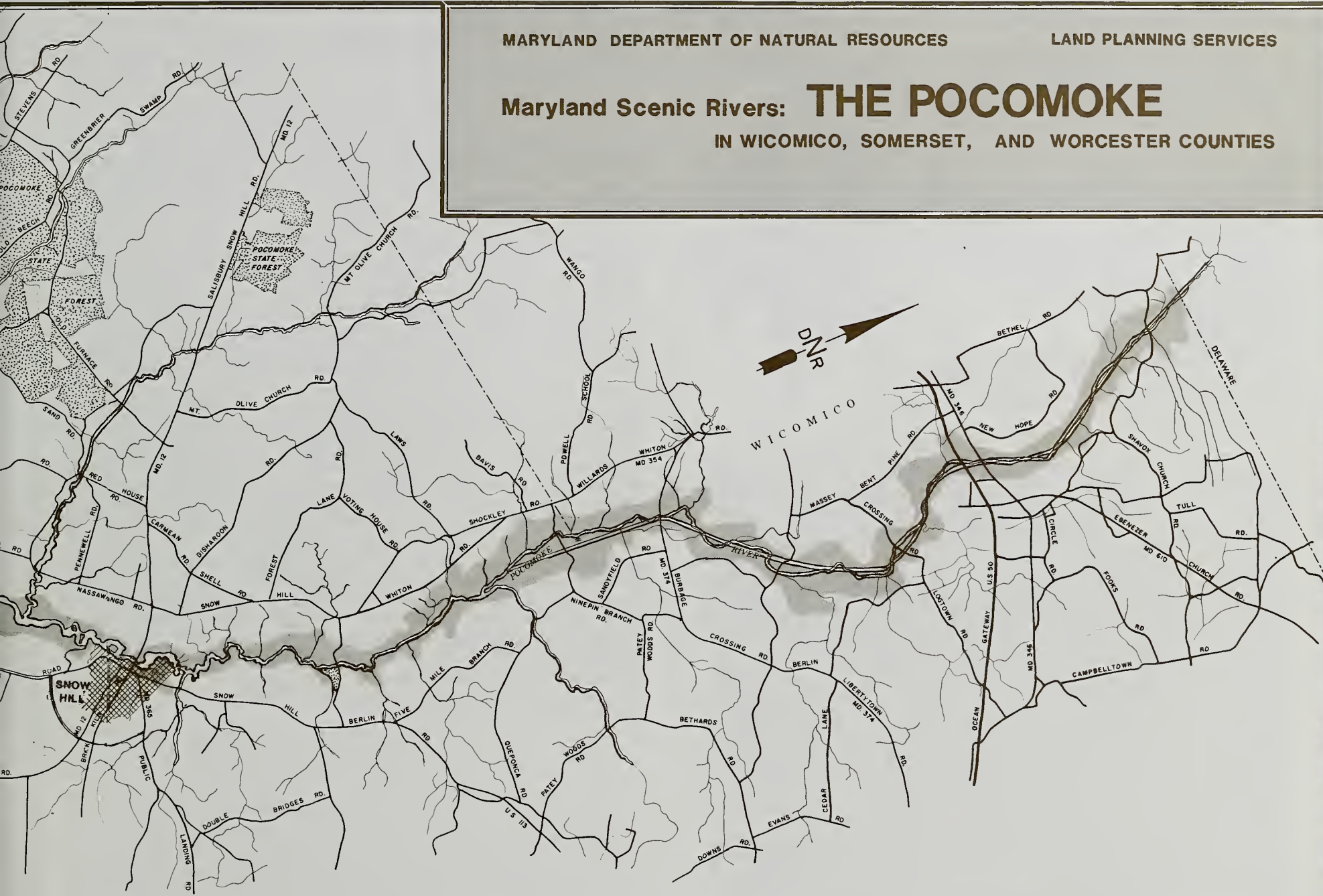
**LEGEND**

-  Cities, Towns
-  State Lands
-  Designated Areas of Critical Concern,  
Maryland Department of State Planning, 1981



# Maryland Scenic Rivers: **THE POCOMOKE**

IN WICOMICO, SOMERSET, AND WORCESTER COUNTIES





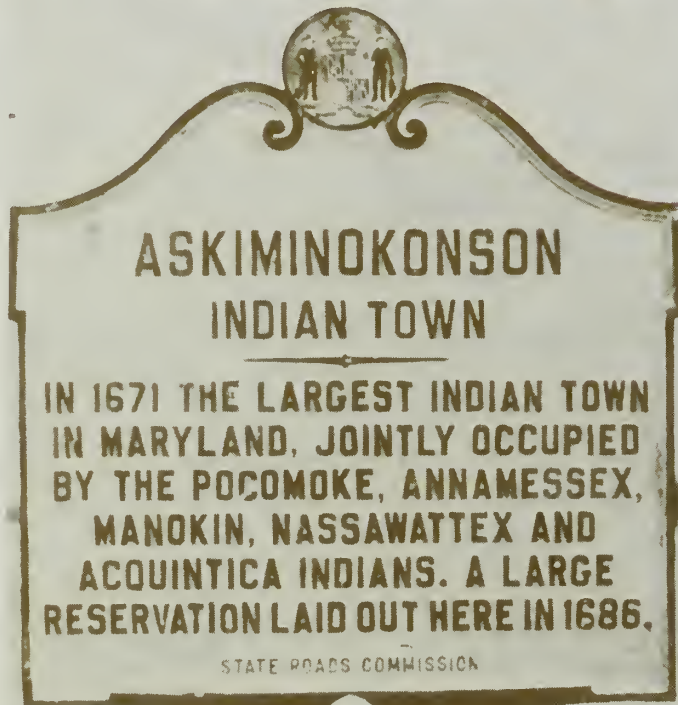
## Cultural Resources

Along the Pocomoke River and its tributaries there still remain physical reminders of the history and heritage of the past.

Archaeological findings make authentic reports that Indians were the first inhabitants along the river and set the date of their appearance in the area around 10-12,000 BC. There is evidence that several major tribes and subtribes had villages along the river shores and tributaries.

The major tribes along the river were called "Pocomokes". There were also the Acquintica, Quandanguam and Nassawattox who formerly lived along tributaries to the Pocomoke. Perhaps these latter peoples had all been under the jurisdiction of the Pocomokes. These Indians and their neighboring tribes were part of a larger Indian linguistic family, the Algonquin Nations. As a result of colonization and the onslaughts made against them by Colonel Edmund Scarborough of Virginia, the lower Somerset County tribes began to leave their hunting grounds and take up residence in mid-county by 1666. For them and their neighbors a reservation called "Askiminokonson" was set aside in 1686 on the west side of the Pocomoke near the present site of Snow Hill. To this reservation came not only the lower area Pocomoke but some Annemessex and Manokins. They were joined also by some members of still other neighboring tribes—Assateagues, Chincoteagues, Nassawattox and Acquintica. These people, including the Pocomoke, lost their separate identities within a few years and all became known as Assateagues (Clark, 1953). Their town, late in the seventeenth century (1671), became the largest Indian concentration in Maryland. In May of 1686 the Emperor of the Assateagues listed some eight Indian tribes who were under his command at Askiminokonson. Relentless white pressure led to the departure of this mixed group of Indians northward by 1748. It is generally agreed that the mixed blood "Nanticoke" Indians living in the vicinity of Oak Orchard, Delaware, on Indian River are descendants of those migrant Pocomoke-Assateaque people (Clark, 1953).

The Indians had very little adverse impact on the environment of the river for they eked out a subsistence by hunting, fishing and some farming. This all changed, however with the coming of the first white settlers. Captain John Smith, Giovanni da Verrazano, Bartholomew Gilbert, Luis de Velasco and Henry Norwood were among the first Europeans to visit the Pocomoke River Area. From 1603 to 1620 exploration and mapping of the area was conducted by the English. Despite the problems between the first settlers and the Indians trade developed and continued. By using the abundant natural resources of the river basin for trade, ties with New England and the West Indies



developed as settlements of Dutch, English, French and Quaker pioneers from Virginia increased. The late 1700's and early 1800's brought prosperous times to the river basin. Shipbuilding, brick manufacturing, the smelting of iron ore, and tobacco output all expanded. Some plantations were as large as 1,000 acres and employed as many as two-hundred slaves. Primary pioneer activities of logging, trapping, fishing and tobacco cultivation provided exports to trade for rum, sugar and molasses imported from the West Indies. Associated with these industries were the secondary trades of cabinet making and shipbuilding, hat manufacturing, leather tanning and textiles. The underground railroad, the Civil War period and prohibition brought slaves, deserters, smugglers and bootleggers to the dark impenetrable marshes and swamps of the Pocomoke river in those early days. From the Civil War period until the early 1900's activity in the river basin was concentrated around the towns of Snow Hill and New Town (now Pocomoke City). Colorful steamboats connected this isolated area with Baltimore and Washington, and a railroad was completed in 1879.

Reminiscent of the early history of the area are several old houses and churches, the ruins of Nassawango Iron Furnace and a few old steamboat wharves and landings. The old houses include; Beverly of Worcester, Barrel House, Cellar House, Reward, and Puncheon. Beverly is located near Dividing Creek on the east bank of the Pocomoke and is the ancestral home of the Dennis family of Maryland. John Upshur Dennis owned a fleet of ships that carried Pocomoke Cypress to the West Indies and brought back molasses. Also on Dividing Creek stands Barrel House—a dignified eighteenth century dwelling which is supposed to have been a station for Patty Cannon's Underground railroad. Overlooking the Pocomoke River between Pocomoke City and Snow Hill about six miles northwest of Pocomoke City is the legendary Cellar House. Legend says that tunnels leading from the river to the cellar of the house were used to transport and store stolen goods and as a way station on the underground railroad. Another legend of Cellar House is that the owner's wife fell in love with one of his ship's captains and he killed her. Her ghost, they say, still roams the Pocomoke and its shores.



*The Tivoli is shown at Snow Hill, 30 miles above the mouth and the last stop on the Pocomoke River route.*



*Beverly—An Early Maryland Home.*

Because the Reverend Francis Makemie came to Maryland from Ireland in 1683 and sailed up and down the Pocomoke River founding churches at Rehobeth, Snow Hill and Pocomoke City, the Pocomoke can be called the "Gateway of Presbyterianism" in America. His churches at Rehobeth are claimed to be the oldest Presbyterian churches in America (Worcester County undefined material).

The ruins of Nassawango Iron Furnace are found along Nassawango Creek about three miles from its confluence with the Pocomoke. The "old furnace", as it is called by local residents, was once surrounded by a thriving village called Furnaceville or Furnacetown. There were individual homes, a general store, hotel, church, tavern, grist mill, saw mill, school, warehouse and a 14 room Ironmasters mansion. Operation of the furnace was abandoned in 1847 because the iron which was smelted from bog ore from along Nassawango Creek was of very poor quality.



Before overland passage was fully established almost all freight and passenger traffic was carried on the waters. Ships, barges and boats of all kinds regularly plied the black waters of the Pocomoke. Several steamship lines operated between the Eastern Shore and Baltimore and during peak periods made stops at Rehobeth and Shelltown as well as at the several other landings along the Pocomoke River. Special Ships were built to make traveling the narrow and crooked Pocomoke easier. These big ships were called "side-wheelers" and were built in great numbers from the War of 1812 until about 1920. Nowadays, except for an occasional vessel that brings fertilizer or oil up to Snow Hill, ships seldom travel the black waters of the Pocomoke, the old landings are rotting into the water and the roads leading to them are overrun by forest.

**Old Wharves and Landings**  
Kensey, 1967

- |                      |                      |                    |
|----------------------|----------------------|--------------------|
| Mouth of River       | Dividing Creek       | Red Landing        |
| Shelltown            | Pusey Landing        | Stimsons Wharf     |
| Bullbegger Creek     | McMasters Wharf      | Nassawango Creek   |
| Pitts Wharf          | Cottingham Ferry     | Fishhawks Nest     |
| Pitts Creek          | Cellar House Landing | Rice Fields        |
| Cedar Hall Wharf     | Wills Landing        | Cypress Point      |
| Rehobeth Wharf       | Milbourne Landing    | Dyghtons           |
| Powells Wharf        | Callahan Landing     | Shipyards          |
| Puncheon Landing     | Mattaponi Ferry      | Snow Hill Bridge   |
| Railroad Draw Bridge | Adams Wharf          | Duck Island        |
| Shipyards            | Deep Landing         | Mullets Bay        |
| Pocomoke City        | Corkers Creek        | Fishhawks Island   |
| County Draw Bridge   | Weeks Landing        | Haywards Landing   |
| Stevensons Wharf     | Shad Landing         | Purnell Creek      |
| Winter Quarter       | Moores Landing       | Blue House Landing |
| Careys Creek         | Shabaron Point       | Porters Bridge     |



*Nassawango Iron Furnace*

## Soils

The Pocomoke river is bounded almost entirely by a band of three soil associations; muck, alluvial and tidal marsh.\* These soils are usually water-logged, are subject to periodic flooding, have limited mineral values and are considered highly unsuitable for development. Suitability for development is generally based upon engineering properties and percolation characteristics. The rate of percolation usually determines whether or not the soil on the site can facilitate a septic-tank type of sewage disposal. The soils in these associations are also unsuitable for farming, earthwork, pipeline construction, road and highway location, campsites, athletic fields, cemeteries and sanitary landfills, but they are among the few soil associations in the watershed which, because they have remained undeveloped, provide the sole remaining habitat considered excellent for plants that provide food and shelter for waterfowl, furbearing animals and other wildlife.

There are several areas that are devoid of wetlands along the Pocomoke River which have soils suitable for development. In Somerset County near Rehobeth, the Matapeake-Mattapex soil association is well suited to development and extends along the River in three locations covering approximately three miles of shoreline. In Worcester County three soil associations that include soils suitable for development touch the river's edge in several locations: 1) the Lakeland Klej-Plummer Association lies along the Pocomoke River in two places near the river's edge and at Snow Hill, 2) the Mattapex-Matapeake-Othello Association is adjacent to the river in one location at the Virginia boundary, and 3) the Fallsington-Woodstown-Sassafra Association lies along the River in the Pocomoke City area. In Wicomico County no soil associations suitable for development lie along the river banks, but the Evesboro-Klef association is located quite near the river adjacent to the muck association.

\*See United States Department of Agriculture Soil Conservation Service Soil Surveys for Worcester, Wicomico and Somerset Counties, Maryland.



## Wetlands

There are forty-one wetland areas, consisting of several different types, which form an almost continuous band along both banks of the Pocomoke River and its two major tributaries—Dividing and Nassawango Creeks. These wetlands total approximately 17,944 acres. The natural resources that are most abundant and those which contribute most dramatically to the scenic values of the Pocomoke River occur in the wetlands that lie in the floodplains along the river and its tributaries. These wetlands have a high functional value: 1) they absorb large quantities of water providing valuable erosion and flood control, 2) they act to retard pollution by filtering out some of the chemicals, sediment and nutrients that would otherwise enter the river, 3) they provide unique habitat for plant and animal species (some of the most unusual varieties of flora and fauna in the Pocomoke watershed are found in the wetlands along the river and its tributaries), 4) they serve as spawning, feeding and nursery grounds for fish and are the key in the food chain which supports such marine life as crabs, oysters and clams, 5) they serve as nesting grounds and habitat for many species of song and shore birds and waterfowl, 6) they have extremely high recreational potential for fishing, crabbing, nature study, bird watching, hunting and trapping, and 7) they provide valuable scenic buffer between the river and the remainder of the watershed (Metzgar, 1967).

There are eight different types of wetlands found along the Pocomoke River and its tributaries. These include seasonally flooded wooded basins or flats (type 1), inland open fresh water (type 5), shrub swamp (type 6), wooded swamp (type 7), bogs (type 8), coastal shallow fresh marsh (type 12), irregularly flooded salt marsh (type 17), and coastal salt meadow (type 16).

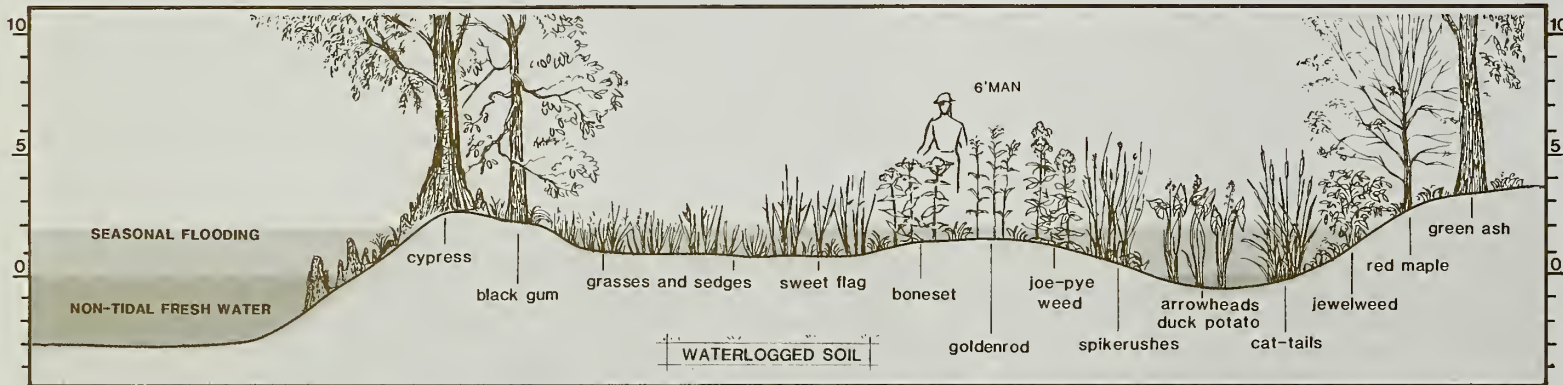
Seasonally flooded wooded basins or flats are found extensively throughout the river basin. One-hundred and twenty-five wetland depressions of variable sizes including a pitcher plant bog (type 8) were identified during a detailed wetland inventory conducted by SCS. The outside peripheral edge of these depressions are usually also type one wetlands.

Wooded swamps are the most prevalent wetland types in the watershed and are found in at least thirty-seven different places along the river. Coastal shallow fresh marshes are located in four areas, two of which are at the river's mouth and two near Snow Hill. Coastal salt marshes are also located in four areas, all of which are at the river's mouth. Shrub swamps are located near the mouth of the river and along Dividing Creek. They are also found along Nassawango Creek

and in the area near Whiton Crossing. Inland open fresh water wetlands are located in two areas, one of which is near the mouth of the river and the other in Wicomico County. None of the wetlands along the river are currently being used for commercial or residential activity. However, it is interesting to note that, since 28,511 acres of wetlands were first identified in the Pocomoke river watershed twenty years ago by the Maryland department of Natural Resources, 10,567 acres or 37% of those wetlands were transferred to other uses. This transformation reduced the overall wetland value of the area. Greatest alterations to the wetlands occurred in Wicomico and Worcester

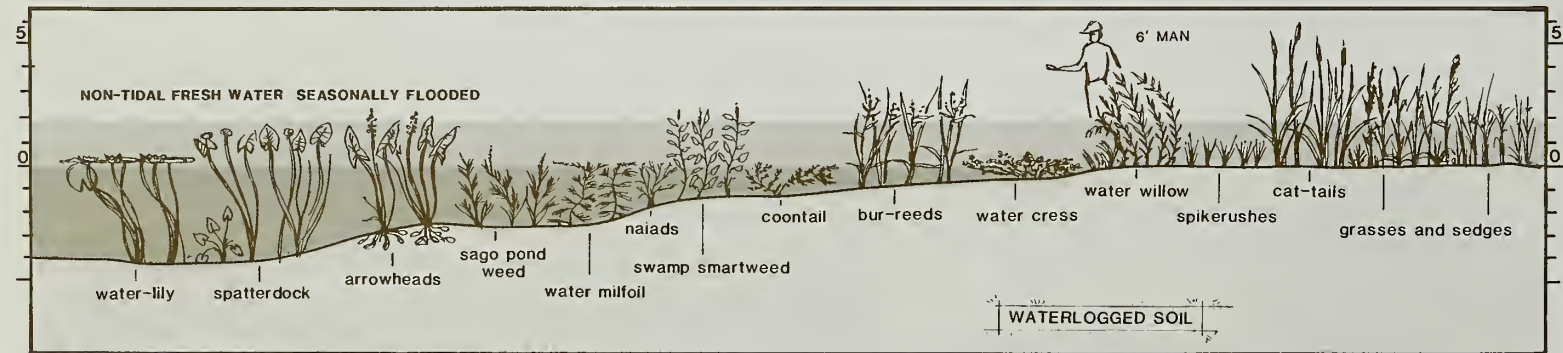
Counties, from the Delaware state line to Porter's Crossing, involving almost complete loss of wooded swamps (type 7) by reclamation projects.

Present wetland policies and studies should aid in the prevention of needless loss of wetlands. However, constant monitoring of wetland acres is necessary because the protection of the natural qualities of the wetlands along the Pocomoke river could be the single most important step in retaining the scenic character of the river.



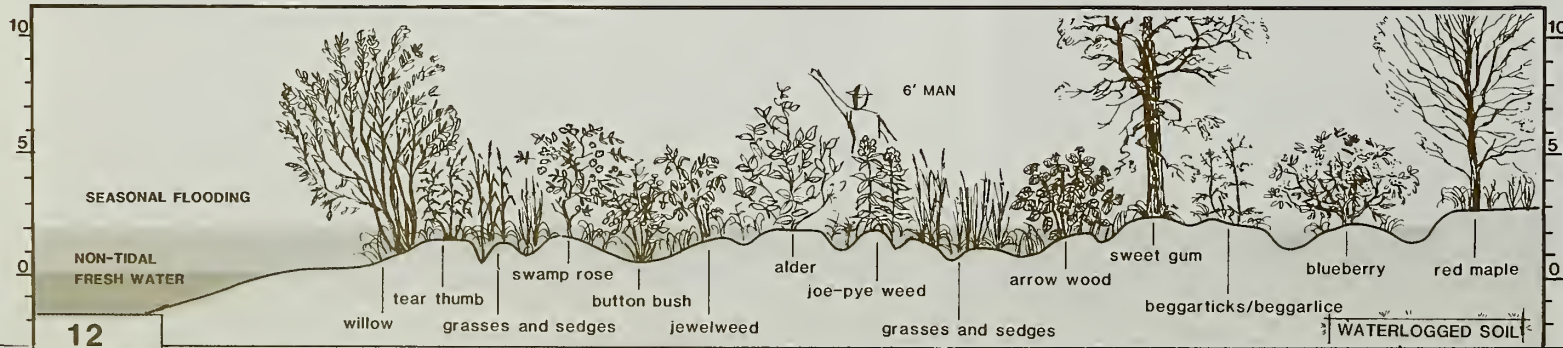
**WETLAND TYPE 1**

SEASONALLY  
FLOODED  
FLATLANDS  
AND BASINS



**WETLAND TYPE 5**

INLAND  
OPEN  
FRESH  
WATER

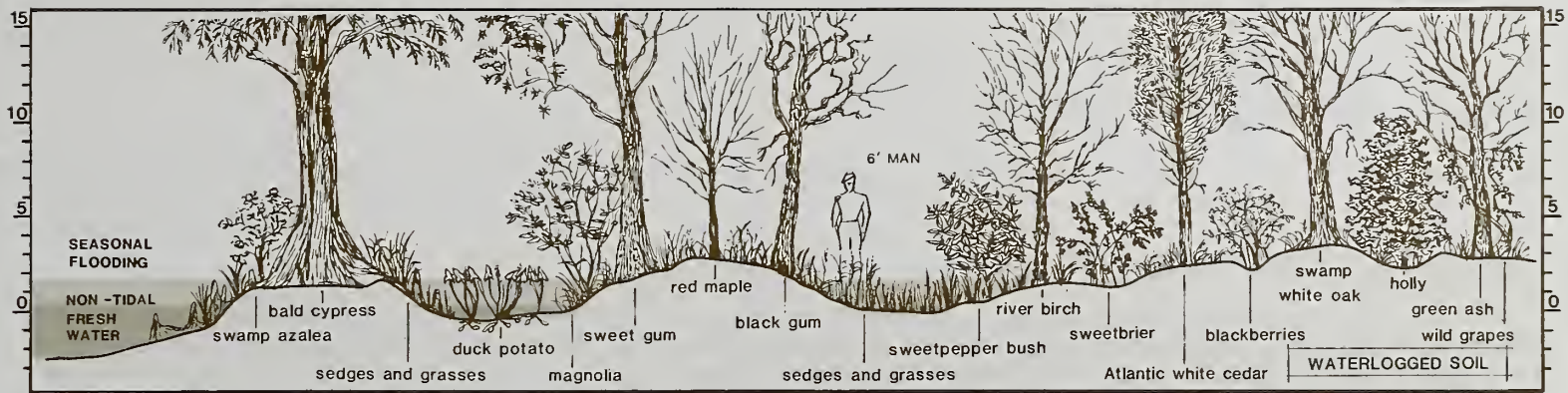


**WETLAND TYPE 6**

SHRUB  
SWAMP

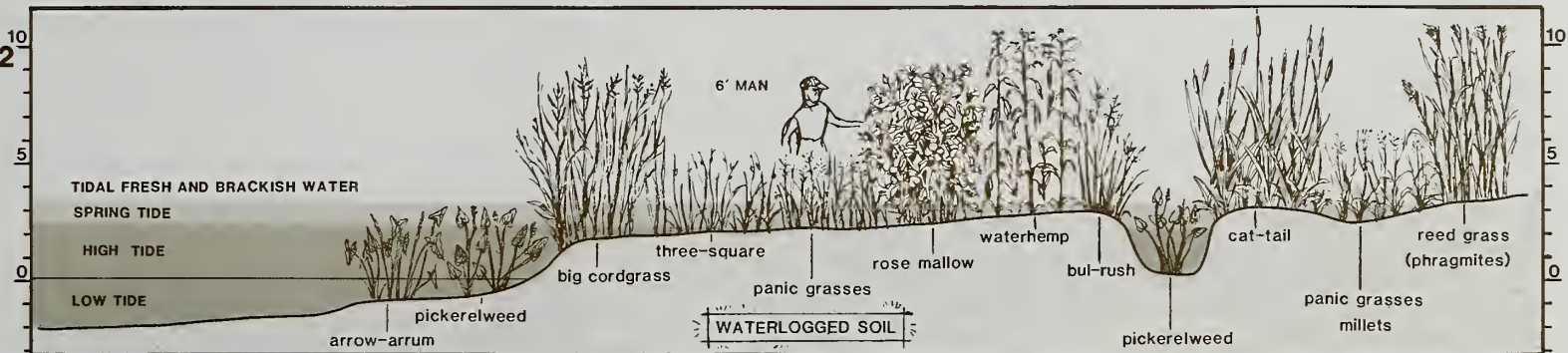
**WETLAND TYPE 7**

**WOODED SWAMP**



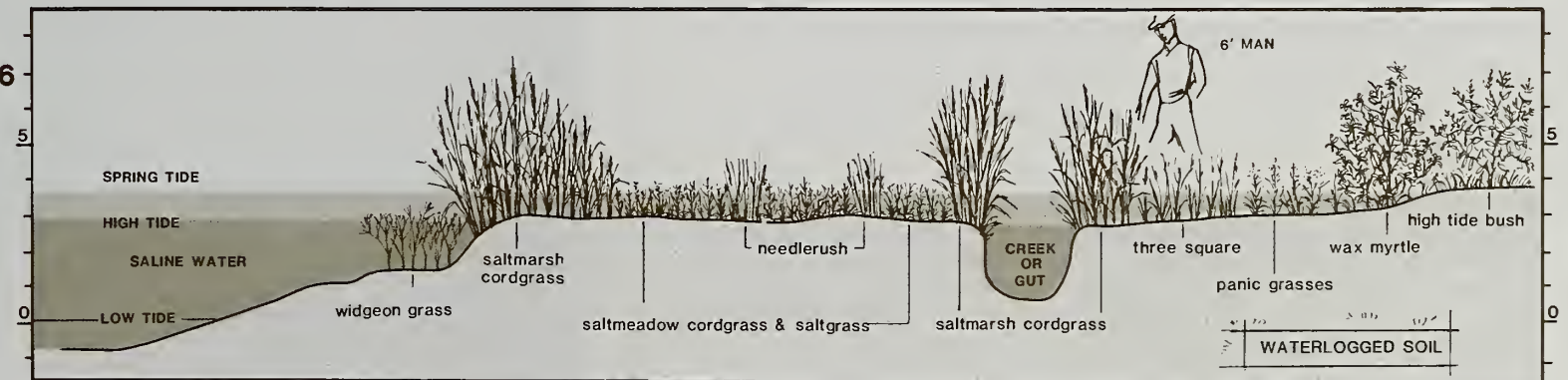
**WETLAND TYPE 12**

**COASTAL SHALLOW FRESH MARSH**



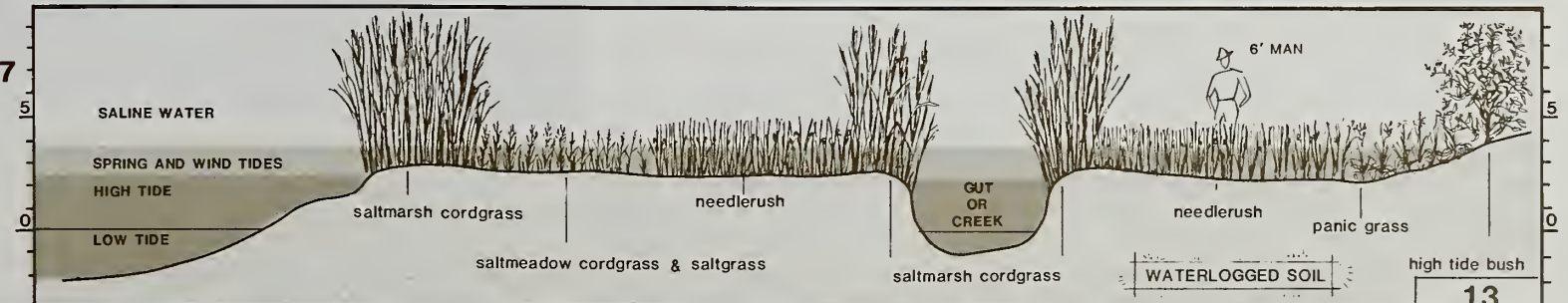
**WETLAND TYPE 16**

**COASTAL SALT MEADOW**



**WETLAND TYPE 17**

**IRREGULARLY FLOODED SALT MARSH**



## Water Quality

The waters of the State of Maryland are divided into classes. For each class water quality standards are set which delineate maximum or minimum in-stream levels for various water quality parameters. The parameters are dissolved oxygen, fecal coliform, pH, turbidity and temperature.

**Dissolved oxygen (DO)** depletion in waters caused by pollution can place stress on aquatic animals and reduce their ability to meet the demands of their environment. In extreme cases it would cause death by oxygen starvation.

**Fecal coliform** is a type of bacteria found in the gastrointestinal tract and feces of warm-blooded animals. Fecal coliform is used as an indicator of pathogenic organisms.

**The pH** (hydrogen ion concentration) is a measure of acidity. The pH scale is zero to 14, less than 7 the water is acidic, 7 neutral and greater than 7 is alkaline. Natural waters have a pH typically between 6.5 and 8.5. Acidic waste can exert stress conditions which kill aquatic life and basic conditions (pH above 8.5) begin to decrease reproduction in many aquatic species.

**Turbidity** is the cloudiness in water due to the suspension of silt or finely divided matters.

**Temperature** is the degree of hotness or coldness measured on a definite scale.

According to the *208 Water Management Plan for the Pocomoke River Basin* there are three widespread water quality concerns in the Pocomoke River Basin: bacterial contamination, low dissolved oxygen, and excess plant nutrients. These conditions can be attributed to both point and/or nonpoint sources of pollution or natural conditions, depending on the area.

Bacterial contamination is widespread in the basin. The areas where bacterial standards violations are most apparent are those areas which are closed to shellfish harvesting. Bacteriological contamination can result from a number of sources. The most probable sources in the Pocomoke Basin are failing septic systems, urban runoff, runoff from agricultural land used to dispose of or store animal waste, and improperly treated domestic or industrial wastewater.

Trend network sampling and intensive survey samplings conducted in 1976 and 1977 show violations of the /Class I bacteriological standards in the Pocomoke River mainstem below Snow Hill all the way to Shelltown. Particular problems were noted in Wagram Creek and Rehobeth Branch. Sampling dome above Rt. 50 also indicates bacteriological contamination. All other areas of the basin meet water quality standards for bacteria.

Relatively low dissolved oxygen levels are very common throughout the basin. The shallow, sluggish streams are naturally low in dissolved oxygen because of the leaching of materials from the acid soils associated with the surrounding marsh and swamp lands. Other than the natural causes in the Pocomoke Basin, municipal and industrial discharges, stormwater runoff from urban and agricultural land, and failing septic systems are the most probable sources related to low dissolved oxygen conditions. Another cause of low dissolved oxygen conditions are excessive amounts of nutrients which can lead to algae



*Good water quality is important to a variety of aquatic life.*



blooms under certain conditions. These algae blooms can block out sunlight, thus reducing photosynthesis of submerged plants. This in turn lowers the dissolved oxygen level of the water body. Typical cyclical fluctuation of oxygen levels can create stress for aquatic organisms.

The waters of the Pocomoke River are designated as Class I. This means that the water quality should meet Class I water quality standards set by the State. These include: water contact recreation (boating and swimming); spawning and/or nursery area for white perch, striped bass, spot, croaker and weakfish; limited commercial and recreational fishing; shellfish harvesting (especially hard shell clams); and wintering area for geese, swans and various species of ducks.

Good water quality and quantity can be insured by retaining soils and maintaining vegetative cover along the river and in the watershed.



*Good water quality is important for water contact recreation and fishing.*

## WATER QUALITY STANDARDS FOR THE POCOMOKE RIVER

(Regulation 08.05.04.03, Maryland Water Resources Administration)

### STANDARDS FOR CLASS I WATERS

#### (Water Contact Recreation & Aquatic Life)

##### (1) Bacteriological Standards

There shall be no sources of pollution which constitute a public health hazard. If the fecal coliform density exceeds a log mean of 200/100 ml, the bacterial water quality shall be considered acceptable only if a detailed sanitary survey and evaluation discloses no significant public health risk in the use of the waters.

##### (2) Dissolved Oxygen Standard

The dissolved oxygen concentration shall be not less than 4.0 mg/liter at any time, with a minimum daily average of not less than 5.0 mg/liter, except where, and to the extent that, lower values occur naturally.

##### (3) Temperature Standard

For all discharges of heat, the maximum temperature of receiving waters beyond the mixing zone determined in accordance with Regulation .13 may not exceed 90°F (32°C), or ambient temperature of the receiving waters, whichever is greater.

##### (4) pH Standard

Normal pH values must not be less than 6.5 nor greater than 8.5, except where—and to the extent that—pH values outside this range occur naturally.

##### (5) Turbidity

- a. Turbidity may not exceed levels detrimental to aquatic life; and
- b. Within limits of Best Practicable Control Technology Currently Available, turbidity may not exceed for extended periods of time those levels normally prevailing during periods of base flow in the surface waters; and
- c. Turbidity in the receiving water resulting from any discharge may not exceed 50 JTU (Jackson Turbidity Units) as a monthly average, nor exceed 150 JTU at any time.

## Channel Modification

The Pocomoke River has been modified for both drainage and for navigation. Because of the high water table and waterlogged soils, drainage for agricultural purposes has been undertaken in the Pocomoke watershed ever since the early settlement period (1843-1970). During this period clearing of the river consisted primarily of the removal of fallen trees and logs. In 1912 and 1913 dynamite was used to straighten some sections of the old channel. Various methods for draining the channel and levying taxes in relation to drainage were proposed in 1916 and 1918, but were never implemented.

Perhaps the most significant drainage of the Pocomoke River began in 1939 when work was performed under the Civilian Conservation Corps (CCC) and the Works Project Administration (WPA) to remove trees and sunken logs from the lower sections of the channel. The Maryland Legislature made available state funds for drainage work on the river, and the Commissioners of Wicomico County and Worcester County also agreed to appropriate funds for two years. Monies were then provided on the condition that a Civilian Conservation Corps could be secured to do the clearing and supervise the work. In August, 1939, construction of a channel was started and the CCC camp was established. (Pocomoke River, Preliminary Study, 1968).

Survey work to obtain information for design and construction plans was started in November, 1939. Channelization started at a point one mile below Whiton Crossing. From this starting point upstream to the Delaware state line the distance following the old river bed was 17.23 miles. This distance was shortened to 14.4 miles following the

relocated line as it is today. The average depth of cut was about 7 feet, with a bottom width at the beginning point of 60 feet. At the Maryland-Delaware state line the bottom width was reduced to 20 feet.

There are 14 major watersheds as designated by conservation need inventory which use the Pocomoke as an outlet. Six public drainage associations have taken advantage of Public Law 566, the *Watershed Protection and Flood Prevention Act*, in the past few years and numerous groups have organized small drainage projects.

During early steamboating days there was strong opposition on the part of operators to the sending of their large craft above Corkers Creek. This situation was remedied by cut-through canals made by the U.S. Army Corps of Engineers in 1879-1888 when many thousands of cubic yards of spoil were removed to straighten the river's course. These canals, known as First Cut, Second Cut and Thoroughfare, were located respectively near Robin's Wharf, Dightons (Dyghtons) and between Second Cut and Cypress Point (Arcadia, 1977).

At very low tide the muds located at the mouth of the river also became somewhat of a barrier to shipping, especially to large schooners and steamboats late in the last century. Because of the oozy, drifting nature of these muds it became impossible to keep the channel open. Thus, in the 1930's, a short-cut canal was dredged by the Army Corps of Engineers. It was six feet deep at the base of the peninsula and extended out to Williams Point on the north side of the river. This relocation of the entrance to the Pocomoke eliminated the trouble crossing the muds and made the point into an island.



# Biological Resources

## Flora

There are seventy-two families of plant life that have been identified in the Pocomoke River wetlands. Of the total flora 40% range largely southward, while only 3.0% are varieties found exclusively in northern climates. The other 57% are found in both northern and southern climates. Except for the grassy wetlands near the mouth of the river, almost all of the acres of wetlands in the watershed are covered by an oak-gum cypress forest of bottomland hardwood (Beaven and Oosting, 1939). Because of its location at the northernmost extremity of its normal growth range, this southern overflow forest includes the most concentrated stands of cypress and Atlantic white cedar in the State of Maryland. The cypress seldom forms extensive pure stands but may be seen along the river edge in most areas. Local old growth cypress trees are known to have reached heights of one hundred and ten feet. The Atlantic white cedar is a species that is generally rare in Maryland. Other primary species of trees in the forest include sweetgum, green ash, and red maple. Secondary species include swamp white oak, beech, black gum, and holly. On higher ground are found loblolly pine, pond pine, shortleaf pine and miscellaneous oaks and hickories. Understory species include bayberry, strawberry bush, trumpet honeysuckle, viburnum, highbush blueberry, and wild azalea.

Plant life identified in the grassy meadow wetlands near the mouth of the river includes; water lilies, coontail, salt grass, blackrush, cattail, big cordgrass, and panic grass fringed to the landward by willows, small maples and sweetgums.

There are several rare, threatened or endangered plant species located in the Pocomoke drainage area, these include: Seaside Alder (*Alnus maritima*), Dwarf Trillium (*Trillium pusillum* var *virginianum*), *Micranthemum micranthemoides*—a hemianthus, Crossvine (*Arisostichus capreolata*), Pale Green Orchis (*Habenaria flava*) and Pitcher Plant (*Sarracenia purpurea*) as well as several rare arrowheads (*Sagittaria* spp.) (Broome, 1979).





## Fauna

The density of vegetation and food abundance in the Pocomoke River wetlands provides an exceedingly rich ecosystem where a wide diversity of fish and wildlife flourish. More than 27 species of mammals, 29 reptiles, 14 amphibians and 172 species of birds (resident and migratory) have been identified in the wetlands adjacent to the river. This area has been described by ornithologists as one of the best environments for bird life on the Atlantic coast. In addition to the terrestrials and amphibians, the Pocomoke and its wetlands and tributaries support a very high concentration of fish per acre and have one of the best spawning runs in the State for shad and herring. Listed are some of the fauna of the Pocomoke River and adjacent lands.

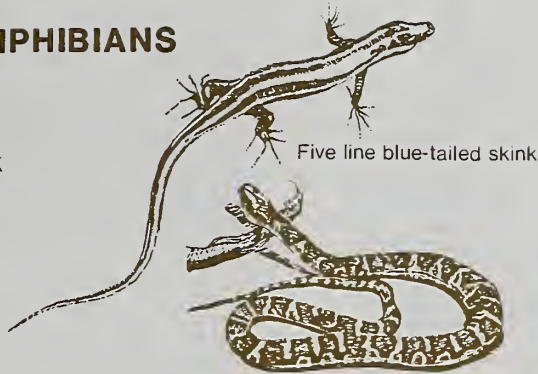
Rare, threatened, or endangered species known to inhabit the Pocomoke River area are the Delmarva fox squirrel (*Sciurus niger cinereus*), the Eastern narrowmouthed toad (*Gastrophryne carolinensis*), the southern bald eagle (*Haliaeetus leucocephalus*), the peregrine falcon (*Falco peregrinus*), and the Eastern tiger salamander (*Ambystoma tigrinum tigrinum*). Species of interest found along the Pocomoke include; the carpenter frog, pileated woodpecker, red-headed woodpecker, osprey, Swainson's warbler, and the eastern bluebird. Prior to 1661, eastern black bear, eastern cougar (American lion or puma) and timber wolf were found in the Pocomoke forest, but by 1800 they were extirpated. The passenger pigeon and the Carolina parakeet were also formerly found in the Pocomoke forest. They are now extinct.

Of the animals found in the Pocomoke Basin the only poisonous species is the northern copperhead. The corn snake (or red rat snake) is often confused with the copperhead. Also found in the Pocomoke drainage and mistaken for a poisonous species (cottonmouth moccasin), are the common banded water snake and the redbellied water snake. The cottonmouth, however, does not occur in the Pocomoke area.

From the days of the Indians the Pocomoke has been a fish paradise where numerous species, and in the early days, large sturgeon spawned. Both fresh and salt water species occur in the watershed. Studies prior to 1968 showed that the Pocomoke River supported at least two-hundred pounds of fish per acre of water and at least one-thousand pounds per acre during shad and herring runs. During recent years, however, the populations of shad and herring in the Pocomoke have declined. Sportfishing is good on the river. In the Sound alewives, catfish, croakers, eels, shad, gray sea trout, striped bass, spot, white perch and yellow perch are caught by such methods as haul seines, gill nets (anchor, drift and stake nets) pound nets, and fyke nets. In the river proper, largemouthed bass, blue gill, crappie, carp, catfish, alewives, glut herrings, American shad, gizzard shad, white perch, yellow perch, pumpkinseed sunfish, etc. are caught by sport fishermen. Fishing is also done in the mill ponds near the river. Sportfishing for striped bass, spot, croakers, white perch, bluefish, channel bass (red drum), black drum, and various sea trouts is extremely popular. Fisheries are located as follows: pound nets—Shelltown; drift and stake nets—Pocomoke City, Snow Hill and vicinity; bow nets—Pocomoke City and Snow Hill; fyke nets—mouth of Nassawango Creek. In the sound the fisheries are located below the north of the Virginia side near Saxis Island. The river was stocked annually with millions of both shad and yellow perch from 1890-1943. These stockings have produced no demonstrable results. Non-indigenous largemouth bass and crappie have been introduced, and are well established. Striped Bass are now being stocked near Pocomoke City.

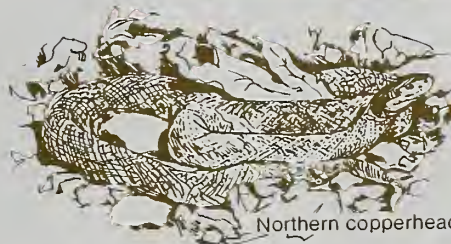
## REPTILES AND AMPHIBIANS

Northern fence lizard  
 Ground skink  
 Five line blue-tailed skink  
 Eastern worm snake  
 Ring neck snake  
 Hognose snake  
 Eastern king snake  
 Coastal plain milk shake  
 Redbellied water snake  
 Rough green snake  
 Black racer  
 Corn snake  
 Black rat snake  
 Common banded water snake  
 Northern redbellied snake  
 Eastern ground snake  
 Eastern ribbon snake  
 Common garter snake  
 Northern copperhead  
 Musk turtle  
 Snapping turtle  
 Spotted turtle  
 Eastern Carolina box turtle  
 Northern diamond back terrapin  
 Eastern painted turtle  
 Redbellied turtle  
 Midland painted  
 loggerhead turtle  
 Eastern tiger salamander  
 Marbled salamander  
 Redbacked salamander  
 Two-lined salamander  
 Eastern mud salamander  
 Eastern spadefoot  
 Narrowmouthed toad  
 Fowler's toad  
 American toad  
 Carpenter frog



Five line blue-tailed skink

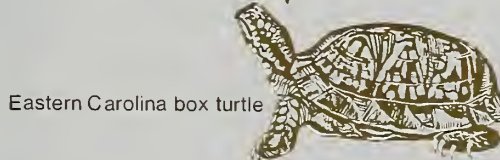
Common banded water snake



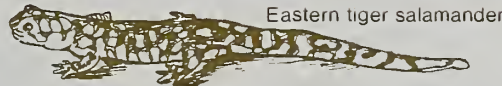
Northern copperhead



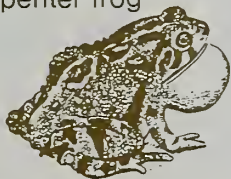
Snapping turtle



Eastern Carolina box turtle



Eastern tiger salamander



Fowler's toad



Carpenter frog



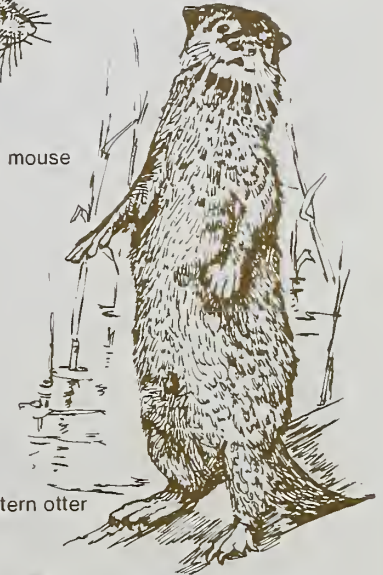
Narrowmouthed toad

## MAMMALS

**Fossorials**  
 Common mole  
 Least shrew  
 Carolina shrew  
 Shorttailed shrew  
**Winged**  
 Silver haired bat  
 Red bat  
 Hoary bat  
 Big brown bat  
**Rodents**  
 Southern white-footed mouse  
 House mouse  
 Brown rat  
**Common Game Species  
 and Furbearers**  
 White-tailed deer  
 Southern gray squirrel  
 Eastern cottontail rabbit  
 Southeastern mink  
 Southeastern otter  
 Red fox  
 Eastern gray fox  
 Raccoon  
 Muskrat  
 Virginia opossum  
 Skunk  
**Marine**  
 Harbor seal  
 Bottlenose dolphin



Southern white-footed mouse



Southeastern otter



White-tailed deer



Eastern cottontail rabbit



Southern gray squirrel

# BIRDS



Osprey



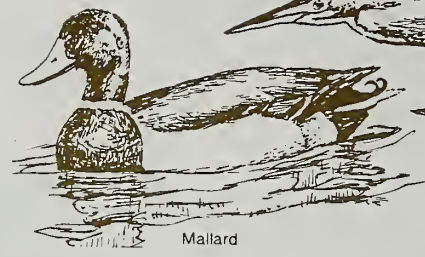
Bald Eagle



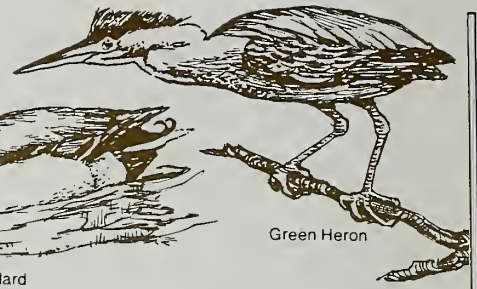
Pileated Woodpecker



Common Screech Owl



Mallard



Green Heron



Belted Kingfisher



Mourning Dove



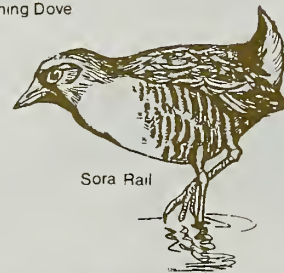
Pine Siskin



Common Bobwhite



Evening Grosbeak



Sora Rail



Yellow-throated Warbler



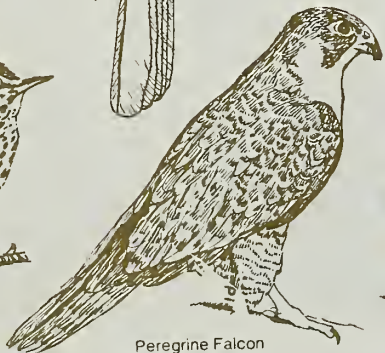
Brown Thrasher



Common Pintail



Wood Thrush



Peregrine Falcon



Wood Duck



Snowy Egret

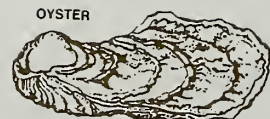


# CHART OF FISH, SHELLFISH, AND CRUSTATIONS HABITAT AND PROBABLE DISTRIBUTION WITHIN THE POCOMOKE SCENIC RIVER MAPPING SERIES

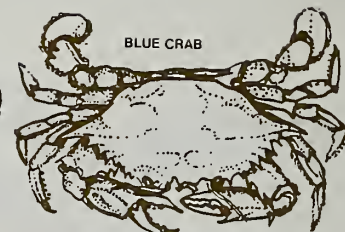
A :Adults    J :Juveniles    S:Spawning Area    \*:Anadromous species seasonally present

MAP NUMBER → 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

OYSTER																	AJS	
BLUE CRAB																AJ	AJ	AJ
AMERICAN EEL	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	
SEA LAMPREY		AJ	AJS	AJS	AJS	AJS	A	A	A	A	A	A	A	A	A	A	A	
ALEWIFE HERRING *	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJ	AJS	AJ	AJ	AJ	AJ	AJ	AJ	AJ	
BLUEBACK HERRING *	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJ	AJS	AJS	AJ	AJ	AJ	AJ	AJ	AJ	
HICKORY SHAD *		AJS	AJS	AJS	AJS	J	J	J						AJ	AJ	AJ	AJ	
AMERICAN SHAD *		AJS	AJS	AJS	AJS	J	J	J						AJ	AJ	AJ	AJ	
GIZZARD SHAD	AJS	AJS	AJS	AJS	AJ	AJ	AJ	AJ	A	A	A							
MENHADEN								J	J	J	J	J	J	AJ	AJ	AJ	AJ	
BAY ANCHOVY									AJ	AJ	AJ	AJ	AJS	AJS	AJS	AJS	AJS	
STRIPED KILLIFISH											AJ	AJ	AJ	AJS	AJS	AJS	AJS	
BANDED KILLIFISH					AJ	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJ	AJ	AJ	
MUMMICHOG						AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	
SHEEPSHEAD MINNOW														AJ	AJ	AJS	AJS	
MOSQUITOFISH	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	
EASTERN MUDMINNOW	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	
ATLANTIC STURGEON														A	A	A	A	
LONGNOSE GAR	AJS	AJS	AJS	AJS	AJS	AJS	AJS											
CARP	A	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	A	A	A	A	A	A	
REDFIN PICKEREL	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS			
CHAIN PICKEREL	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS				
WHITE CATFISH		AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJ	AJ	AJ	A			
BROWN BULLHEAD	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS			
TADPOLE MADTOM	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS				
TESSELLATED DARTER	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS									
CREEK CHUBSUCKER	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS				AJS		
GOLDER SHINER	AJS	AJS	AJS	AJS		AJS	AJS	AJS	AJS	AJS	AJS	AJS				AJS	A	
SPOTTAIL SHINER	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJ	
PIRATE PERCH	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS				AJS	
WHITE PERCH	S	S	S	JS	AJS	AJS	AJS	AJS	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	AJ	
YELLOW PERCH	S	S	S	AJS	AJS	AJS	AJS	AJS	AJ	AJ	AJ	AJ	AJ	AJ	AJ	A	A	
SILVER PERCH																	A	
BLUESPOTTED SUNFISH	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS				
BLACKBANDED SUNFISH						AJS												
REDBREAST SUNFISH	AJS	AJS	AJS	AJS														
LARGEMOUTH BASS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS								
STRIPED BASS														AJS	AJS	AJ	AJ	
BLUEGILL	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS			
BLACK CRAPPLE	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS									
ATLANTIC SILVERSIDE										AJS	AJS	AJS	AJS	AJS	AJS	AJS	AJS	
ROUGH SILVERSIDE														AS	AJS	AJS	AJS	
TIDEWATER SILVERSIDE																	AJ	
THREESPINE STICKLEBACK																	AJS	
ATLANTIC NEEDLEFISH																	AJS	
NORTHERN PIPEFISH																	AJ	
OYSTER TOADFISH																	AJS	
SUMMER FLOUNDER																	AJ	
WINTER FLOUNDER																	A	
HOGCHOKER																	AJS	AJS



OYSTER



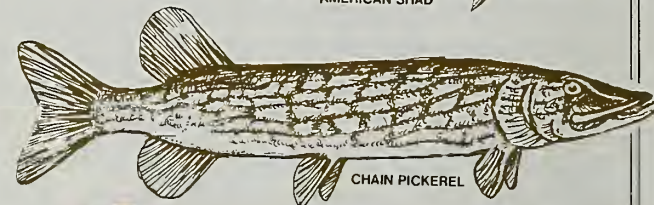
BLUE CRAB



AMERICAN EEL



AMERICAN SHAD



CHAIN PICKEREL



BROWN BULLHEAD



WHITE PERCH



YELLOW PERCH



STRIPED BASS



OYSTER TOADFISH



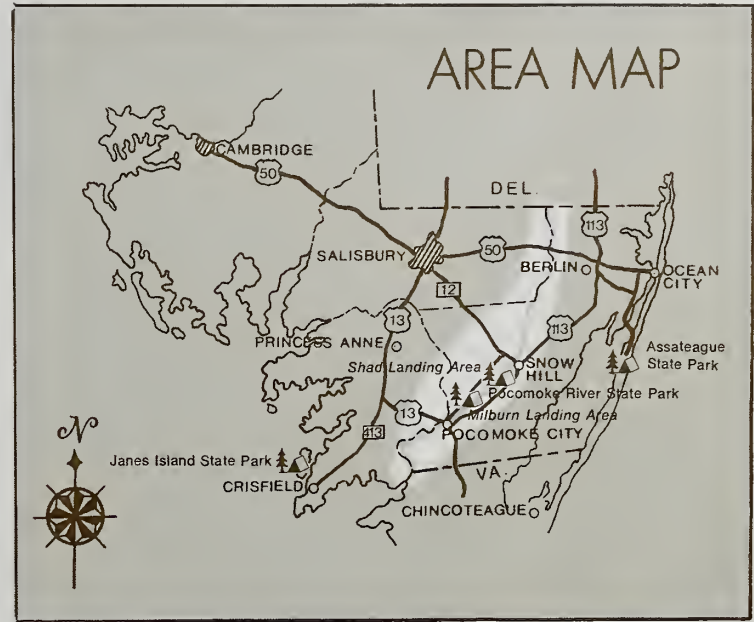
# Recreational Resources

The Pocomoke State Forest including Milburn and Shad Landing areas (collectively known as Pocomoke River State Park), the Pocomoke River Wildlife Management Area and City Parks at both Snow Hill and Pocomoke City provide for a wide variety of recreational uses of the Pocomoke River and surrounding areas. These activities include picnicking, camping, swimming, hiking, boating, nature studies, and hunting and trapping. In addition to activities provided for by these areas, canoe trips are frequently sponsored by local individuals, organizations, educational institutions, and Maryland Forest and Park Services.

**Pocomoke State Forest**—This area contains 13,111 acres of woodland, streams and wildlife habitat adjacent to the Pocomoke River. There are seventy-four miles of roads and trails which are used primarily for fire protection. These roads can also be used by hunters to gain access to the forest which is open to hunting as well as fishing in season. Several miles of trails are provided for four-wheeled vehicles and motorcycles in the forest near Shad Landing. An off-road-vehicle permit is required. Campers and others at the Pocomoke River State Park can use the adjacent forest for related activities.



*Playgrounds in Pocomoke State Park, Milburn Landing area.*

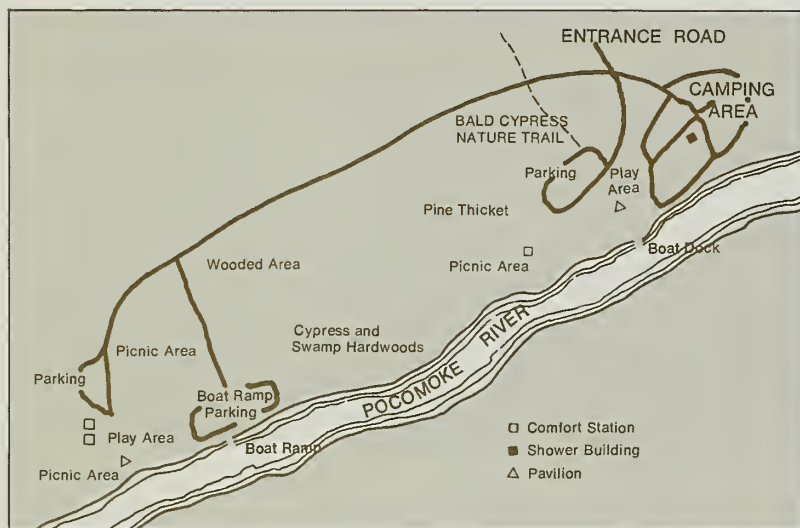


**Pocomoke River**



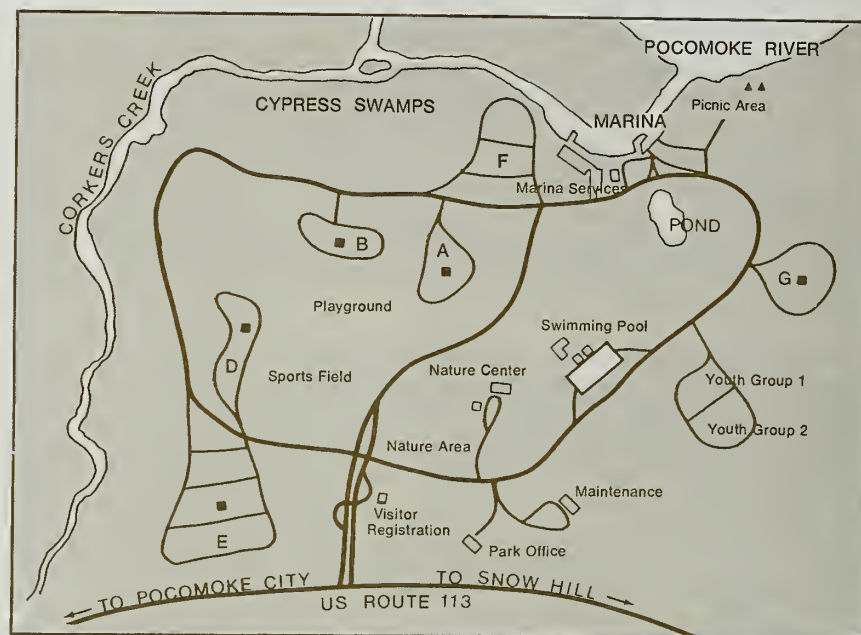
*Boat docks in Pocomoke State Park, Shad Landing Area.*

## Pocomoke River State Park: MILBURN LANDING AREA



**Milburn Landing Area**—Camping, picnicking, fishing boating and interpretive programs are provided. There are fifty campsites available in a heavily wooded section of this area adjacent to the river. Family campsites as well as three youth group camping areas (each accommodating up to forty youths) are provided. Family campsites are on a first-come-first-served basis; youth group camping areas, however, can be reserved by prior arrangements with the park superintendent. Water, shower facilities and flush toilets are provided in the family camping area. The picnic areas contain picnic tables, fireplaces and pavilions (each with six tables and a fireplace). Most of the picnic areas are on a first-come-first-served basis, pavilions may be reserved in advance for a fee. Fishing is permitted in the Pocomoke River and boat launching ramps are provided for river access. Fishing licenses are required since the waters here are tidal. Scheduled nature walks and evening campfire programs are conducted periodically throughout the summer. There is also a self-guided nature trail through the cypress swamp.

## SHAD LANDING AREA



**Shad Landing Area**—Camping, picnicking, fishing, boating, an interpretive program and swimming are offered at Shad Landing. There are six areas available for tent and trail camping. Four areas (A,B,D, G) have modern washhouses serving 30 individual sites in a loop arrangement. The lower deck of the marina services building contains the washhouse for area F. Area E has 50 sites and a heated washhouse for year-round camping. Two youth group areas are available by advance reservation and accommodate up to forty youths. Family sites have picnic tables, charcoal grills, washhouses with hot showers, flush toilets and laundry tubs. Like Milburn Landing the picnic area at Shad Landing contains picnic tables, fireplace, playground equipment and pavilions. Pavilions may be reserved in advance. In addition to fishing in the Pocomoke River and nearby creeks, a  $\frac{3}{4}$  acre fishing pond is provided for youths. A marina is provided at Shad Landing which includes 23 boat slips (with water and electrical hookups), a well-lighted dock area, a fuel and transient pier; and a two-deck marina services building containing a commissary, washhouse, snack bar and seating places. Rowboats, out-board motors and canoes may be rented. A boat launching ramp is also available. A nature center at Shad Landing contains exhibits, a library, and space for meetings and other activities. Seasonal naturalists



*Canoeing on Corker's Creek near Potomac State Forest.*

conduct campfire programs, canoe safety sessions and canoe trips, nature workshops and nature walks, fishing contests and other activities for park visitors. A self-guiding nature trail through the cypress swamp is also offered. Outdoor education programs for children can be arranged during the school season. A 25-meter swimming pool with associated facilities such as a modern bathhouse with showers, flush toilets, lockers and dressing areas are provided. There is also a wading pool for small children. Because of depth, strong undercurrents and eddies, swimming in the Pocomoke River is not recommended. Hunting and trapping are permitted in designated areas along the river but are not allowed in the Pocomoke State Park.

**Pocomoke River Wildlife Management Area**—This State game management area encompasses 500 acres of land on the east side of the Pocomoke adjacent to the State forest area. This is a public hunting area and deer and puddle ducks (dabbling ducks that feed in shallow water) are abundant. These ducks can be hunted along the Pocomoke River from temporary or portable duck blinds. Permanent duck blinds are not permitted. Hunting for deer here can be difficult due to inaccessibility through the river swamps.



*Camping at Shad Landing.*

**Recreational Needs:** A canvas by the Department of Agriculture's Soil Conservation Service of recreational needs (in addition to the existing ones) as outlined in county comprehensive plans include: public or privately owned camping areas, river parks and preserves, nature study areas, roadside parks, public landings (boat launching ramps and docks with parking areas), and nature trails. In Somerset County's Comprehensive Plan, recreation facilities were rated inadequate in number for all age groups. Additionally, the State Comprehensive Outdoor Recreation Program (SCORP) identifies deficits in areas and facilities for motor boating, hunting, picnicking, walking for pleasure, and waterskiing. Additional recreation areas and facilities should be based upon SCORP policies and recommendations, be compatible with the character of the river, and be consistent with the current SCORP Action Program. (see *Maryland Outdoor Recreation and Open Space Plan*). Recommendations are made in this plan for additional recreation areas and facilities.

**Public Access:** Access to the middle and lower Pocomoke appears to be adequate; therefore only two additional public access points on the upper Pocomoke are recommended (Whiton Crossing and Porters Crossing)—See map on page for existing and proposed public access points.

# Protected Lands

## State Wildlands

Wildlands in the State of Maryland are classified as type one, two, or three. Type one wildlands are primitive areas which, by their size or location, are in effect untouched by urban civilization and can offer the experience of solitude and self-reliance; type two are units of importance for all the natural sciences, especially ecology and with outstanding value for education, research, and appreciation of natural process; and type three are areas which are not of ecological or primitive stature, but which have the appearance of being in an untouched state or are capable of attaining that appearance if held and managed for this purpose. On the Pocomoke River all of the designated State Wildlands are classified as type two. These include the 1,429 acre State-owned Cypress Swamp near Rehobeth and 1,295 acres in the Pocomoke State Forest (see map on page ). Preservation in the natural condition is the prevailing purpose of these holdings where activities are limited to such uses as hiking, hunting, fishing, wilderness camping and nature study.

## State Critical Areas (refer to map on pages 6 & 7)

As required by state legislation the Secretary of State Planning identifies and designates areas of critical State concern after consultation with local governments. These areas contain valuable natural resources or have one or more features...“which contribute substantially to or have a substantial effect upon the social, economic, or environmental welfare of the citizens of the State...[and] because of [their] inherent characteristics or vital location [are] *susceptible* to physical alteration, destruction, or loss...” (COMAR 16.00.02.08. A, B [1] [2]). Because of its attributes, the Pocomoke River from bank to bank, plus all adjacent lands with soil classified in the USDA Soil Conservation Service’s soil surveys for Maryland counties as muck, muck and peat, mixed alluvial, and tidal marsh, has been designated an area of critical State concern. Designation does not, however, extend past a point one-half (1/2) miles from the junction of any tributary with the banks of the Pocomoke River, and in the corporate limits of Snow Hill and Pocomoke City includes only those lands within the 100-year floodplain as identified on the Flood Insurance Rate Maps effective May 15, 1980 and September 3, 1980 respectively (Areas of Critical State Concern: Designation Report, 1981). The purpose of critical area designation is to insure that the future use of the river is accomplished in a manner which is most compatible with its attributes.





## SECTION II ——— Resource Use and Protection Plan





The Pocomoke River is the only river on the Delmarva Peninsula designated under the Scenic and Wild Rivers Act of Maryland. The river is also eligible for study by the Federal Government for inclusion in their Wild, Scenic and Recreation Rivers System. Additionally, the swamps adjacent to the river in all three counties have been recommended for potential nomination to the National Natural Landmarks Program.

The resources that led to the designation of the Pocomoke as a Maryland Scenic River are clearly outlined in the preceding section. Such practices as clear-cutting to the water's edge, channelization, and pollution of the water negatively impact the resources that contribute to the scenic appeal of the river. It is therefore necessary to plan for the wise use of the river's resources by suggesting compatible land and water uses. The multiple usage of resources already occurring in the Pocomoke River basin suggests that this comprehensive management plan is the only reasonable approach to insure that wise management of the river's scenic resources will be accomplished. Here scenic and wild river objectives for the Pocomoke are set, the planning area is defined, the river is divided into segments and classified, the qualifications used for classification are outlined, guidelines for proper resource use and adequate public access are offered, and implementation techniques are recommended.



## Objectives

In order to assure its preservation as a wild and scenic river, the Pocomoke should be managed to:

*Protect the river's outstanding scenic qualities;*

*Maintain and enhance the outstanding biological and ecological resources of the river corridor;*

*Maintain and/or improve the existing water quality;*

*Maintain the free-flowing condition of the water;*

*Promote compatible land use;*

*Provide for recreation which is compatible with scenic and wild river designation and natural resources of the area;*

*Preserve and/or interpret the archaeological historical and cultural features within the river corridor; and*

*Conserve agricultural lands.*

## Scenic River Planning Area

Primary planning focus will be upon the scenic corridor because the corridor provides the greatest impact upon the future of the waterway as a scenic resource. The scenic corridor includes the wetlands adjacent to the river plus other adjacent lands with unique, natural, or scenic resources. These lands are to be managed for maximum maintenance of the integrity of the river and the enhancement of its biological, ecological, and recreational values.

# Classification

Based upon their attributes, entire rivers or river segments are usually classified as wild, scenic, or recreational. Generally, qualifications for river classification are as follows:

## Wild River

- a. River must be free-flowing.
- b. Water quality should be supportive of local fish and wildlife populations.
- c. Shorelines should be essentially primitive, free of man-made intrusions, including waterway modifications and should be natural-like in appearance.
- d. River must be generally inaccessible by road.

## Scenic River

- a. Water is free-flowing. Low dams, diversion works, or other structures should not be located in the scenic river area; upstream impoundment construction is contingent upon adverse impact.
- b. Water quality is (or is capable of being improved so that it is) supportive of local fish and wildlife populations.
- c. Developments and small communities are limited to short stretches.
- d. Accessible generally by roads or an occasional bridge. Short stretches of conspicuous or longer stretches of paralleling and inconspicuous roads or railroads are permitted.
- e. Shoreline is essentially natural-like in appearance; however, some agricultural land and a modest amount of waterway modification may occur.

## Recreational River (Modified Scenic)

- a. River is not necessarily free-flowing; there may be dams or small impoundments.
- b. Water quality should be capable of supporting local or stocked species of fish and wildlife.
- c. Shorelines may be extensively developed. Land may be developed for the full range of agricultural uses including small residential developments. Combinations of paralleling roads or railroads, bridge crossings, and river access points are permissible.

Based upon the preceding qualifications the Pocomoke River has been divided into segments and classified as follows:

- |  |   |
|--|---|
| I. Maryland-Delaware Line to one mile below Whitons Crossing | Modified Scenic   |
| II. One mile below Whitons Crossing to Snow hill             | Wild  |
| III. Snow Hill to Pocomoke City                              | Scenic and Modified Scenic (Modified scenic includes the two cities and outlying areas) |
| IV. Pocomoke City to Pocomoke Sound                          | Scenic  |

# POCOMOKE RIVER: MAP LAYOUT, CLASSIFICATION AND SEGMENT DESIGNATIONS

## SEGMENT I

(CHANNELIZED)  
MODIFIED  
SCENIC

## SEGMENT II

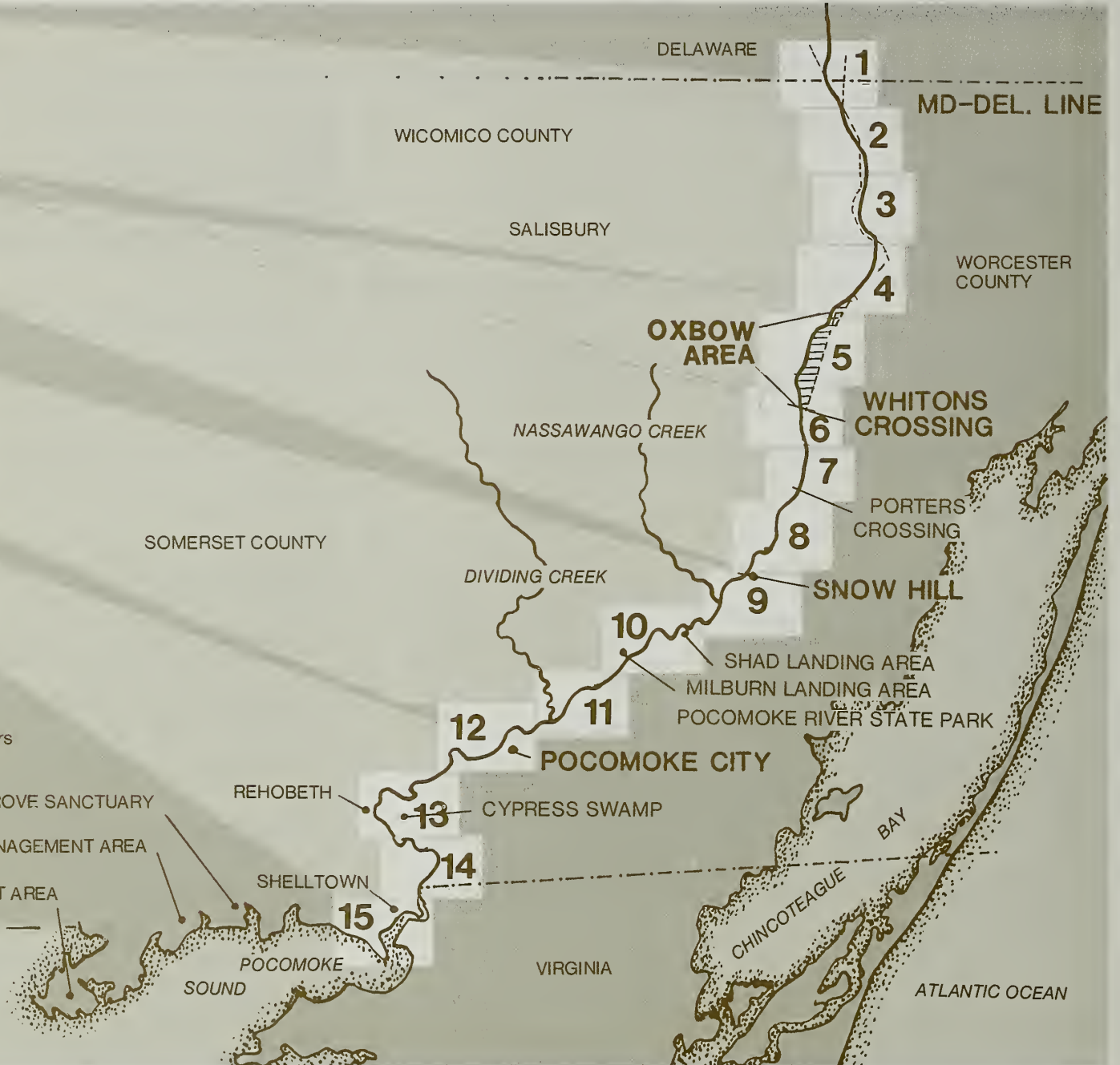
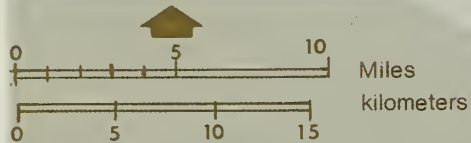
WILD

## SEGMENT III

SCENIC AND  
MODIFIED  
SCENIC

## SEGMENT IV

SCENIC





# Resource-Use Recommendations

Three major types of resource use recommendations are appropriate within the river corridor: general, classification-related, and segment-related. Each set of recommendations is designed to guide land and water use decisions toward achievement of the wild and scenic river objectives. General resource use recommendations apply throughout the river corridor and operate as the basic ground rules for resource protection and use. Classification-related recommendations offer guides for maintaining the natural character of the particular Wild, Scenic and Modified Scenic segments, while segment-related recommendations serve as tools for strictly regulating use in a specific defined area. It is intended that this complex of resource use recommendations supplement rather than conflict with each other. In cases where conflicts or inconsistencies arise, the more protective recommendation should govern.

## I. GENERAL RECOMMENDATIONS

General recommendations emphasize maintaining the corridor's natural character while at the same time recognizing the need to accommodate compatible uses of resources.

### A. WATER QUALITY\* AND FLOW

- (1) For scenic appeal, surface waters should be maintained free of floating debris, oil, scum, or other materials which detract from scenic appeal; materials that will settle to form objectionable deposits; substances producing objectionable odor, taste or turbidity; materials, alone or combined, in concentration which are toxic to humans, animals, plants or aquatic life; substances alone or in combinations that produce undesirable aquatic life.
- (2) Surface waters, with few exceptions, should be of a quality to allow enjoyment or recreational activities based upon the utilization of fish, waterfowl and wildlife.
- (3) Species harvested by recreation users should be fit for human consumption.

- (4) Discharge of substances which increases unfavorable total acidity or alkalinity should be limited.
- (5) The water quality should be maintained and enhanced by supporting water quality standards set by the "208 Plan" for the Pocomoke River.
- (6) The natural flow volume of the river should be maintained.

**B. FISH AND WILDLIFE**—fish and wildlife have commercial, recreational as well as aesthetic value and should be treated as a multi-use resource.

- (1) Utilization of fish and wildlife resources for commercial purposes should not preclude their use as a scenic or recreational resource.
- (2) Wherever necessary, provide and maintain fish passage facilities.
- (3) Whenever possible, incorporate in land management techniques practices which will contribute toward enhancing wildlife populations.
- (4) Preserve and enhance unique wildlife habitats.
- (5) Protect unique, rare, threatened, and endangered species by encouraging the pursuit of a vigorous habitat management and protection program.
- (6) Encourage greater public awareness of fish and wildlife resources through continuing educational programs.
- (7) Seek cooperative hunting areas.
- (8) Maintain the fish and wildlife resources—where species decline is evident and can be corrected, every effort should be made to do so.
- (9) Where habitat management practices are a limiting factor in species propagation, provisions should be enacted to correct the inadequacy.

\*From: Report of the National Technical Advisory Committee to the Secretary of the Interior, 1968.

### C. STRUCTURES

- (1) Essential public utility service lines and structures should be constructed and situated in a manner which minimizes their visibility from the river and their secondary impact due to run-off.
- (2) Structures for fishery management purposes such as fish ladders should not materially alter the natural character of the river.
- (3) Foot bridges should be made of naturally occurring materials such as wood.
- (4) Temporary structures, such as duck blinds, should not impede the natural flow of the river nor have a negative impact on the environment.
- (5) New permanent structures (such as a dam) which impede the natural flow of the river should be discouraged.
- (6) Structures within the 100-year flood plain should be restricted and other permanent structures should be set back a reasonable distance from the river.
- (7) No structures should be located on soils which have been identified in County Soil Surveys as unsuitable for building purposes.
- (8) Structures visible from the river, trails, or developed recreation sites should have sufficient vegetative screening to make them as inconspicuous as possible.

### D. FORESTRY PRACTICES—forestry management practices should follow the following guidelines:

- (1) Species diversity within the scenic corridor should be maintained.
- (2) Rare or threatened species habitat should be protected from destructive logging operations.
- (3) Logging operations should comply with the scenic corridor concept.
- (4) Clear-cutting should be kept a reasonable distance from the river.

- (5) Logging debris should be kept from entering the watercourse.
- (6) Logging equipment should be screened from view from the river.
- (7) Logging in unique natural areas should be discouraged.

### E. PUBLIC ACCESS

- (1) All new public roads which parallel the river should be located outside the scenic corridor.
- (2) New hiking trails that parallel the river should be situated in a manner which is compatible with the scenic character of the river.
- (3) New parking areas should be located, with few exceptions (Porters and Whiton Crossings) outside the scenic corridor.
- (4) New public roads for river access may be provided where needed but should not be established within 5 miles of an existing access road or in the wild section of the river.
- (5) The above excludes temporary logging and maintenance roads.

### F. RECREATION

- (1) Trails, bike paths and scenic roads should link parklands, conservation areas, scenic landscapes and historic and cultural areas.
- (2) An interpretive brochure which points out the scenic nature of the river should be developed.
- (3) One-hundred year flood plains, wetlands, and other unique natural areas should remain as open space areas.
- (4) Buffers should be maintained between public lands used for recreation and private lands.
- (5) Public campsites should be screened from view along the waterway.
- (6) Different types of recreation use and their impacts on the natural resources of river character should be monitored.

- (7) When necessary total visitor use should be regulated to avoid negative environmental impacts.

#### G. DREDGING, FILLING AND OTHER EARTH MOVING ACTIVITIES.

- (1) No surface mining should occur in the scenic corridor
- (2) Altering marsh hydrology by dredging and filling should be avoided.
- (3) With the exception of approved agricultural drainage projects, avoid excavation of materials and other earth disturbing activities within the scenic corridor.
- (4) All earth moving activities should be done in a manner which will not destroy the natural character of the river corridor.
- (5) In any earth moving operation adjacent to the river, erosion and sedimentation guidelines should be carefully followed.
- (6) Channel modification work will not be undertaken without prior review by the appropriate State agencies or without written approval of the Secretary of Natural Resources.
- (7) In the event that river banks are disturbed by earth moving operations they should be revegetated as soon as the operation ceases.

#### H. OTHER RECOMMENDATIONS

- (1) **Existing land uses**—existing land uses not mentioned above should be maintained at present level. Existing structures which detract from the natural character of the river should be screened from view. Dilapidated or deteriorating structures in full view from the river should be removed.
- (2) **Signs**—only those signs, which are necessary for public welfare and/or safety, or for location or interpretation should remain in full view from the river.
- (3) **Waste disposal dumps**—all waste disposal dumps should be located away from the river its flood plain.
- (4) **Livestock**—where erosion and water pollution is evident, farmers should be encouraged to fence livestock away from the river.

## Classification-Related Recommendations\*

The river was divided into segments based upon use patterns. The segments were then classified as wild, scenic or modified scenic. The intent of each classification was to describe the relative primitiveness or naturalness of that portion of the scenic corridor. In order to maintain the existing character of that segment, recommendations are made for each classification. Suggested use densities or intensities would be light within the wild segments, light to moderate in the scenic segment, and moderate to heavy in the modified scenic segment. These classification-related recommendations are tailored to more precisely fit the differing requirements along the river's length.

## Segment-Related Recommendations\*

For each segment, recommendations are based primarily upon how that segment is classified. To extract the segment-related recommendations, parameters for each segment were placed on transparent maps and overlaid. Parameters included land ownership and land use, location of archaeological sites, location of existing roads and trails, location of feeder streams, ditches or channelized areas, fish spawning areas by types, location of endangered species habitat and extention ranges, geology and natural soil groups, vegetation (types), and location of the 100-year flood plain. From these an analysis map was compiled to determine the affects (if any) of one parameter on the other. Some of the parameters were checked against recent aerial photographs. If there were inconsistencies the item was field checked and corrected. In this way, finite segment recommendations were extracted.

\*Note—HOW TO INTERPRET THE RECOMMENDATIONS—Segment-related recommendations should be interpreted to mean immediate implementable recommendations on the existing resource uses while classification-related recommendations are guidelines to be used for approved present use or probable unforeseeable future uses.

## Resource Analysis

### SEGMENT I (Modified Scenic)

Maryland Delaware Line to approximately One Mile South of Whiton Crossing, limit of tidal influence 14.4 miles—this segment of the Pocomoke includes approximately 2,250 acres of wooded swamp bordering the river as it flows south from Delaware to Whitons Crossing. The river in this area is a 14.4 mile straight ditch or channel flanked by two spoil banks.

Originally the river meandered over seventeen miles but the channel or Great Ditch, as it is called, reduced this stretch of the river to its present length leaving several cutoffs known as oxbows. Prior to channelization, the existing meander of the old river bed was much as it exists today. The two oxbow meanders in the Whiton Crossing area were quite well-defined. The most striking feature at that time was the dense and mature timber across the entire area below Whiton Crossing. Tree cover was uniform to the river's edge. Below the southernmost oxbow the river disappeared under the tree canopy then reappeared as a river-bed channel. By 1948, ten years after channelization, impounding was evident at the base of the channelized stream and at the oxbow. There was a rapid die-back of saplings and notable changes in the stream meanders well downstream towards Porter's Crossing with beginning evidence of a braiding stream as indicated by rapid change in tree condition. There was clear indication of floristic change along the natural meander and to a lesser degree east of the channelized stream by 1958. A shrub swamp with isolated cypress scattered throughout now reached at least halfway up the old river meander from the terminus of the channelized stream. A definite interlacing network of channels (braided stream) had established below the channelized stream.

Some patches of duckweed appeared in the natural river meander by 1972. Duckweed and some shrub-like vegetation was very dense in the isolated river meander. Between 1958 and 1972 only minor changes occurred in the shrub swamp.

A waste weir (debris dam) has established itself at the end of the channelized area. This plus the spoil banks has caused water levels to back up in Ninepin Branch, Duncan Ditch, Whiton Ditch and Tilghman Race. This high water level behind the weir, is slowly increasing the shrub swamp. Review of available hydrological surveys was carried out by SCS to determine the degree of impounding actually occurring above the weir area.

The channelized stream is isolated from the old river bed and is quite different in character. The spoilbanks are well-established with trees such as red maple, sweetgum, swamp cottonwood, river birch, and sycamore of small diameter. These spoilbanks obstruct the view of the surrounding swamps from the river. The river carries a heavy load of suspended sediments which can be seen entering the river from inflowing agricultural drainage ditches. There are at least five major watersheds in this area served by the channel. Some of the steep banks immediately adjacent to the water support little vegetation so that erosion is occurring from the spoilbank.

the lateral floodplain areas. The shrub swamp created along the old river bed is a wood-duck nesting and feeding area and is of moderate use by puddle ducks on a year-round basis for reproduction, roosting and feeding. Furbearers including raccoon, otter, muskrat, opossum, skunk, and fox utilize the area. Birds are the most notable wildlife in the swamp; great blue herons, kingfishers, woodpeckers, various warblers, owls and hawks are frequently observed. The endangered bald eagle and Delmarva fox squirrel as well as the carpenter frog—a species of special interest, utilize this area. Largemouth bass, black crappie, herring, hickory shad and yellow perch, to name a few, are found in the area's water.

This area remains mostly undeveloped except for the small towns of Willards, Whaleyville, and Powellville. There are several road crossings (two are major highways) and one railroad crossing. Thirteen archaeological sites are located near the river in this segment. Land use is mainly agricultural and forest under private ownership. Selective cutting has occurred immediately north of Whiton crossing. Recreational activities include mostly hunting and nature study. This area is zoned Open Space, and there is little development pressure at this time.

NOTE: Because the oxbows are geographically located in this segment they are described here, but because of their wild character they are hereafter treated as part of segment II (Wild).

## Classification-Related Recommendations

### suggested recreational uses and activities

tent and trail camping

public parking areas

boating (all types) with launching ramps and docks

family and group picnicking

visitors center

nature center

hunting and fishing cabins or lodges

developed public parks and recreation centers with convenient facilities

### non-recreational uses

agricultural—including farmsteads and agricultural structures forestry—following general policy guidelines.

moderate intensity developments with buffer zones

limited number of commercial sites

dams or other structures, where absolutely necessary, continuation and maintenance of existing dams or other water control structures

bridges for motorized travel or expansion of existing bridges

new roads and trails for public access to the river

## Segment-Related Recommendations

Preserve and protect carpenter frog ponds as well as endangered species habitats

Monitor pollution loadings from channelized segment in Delaware

Promote the use of channel maintenance roads for hiking and biking trails

Protect fish spawning areas

Establish animal waste lagoons where needed

Protect archaeological sites through conservation easements or purchase

Improve present boat launch ramp and stabilize roadside parking at Whiton Crossing Bridge

Develop multiple-use area at Ninepin Branch

Maintain vegetation buffers between the river and channel maintenance roads

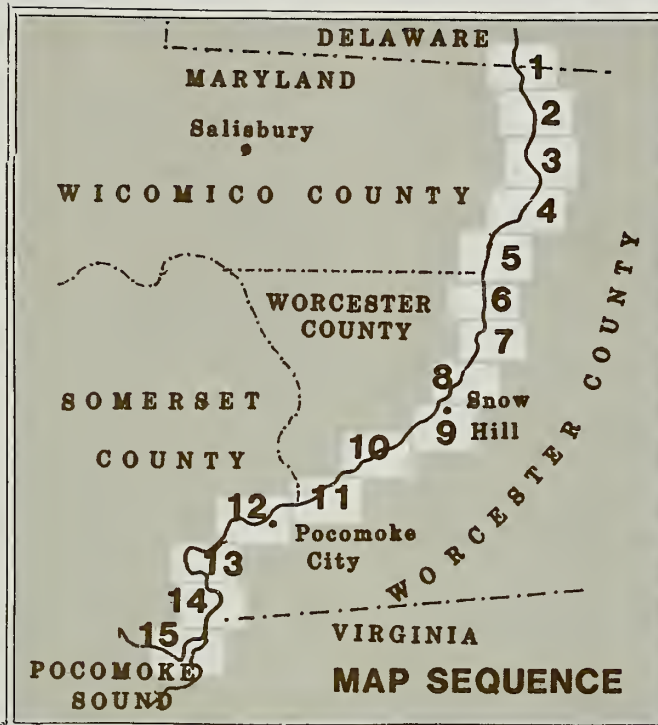
Continue existing clearing and snagging operations as means of preventing clogging of channel

Establish and maintain vegetation buffers wherever erosion is evident or probable



# POCOMOKE RIVER MAP SERIES

Scale 1" = 2000'



## LIST OF MARYLAND HISTORICAL TRUST—HISTORIC SITES INVENTORY LOCATED WITHIN THE POCOMOKE SCENIC STUDY MAPPING AREA

(W) Worcester County  
(S) Somerset County

Reference Number	Located On Map #
1-Douglas Doty House (W)	3
2-Arthur Cozzer's House (W)	3
3-Victor Filator House (W)	3
4-Douglas Carmean Brick Ruin (W)	8
5-Old Alms House (W)	8
6-A Number of Old Houses in Snow Hill (W)	9
7-"Shore Acres" (W)	11
8-Puncheon Mill (S)	12
9-"Ivy Hall"- "Costen" (S)	12
10-"Winter Quarter"- "Cowley" (W)	12
11-Rehobeth Episcopal Church (S)	13
12-Rehobeth Presbyterian Church (S)	13
13-Vessey's Orchard (S)	13
14-"Beverly" (W)	14
15-Sidney McKay Property (W)	14
16-William Point Farm (S)	15

### LEGEND

DESIGNATES  
SWAMP, MARSH,  
OR WETLAND



REFER TO  
FISH SPECIES CHART  
ON PAGE 22



LISTED ON  
MARYLAND HISTORIC  
SITE INVENTORY



### Recreational Use Symbols



BOAT  
LAUNCHING  
RAMPS



DRINKING  
WATER



PLAYGROUND  
EQUIPMENT



TELEPHONES



BOATING,  
OUT-BOARD  
MOTORS



PICNICKING,  
PICNIC  
TABLES



SHOWER,  
WASHHOUSES



PAVILIONS  
MARINA



PARKING



HUNTING,  
TRAPPING



CAMPING,  
TENT



MEN'S  
TOILETS



SNACK  
BAR



TRAILER  
PARKING



FISHING



SWIMMING



WOMEN'S  
TOILETS



ROWBOAT  
RENTAL



FACILITIES  
FOR  
HANDICAPPED



EXHIBITS,  
INTERPRETIVE  
PROGRAMS



HIKING



PAVILIONS  
(W/TABLES)



CANOE  
RENTAL



CAMPFIRES



COMMISSARY

SUSSEX COUNTY, DELAWARE

BEGIN SEGMENT I

WICOMICO COUNTY MD.

WORCESTER COUNTY, MD.

SEGMENT I: MODIFIED SCENIC

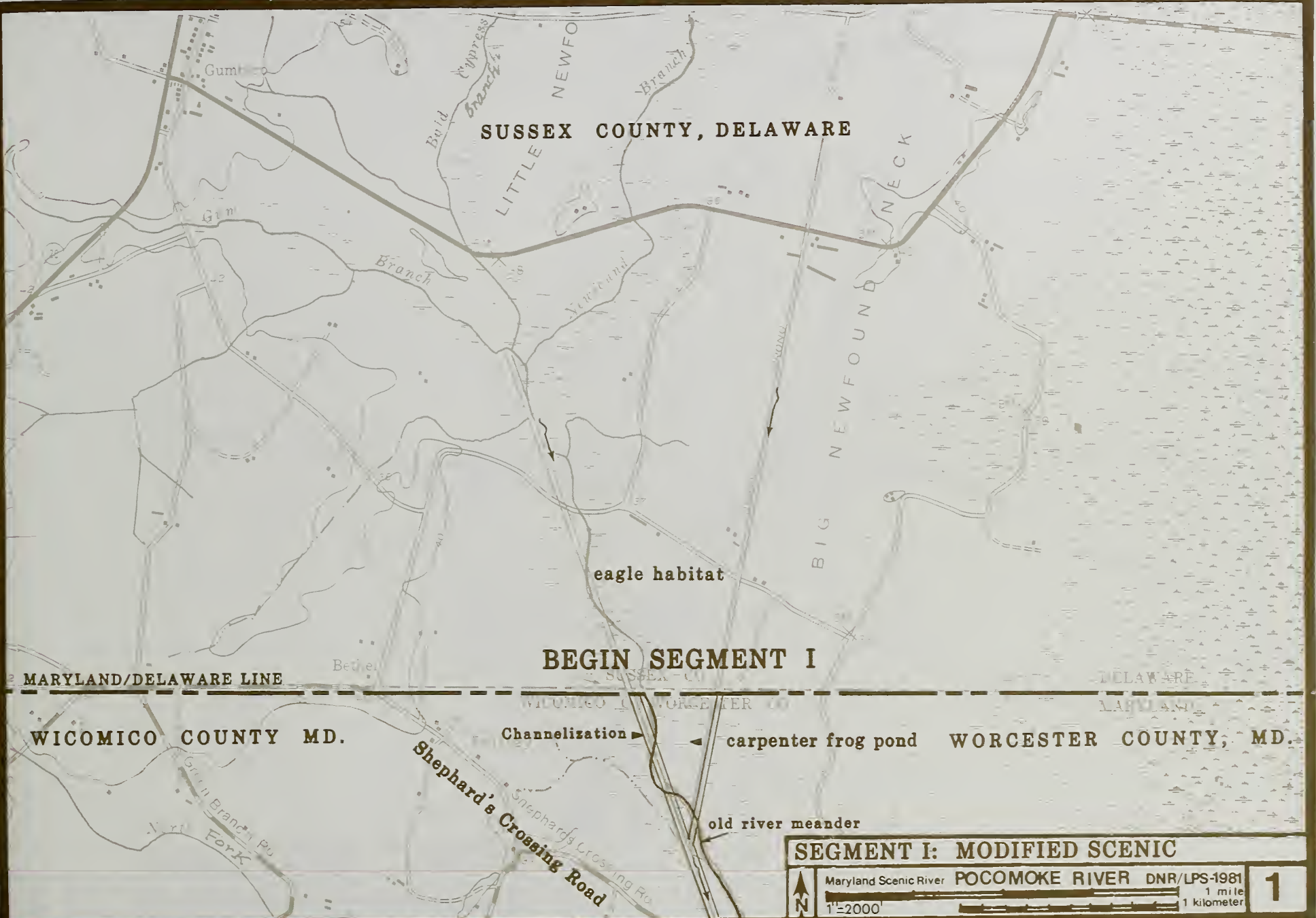
Maryland Scenic River POCOMOKE RIVER DNR/LPS-1981

1

1"=2000'

1 mile

1 kilometer



MARYLAND/DELAWARE LINE

Bald Cypress Branch  
LITTLE NEWFO  
Branch

BIG NEWFOUND NECK

eagle habitat

Channelization

carpenter frog pond

old river meander

Shepherd's Crossing Road

Gum Branch Fork

Gum

Gum

Branch

Newfound

WONG

Bedie

SUSSEX CO

DELAWARE

MARYLAND

WICOMICO CO WORCESTER CO



**SEGMENT I: MODIFIED SCENIC**

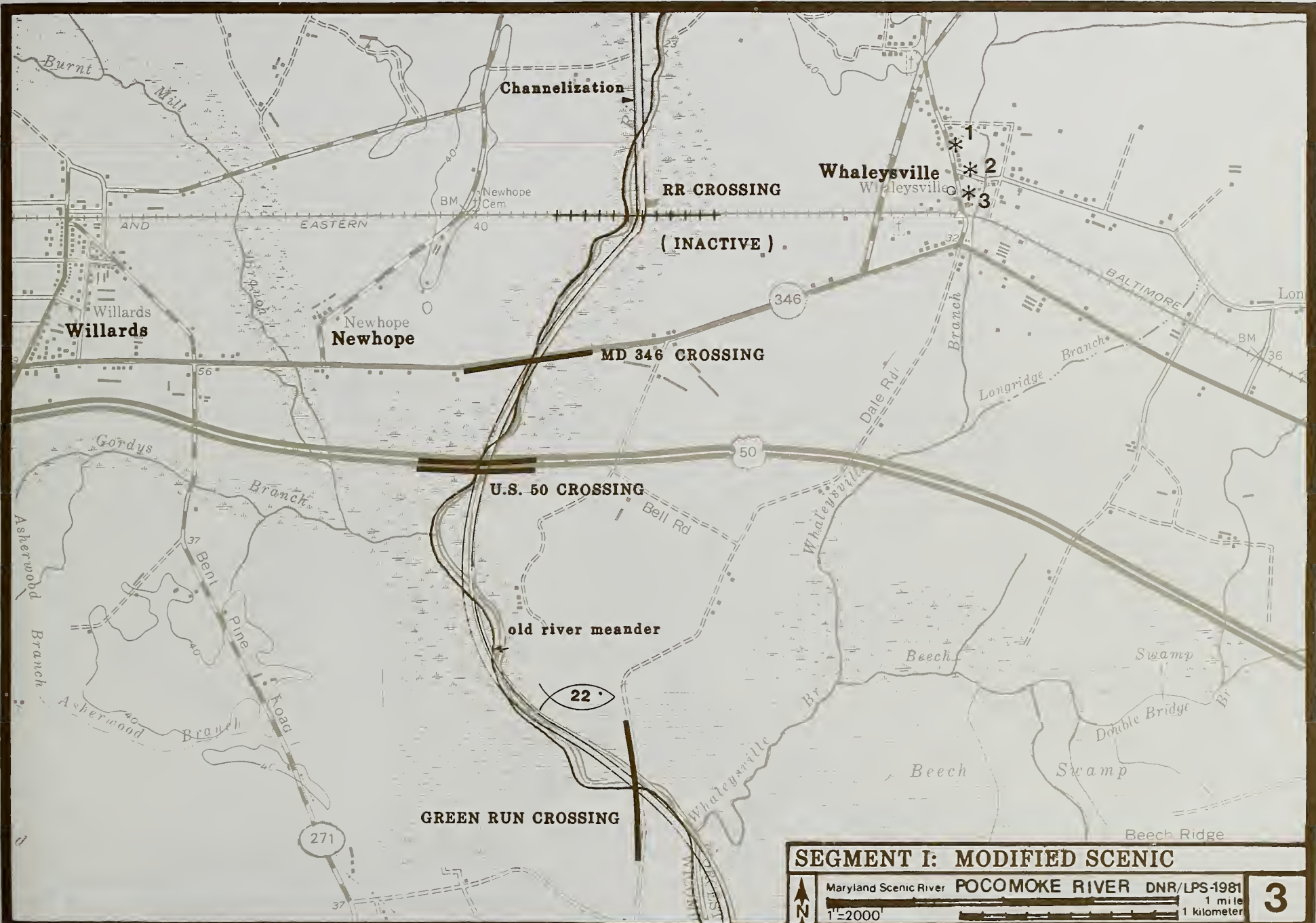
Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981

1"=2000'

1 mile / 1 kilometer

**2**

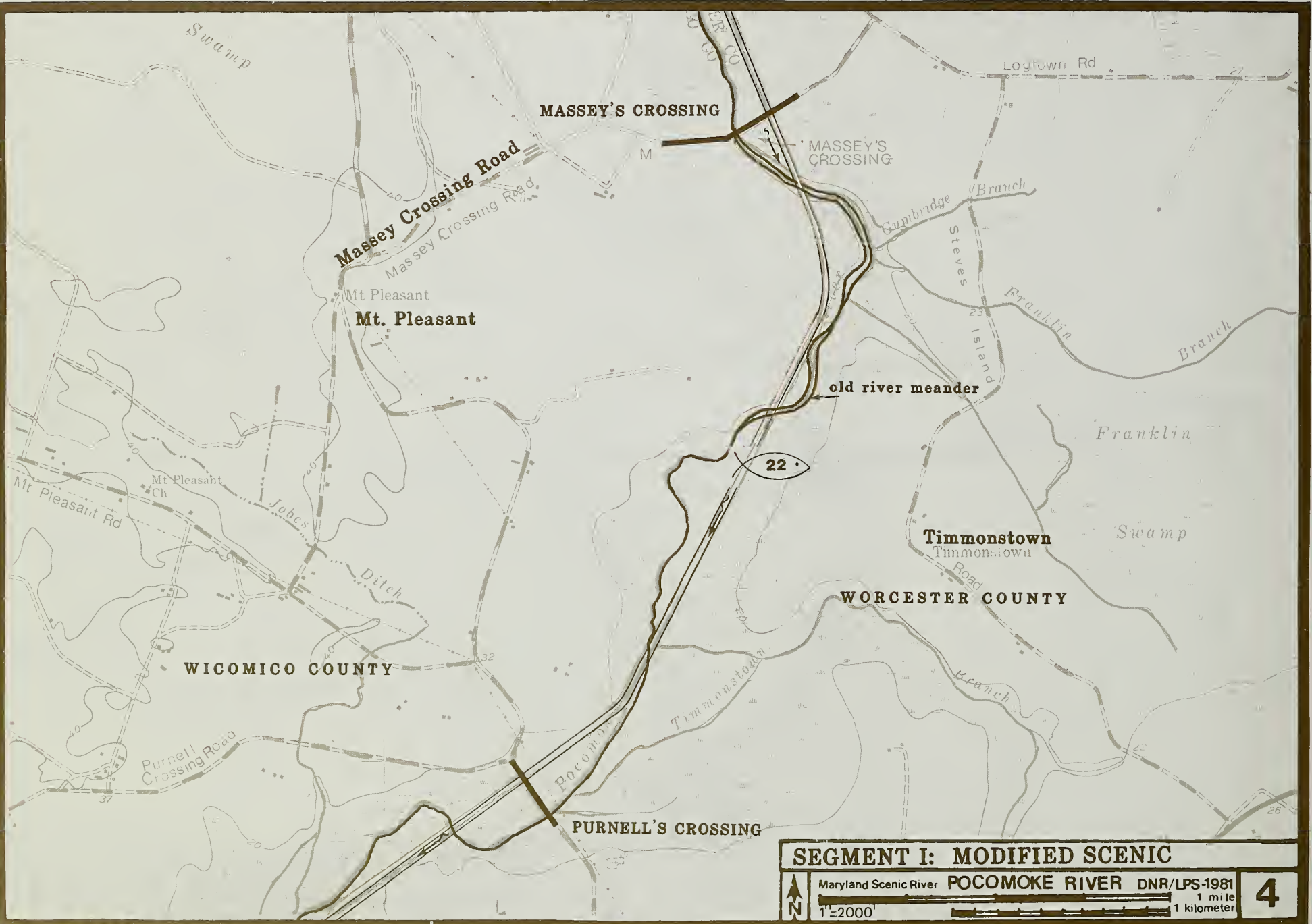




**SEGMENT I: MODIFIED SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
 1"=2000' 1 mile 1 kilometer

**3**

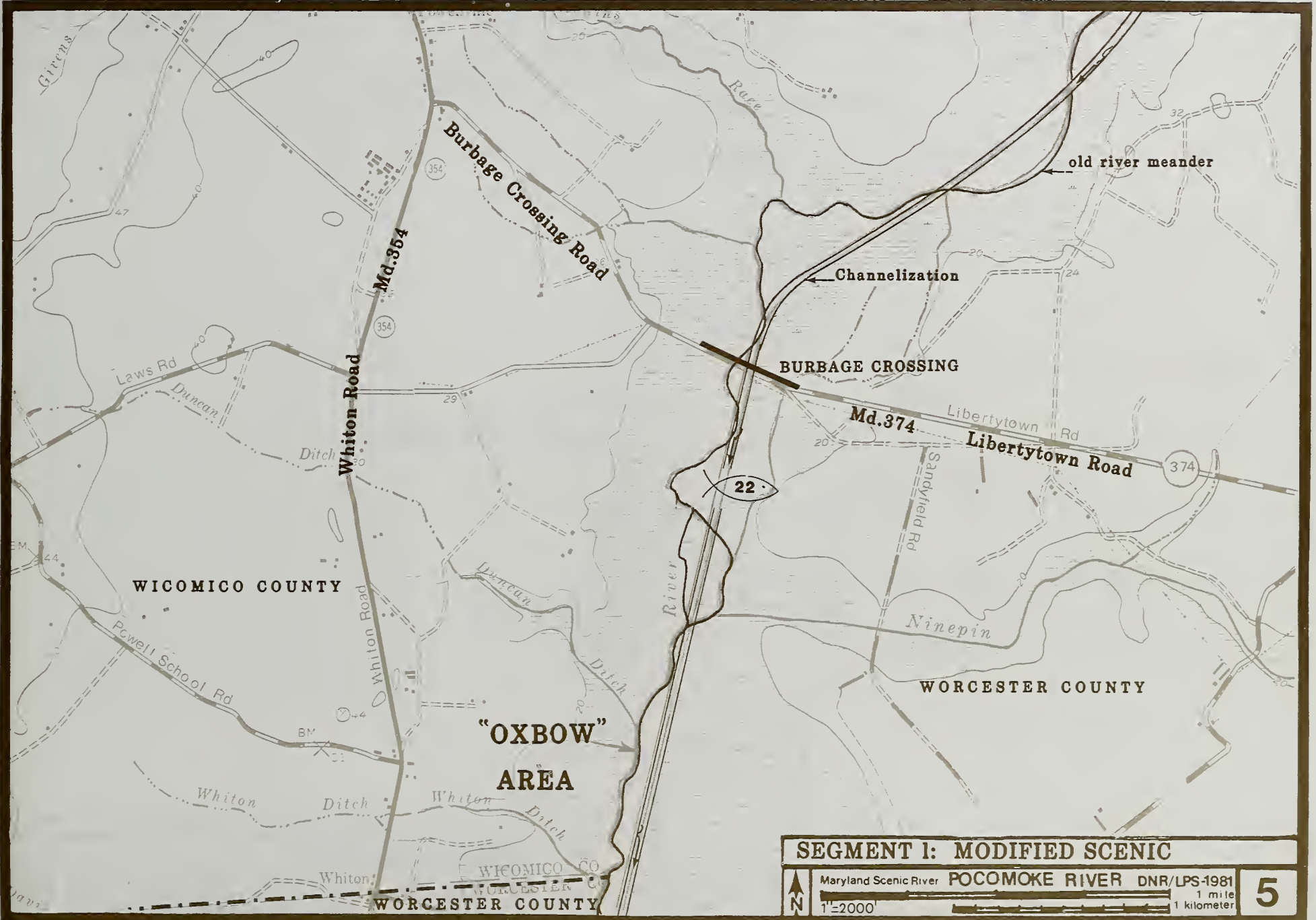


**SEGMENT I: MODIFIED SCENIC**

Maryland Scenic River POCOMOKE RIVER DNR/LPS-1981

1"=2000' 1 mile 1 kilometer

**4**

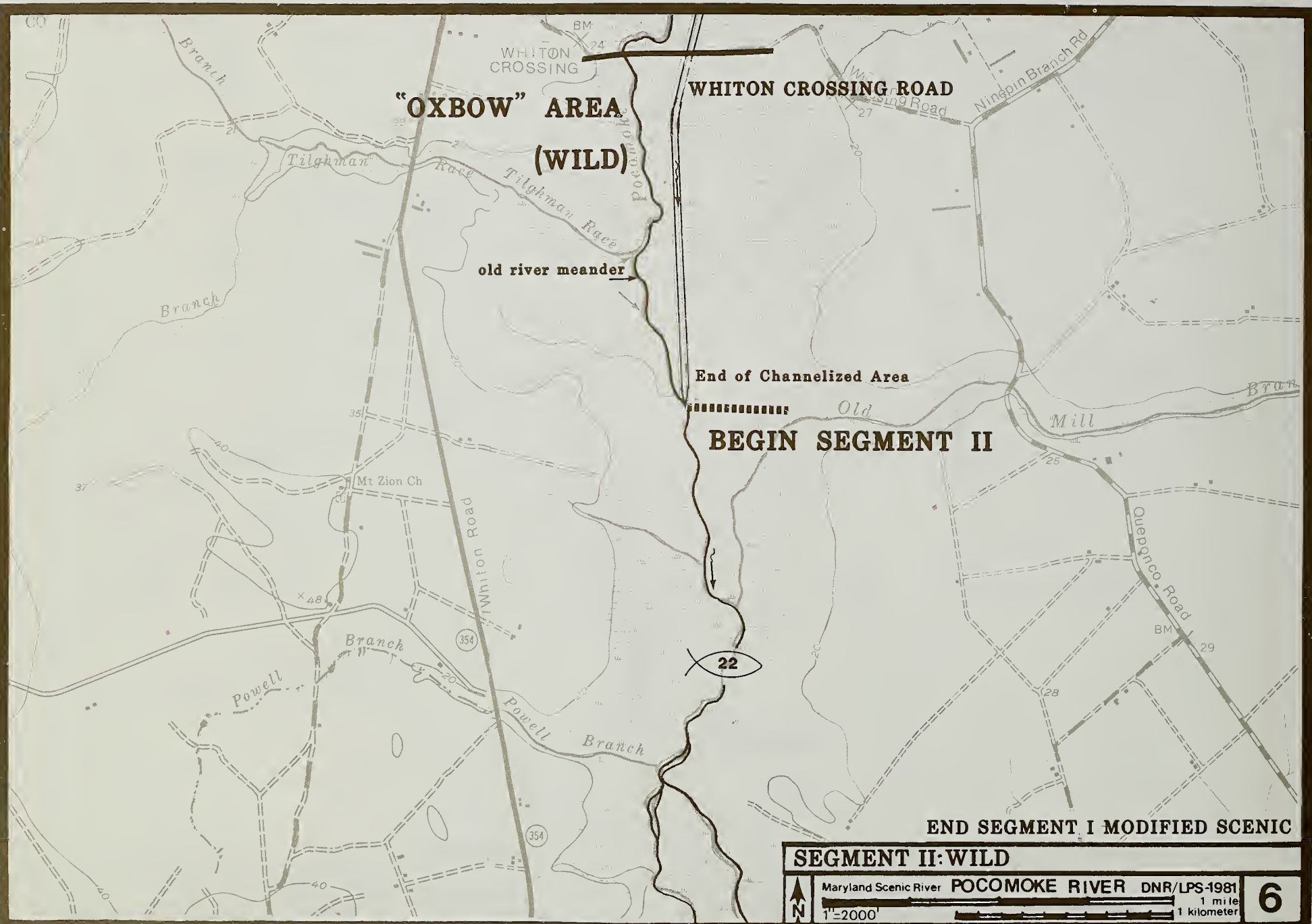


**SEGMENT 1: MODIFIED SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981

1"=2000' 1 mile 1 kilometer

**5**



**"OXBOW" AREA  
(WILD)**

**WHITON CROSSING ROAD**

old river meander

End of Channelized Area

**BEGIN SEGMENT II**

**END SEGMENT I MODIFIED SCENIC**

**SEGMENT II: WILD**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
 1"=2000' 1 mile 1 kilometer

**6**

## Resource Analysis SEGMENT II (Wild)

One mile south of Whiton Crossing to Snow Hill (8 miles)—the river begins to narrow and wind with a dense southern overflow forest close to the water's edge. Because no major roads (except Porters Crossing) and only one powerline intersect the river in this area, it exhibits a wild character with little evidence of human intrusion. In places along the river the lily pads, duckweed, and pickerelweed are backed by tall cypress and oaks. These old-growth trees with vines up to six inches thick create a wilderness-like atmosphere. Wilderness canoeing can be excellent in this area. In addition to its recreational value, this area supports seasonal waterfowl concentrations, and a variety of other wildlife, including an array of songbirds. The area historically has been a significant spawning area for white perch, alewife and shad. There are three archaeological sites, one powerline crossing and two unimproved roads up to the water's edge in the area. Soils immediately adjacent to the flood plain are suitable for development and farming with only slight limitations. At present the surrounding areas are predominantly cropland. Thirty-two acres of land at Porters Crossing are in public ownership. Zoning for the area is Open Space. Problems include flooding, trees susceptible to windthrow, and moderate development pressure in the lower reaches near Snow Hill.

## Classification-Related Recommendations

### **suggested recreational activities:**

primitive hiking and camping

hunting and fishing

canoeing

nature study

other forms of passive recreation which are consistent with the wild character of this segment

### **non-recreational uses:**

conservation of the land in its existing condition

agriculture—following general policy guidelines

forestry—following general policy guidelines

**all other uses are not recommended for the wild river segment**

## Segment-Related Recommendations

Provide limited recreation facilities at Porters Crossing—extensive recreational development is not recommended due to extensive flooding in the area

Discourage new structures or improvements unless they are clearly in keeping with the overall management and classification objectives of the wild river environment

Discourage additional utility crossings

Seek scenic easements from, or conservation agreements with, land owners bordering the River in this area especially in the Whiton Ox-bow area

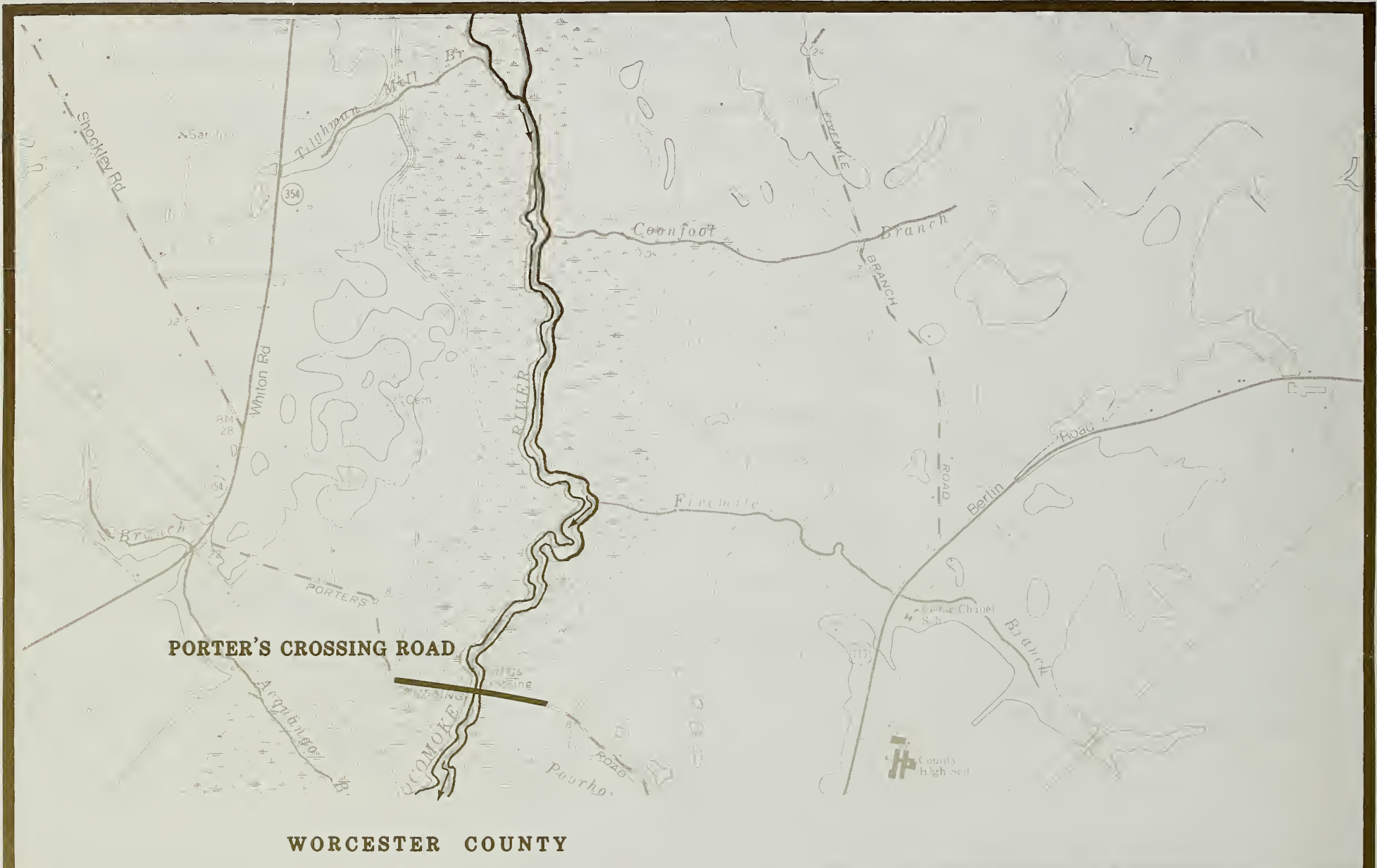
Employ reasonable restraints on allowable volumes of recreational use

Direct development away from the wild river area

Discourage the use of powered boats except those used by the county for channel maintenance purposes

Maintain oxbow cut-offs as fish and wildlife habitat

Provide marked canoe trails up through the oxbow area near the weir



**PORTER'S CROSSING ROAD**

**WORCESTER COUNTY**

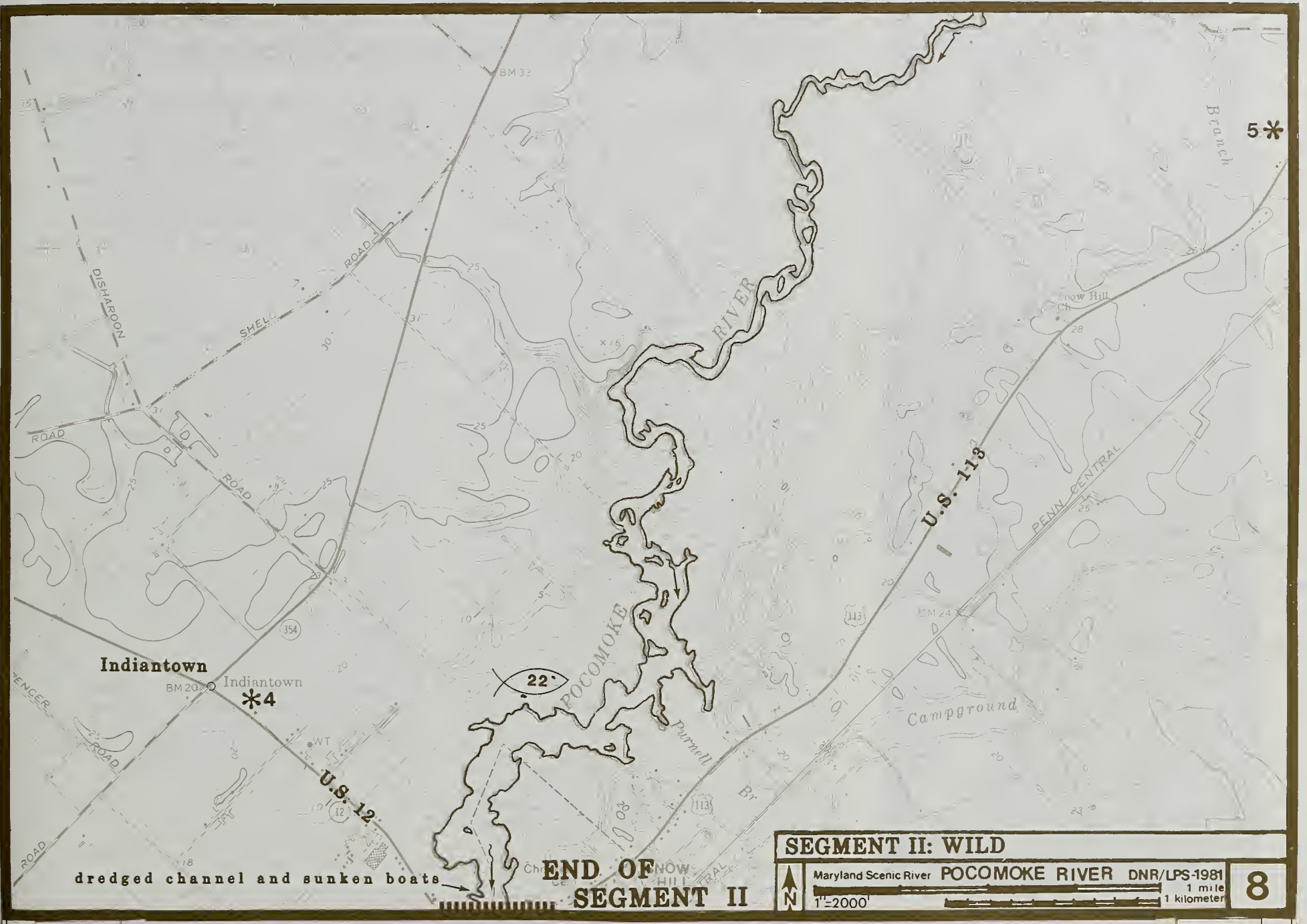


**SEGMENT II: WILD**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981

1"=2000' 1 mile  
1 kilometer

**7**



**SEGMENT II: WILD**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981

1"=2000' 1 mile 1 kilometer

**8**

**END OF SEGMENT II**



## Resource Analysis SEGMENT III (Scenic or Modified Scenic)

Snow Hill to Pocomoke City (14.6 miles)—this segment of the river contains approximately 4,500 acres of wooded swamp. These remote swamps provide a scenic view from the river and create a wilderness atmosphere with alder, buttonbush, arrow arum, and rose occurring along the banks and scattered islands of black gum, green ash, and cypress standing on the edge of the river. Approximately 13,111 acres of land in this segment are in public ownership. Pocomoke State Forest (which includes the Pocomoke River State Park areas—Shad and Milburn Landing) buffers the River and several creeks from surrounding land uses, and provides recreational access to the river and surrounding areas. Eighty percent of the Pocomoke State Forest is upland stands of managed loblolly pine, and selective cutting has occurred throughout.

Between Pocomoke City and Snow Hill the river is of a rather uniform 400-foot width, and has some of the most valuable wetlands in the watershed. In addition to their scenic value these wetlands support a diversity of wildlife and seasonal concentrations of waterfowl. The wetland areas from Pocomoke City north to the Pocomoke State Forest received highest ratings for eagles, ospreys, and hawks. The wetland units between the north side of Dividing Creek and the mouth of Nassawango Creek were generally rated nine and ten (on a ten point scale) for black duck and waterfowl nesting. Nassawango Creek wetlands were also rated nine or ten as habitat for herring and shad. The Phantom crane fly, a rare insect species, is found in the

Dividing Creek area. The area is also valuable for hunting, and serves as important wildlife habitat supporting high densities of songbirds. The lower part of Dividing Creek is canoeable. Atlantic white cedar is present in scattered tracts including a 36-acre tract off the swamp's eastern border near Pocomoke City. This species is rare in the coastal plain of Maryland.

Development in this segment is evident. There are several large farms—some with shoreline erosion due to inadequate buffer zones. Farm and pasture lands come to the edge of the water. Here are located the Nassawango Country Club, Winters Quarters Golf Course, and Cellar House—a 19th century farm house which is registered with the Maryland Historical Trust. Several of the homes have boat docks in the vicinity of Pocomoke City. There are city parks with boat ramps as both Pocomoke City and Snow Hill.

The incorporated towns of Pocomoke City and Snow Hill are located in this segment with associated businesses that utilize the waters of the Pocomoke River. There are at least seven major roads in this area (three of which cross the river), two powerline crossings and a few adverse visual impacts such as trash dumps. Because of improved accessibility and its proximity to these towns, this segment of the river is most susceptible to adverse environmental impacts.



## Classification-Related Recommendations

### suggested recreational activities

boating (low horsepower)

low intensity tent camping

hiking along marked nature or scenic trails

family picnicking (low intensity)

nature study areas

wildlife management areas

plus any activity recommended for the wild segment

### non-recreational uses

single family detached dwellings at low overall intensities

unobtrusive fences, gauging stations and other water-management and public land management facilities

essential public service lines and structures plus any use recommended for the wild segment

**all other uses are recommended in moderation following the general policy guidelines**

**(Modified Scenic)**

Same as Segment I, Column 2

## Segment-Related Recommendations

Encourage landowners to remove trash, dilapidated shelters and other elements that have adverse environmental and scenic impacts.

Eliminate, by purchase wherever possible, inholdings in state forest and parks

Upgrade city riverside parks at both Pocomoke City and Snow Hill, including re-establishment of vegetation, addition of picnic tables and grills, and improved parking areas

Preserve and protect rare, threatened or endangered plant and animal species in the segment

Establish vegetation buffers where shoreline erosion is evident

Seek scenic easement and consider interpretive signage for Cellar House and other points of interest





BEGIN SEGMENT III

SNOW HILL

BYRD PARK

U.S. 12 CROSSING

Nassawango Iron Furnace 3.5 miles

NASSAWANGO CREEK

RIVER

22

Trail

Rt 394

Snow Hill By-Pass

U.S. 113

Route 113

BRICKKILN

BR 18

BRICKKILN

CASTLE

**SEGMENT III: SCENIC OR MODIFIED SCENIC**

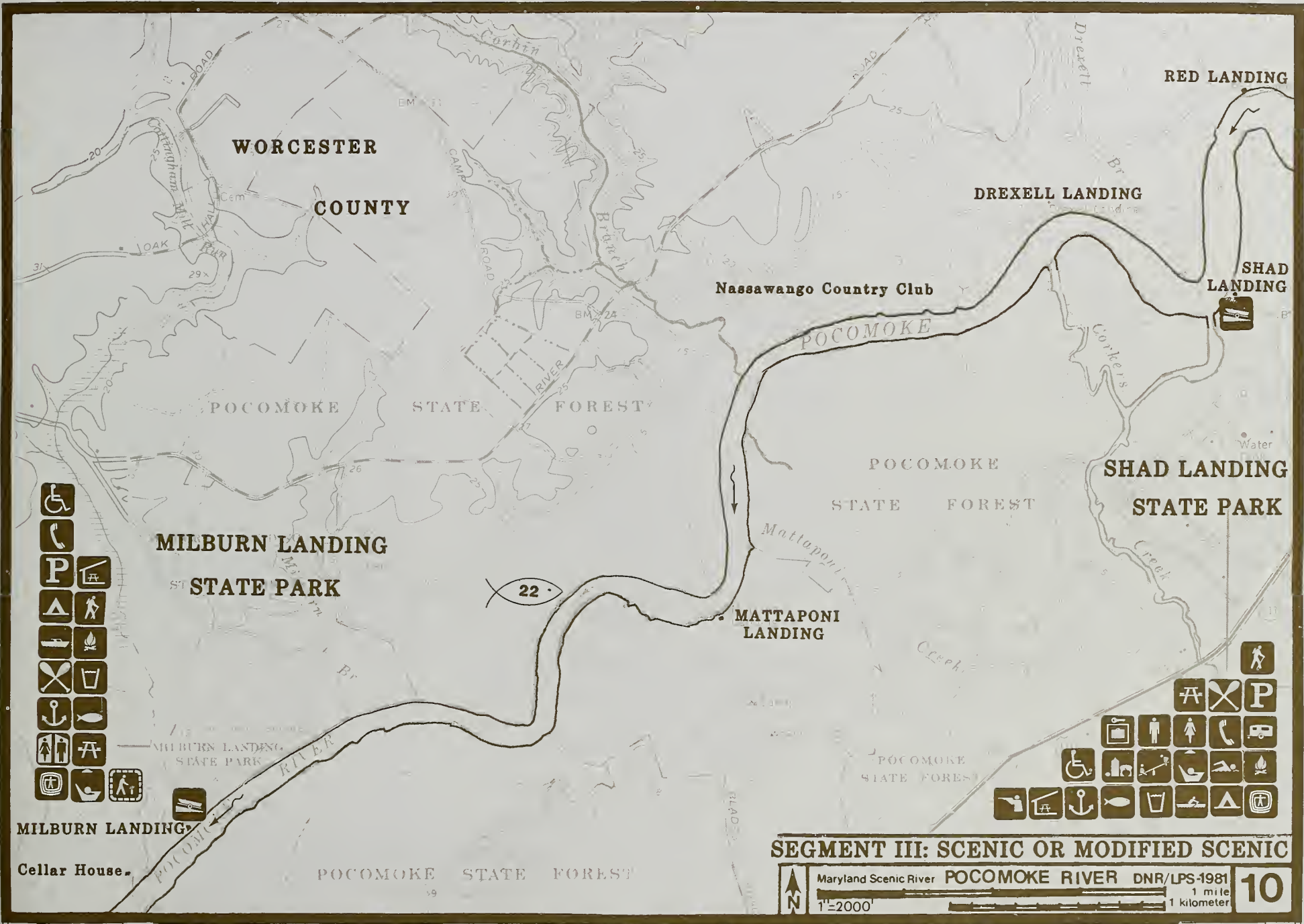


Maryland Scenic River POCOMOKE RIVER DNR/LPS-1981

1"=2000'

1 mile  
1 kilometer

9



**WORCESTER  
COUNTY**

**RED LANDING**

**DREXELL LANDING**

**Nassawango Country Club**

**SHAD LANDING**

**POCOMOKE STATE FOREST**

**POCOMOKE STATE FOREST**

**SHAD LANDING STATE PARK**

**MILBURN LANDING STATE PARK**

**MATTAPONI LANDING**

**MILBURN LANDING**

**POCOMOKE STATE FOREST**

**SEGMENT III: SCENIC OR MODIFIED SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
 1"=2000' 1 mile 1 kilometer

**10**



**SEGMENT III: SCENIC OR MODIFIED SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
 1"=2000' 1 mile 1 kilometer

**11**

**DNR**

50

## Resource Analysis SEGMENT IV(Scenic)

Pocomoke City to Pocomoke Sound (12.7 miles)—From Pocomoke City to Pocomoke Sound the river flows in wide broad sweeps through predominantly wooded swamps near Pocomoke City and through low lying marshland from Rehobeth to Pocomoke Sound. The most significant natural area in this segment of the river is "Cypress Swamp", which contains approximately 1,620 acres of tidal wooded swamp on the south side of the river downstream of Pocomoke City. Here bald cypress is abundant and much of it is mature, even though evidence of former logging activity exists. More significantly, this area contains an extensive mixed white cedar forest. Disturbance in this segment, because of inaccessibility and wet soils, is limited. This inaccessibility coupled with the unique wetland type, makes the area a valuable wildlife habitat. Prothonotary warblers are common and regularly nest in these swamps. Wood Duck and dove nest here also. In addition to the wetlands from Pocomoke City north to Pocomoke State Forest, the areas below the Cypress Swamp are rated as excellent habitat for southern bald eagles, ospreys, and hawks and has them in the greatest concentration. This area upstream to Rehobeth is a striped bass and white perch spawning area.

This segment of the river contains significant acreages in public or quasi-public ownership. These include: approximately 1,529.44 acres of the "Cypress Swamps" near Rehobeth; two wildlife management areas (Cedar Island and Pocomoke Sound) encompassing 4,002 acres, and the Maryland Ornithological Society's Irish Grove Wildlife Sanctuary which constitutes another 1,400 acres on the Sound.

Pocomoke Sound Fish and Wildlife Management Area is located on the lower river, and contains large tracts on woodland surrounding a salt marsh. The area has been logged in places but has regenerated. There are some extremely large loblolly present with diameters of greater than 20 inches. Adjacent lands are marsh, farmland and woodland. Wildlife is abundant and diverse. The site acts as a buffer between farmland and marsh. Contiguous land use is in timber management.

Fair Island and across the channel are mostly woodlands which are attractive with clean sandy beaches and an impressive view of the bay. The island is undeveloped, but the mainland across from the island contains several roads, and has shoreline development and extensive croplands—many without adequate buffer strips. Some erosion and bulkheading exist.

In this segment there are several known archaeological sites; two incorporated towns (Rehobeth and Shelltown); several boat ramps (Marumscro Creek, Shelltown, Cedar Hall Branch, and Rehobeth); three historical sites (Beverly, Vessey's Orchard and Pucheon Landing). A State champion cypress tree stands in the water near Beverly.

## Classification-Related Recommendations

### suggested recreational activities

boating (low horsepower)

low intensity tent camping

hiking along marked nature or scenic trails

family picnicking (low intensity)

nature study areas

wildlife management areas

plus any activity recommended for the wild segment

### non-recreational uses

single family detached dwellings at low overall intensities.

unobtrusive fences, gauging stations and other water-management and public management facilities.

essential public service lines and structures plus any use recommended for the wild segment.

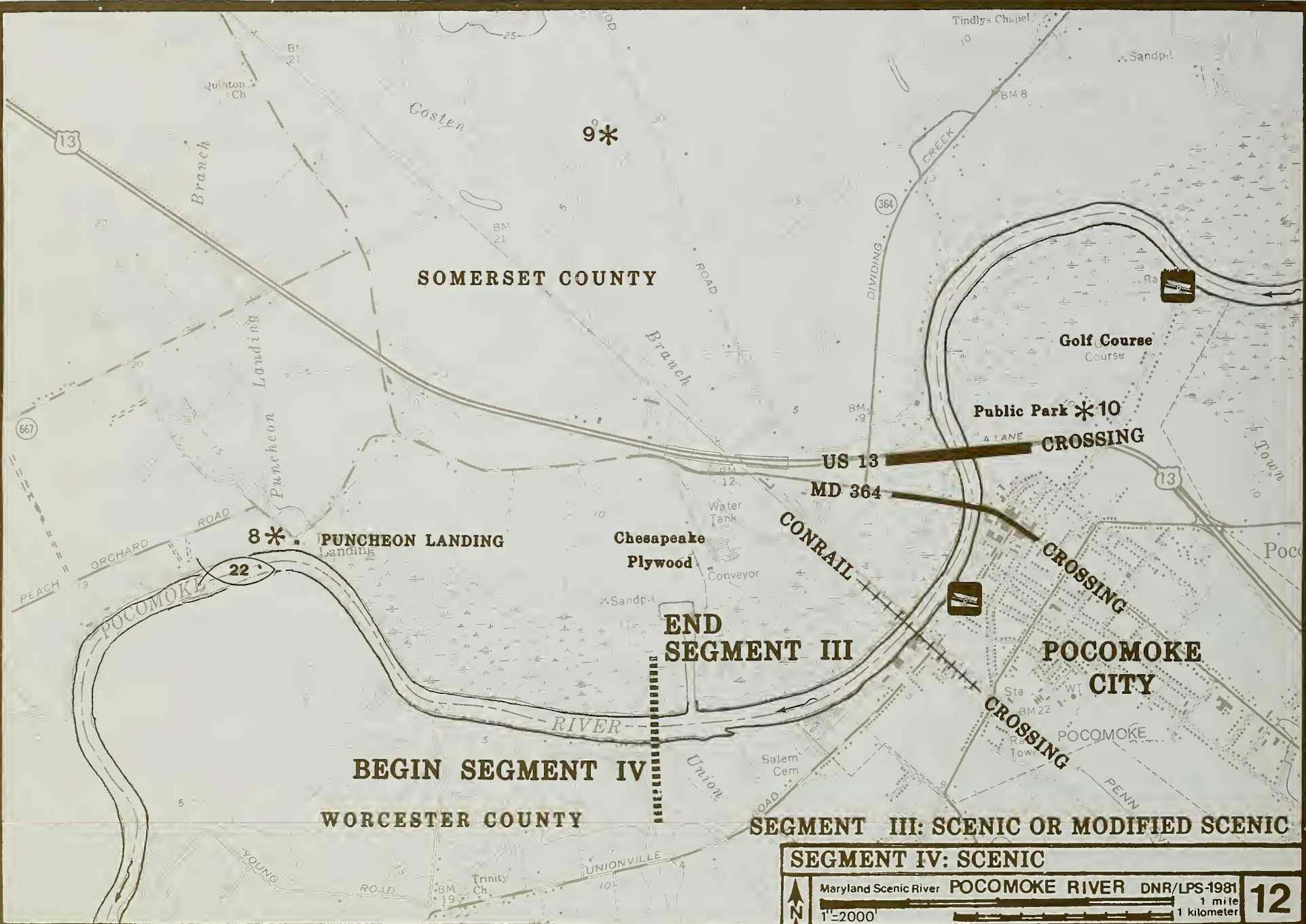
## Segment-Related Recommendations

**all other uses are recommended in moderation following the general policy guidelines**

Seek scenic easements and consider interpretive signage for historical sites and points of interest e.g. Pucheon Landing, Vessey's Orchard, Beverly, Reward, and for the largest bald cypress in Maryland

Continue purchase of cypress swamps, meanwhile seek scenic easements or land donations from private industries and private landowners

Provide a scenic trail along Hickory Point Road and picnic and camping sites with convenience facilities



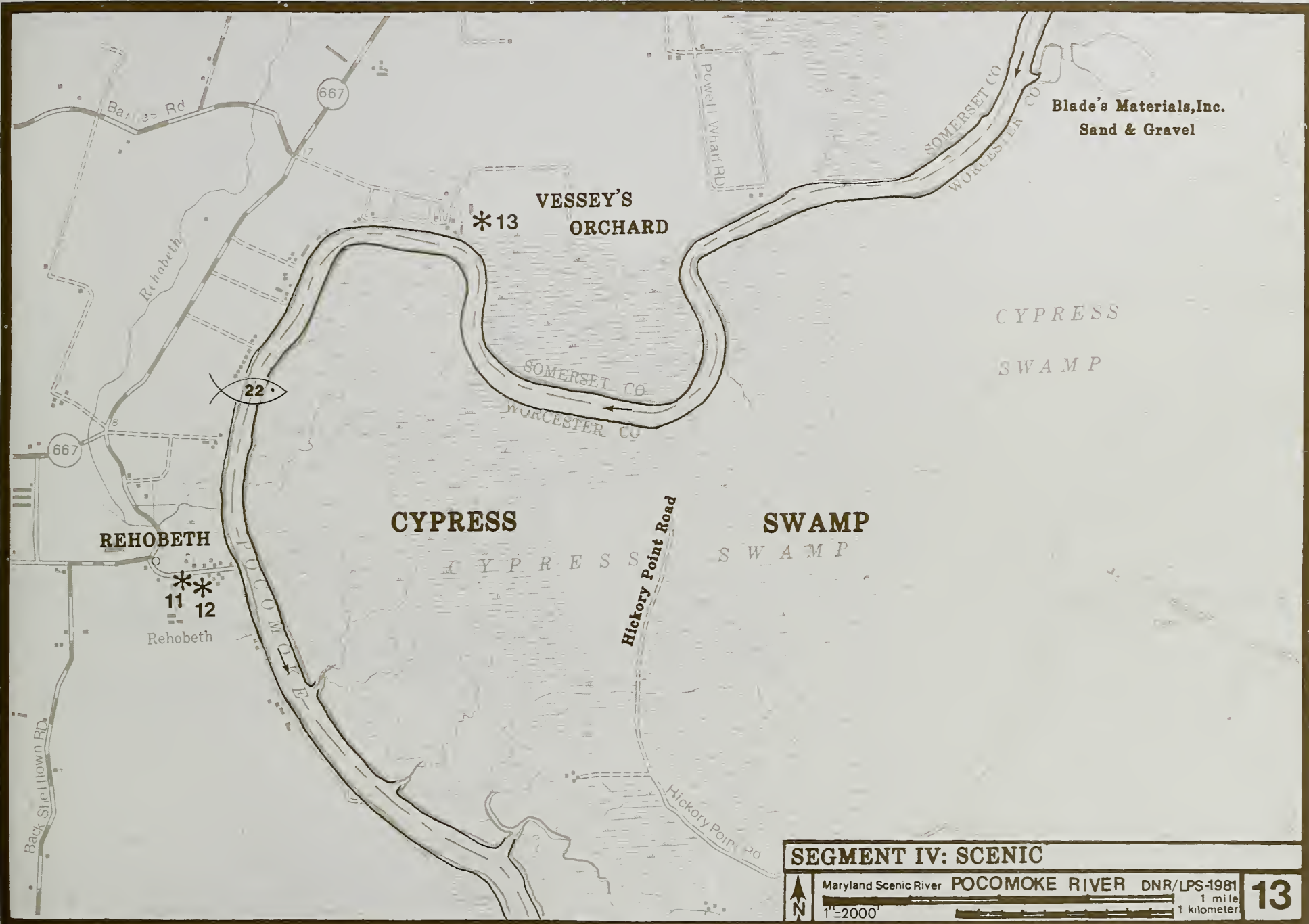
**SEGMENT III: SCENIC OR MODIFIED SCENIC**

**SEGMENT IV: SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
 1"=2000' 1 mile 1 kilometer

**12**





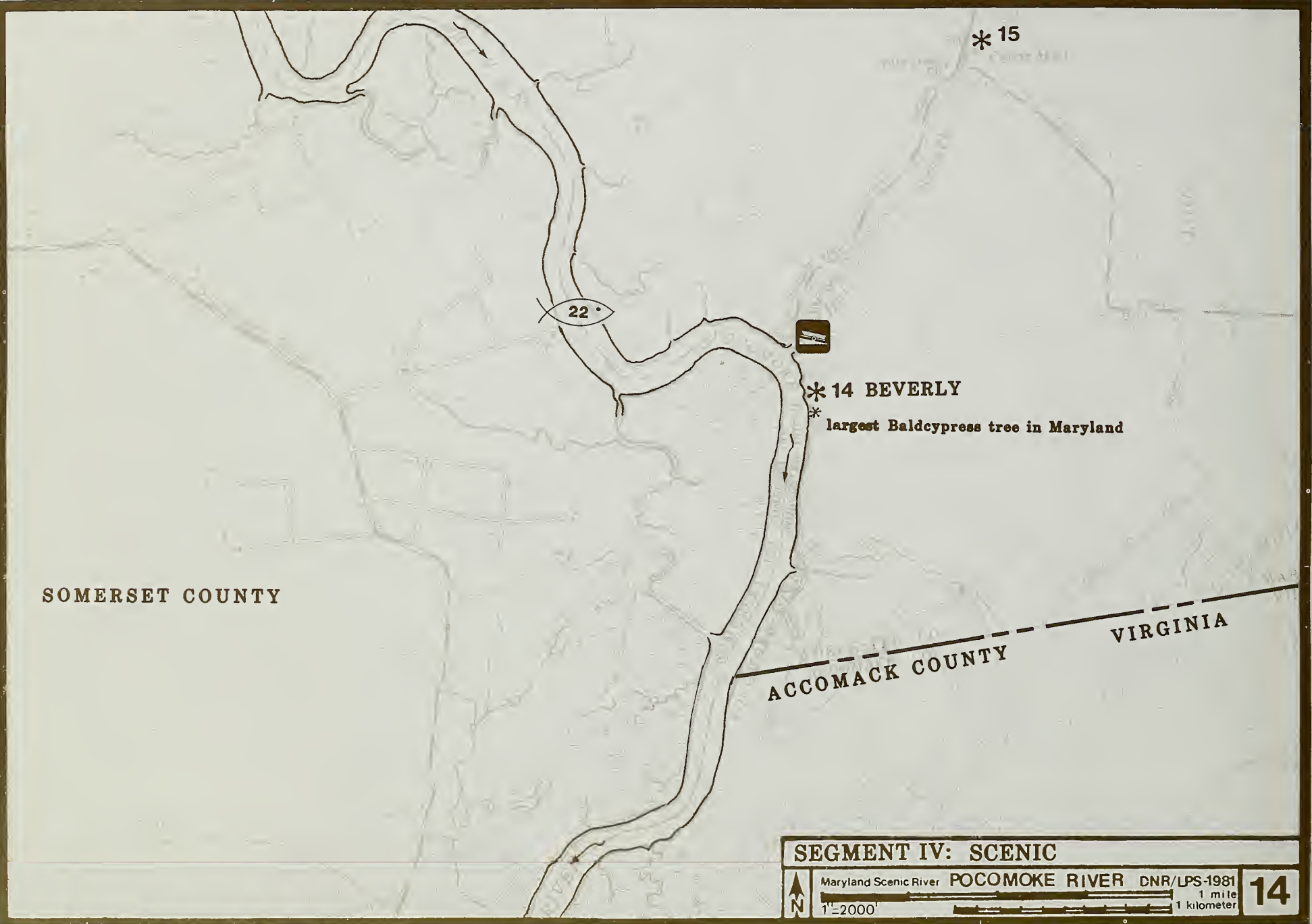
Blade's Materials, Inc.  
Sand & Gravel

**SEGMENT IV: SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981

1" = 2000' 1 mile 1 kilometer

**13**



SOMERSET COUNTY

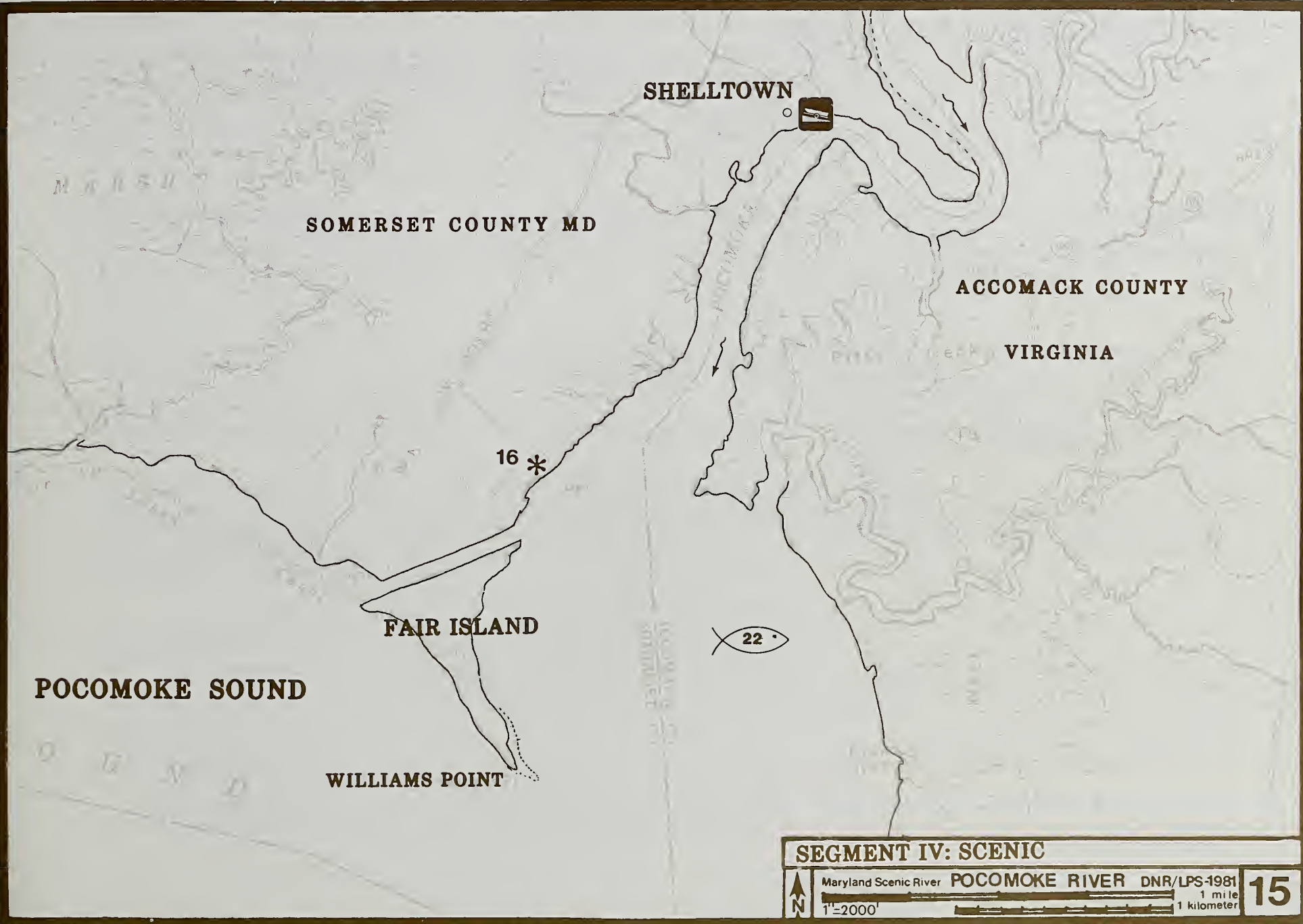
ACCOMACK COUNTY VIRGINIA

**SEGMENT IV: SCENIC**

Maryland Scenic River **POCOMOKE RIVER** DNR/LPS-1981  
1"=2000' 1 mile 1 kilometer

**14**





SHELLTOWN

SOMERSET COUNTY MD

ACCOMACK COUNTY

VIRGINIA

16 \*

FAIR ISLAND

22

POCOMOKE SOUND

WILLIAMS POINT

**SEGMENT IV: SCENIC**

Maryland Scenic River POCOMOKE RIVER DNR/LPS-1981  
1"=2000' 1 mile 1 kilometer

**15**

# The Management Plan

The resource use and protection section represents a plan showing physical recommendations. The management plan is designed to apply organizational, management, legal and other techniques to accomplish the physical plan. To facilitate the management plan,

management policies, roles and responsibilities, and implementation techniques are outlined. In implementation, it is likely that a variety of techniques will be necessary; therefore, every possible technique should be initially considered to determine its feasibility for implementation.

## Management Policies

## Requirements

## Administration

- |  |   |  |
|--|---|--|
| 1. The management of all State forest land within the wild and scenic river boundaries will be for aesthetic and recreational purposes only. | Implement recommendations for forestry operations found in this plan.   | Forest and Parks   |
| 2. All public camping within the wild and scenic river boundaries will be confined to those lands specifically designed for such purposes.   | Care shall be taken to see that recreation users do not infringe upon private property.   | Forest and Parks   |
| 3. Only those hiking trails which do not adversely impact the ecology of the river corridor should be established.                           | Identify and establish a trails system.   | Park Planning  |
| 4. A wild and scenic river corridor should be established and enforced in the affected Maryland Counties.                                    | a) Somerset and Wicomico counties shall enact or amend such ordinances and maps as necessary to establish a Wild and Scenic land use corridor.<br><br>b) Encourage Worcester County to enforce conservation zoning regulations. | Somerset County Planning & Zoning<br>Wicomico County Planning & Zoning<br><br>Worcester County Planning & Zoning |
| 5. The State of Maryland shall be responsible for providing recreational facilities on State lands.  | Provide plans for additional recreational facilities.   | Park Planning  |
| 6. Facility design will be compatible with wild, scenic, or modified scenic classification.  |   | Facilities Design Section Program Open Space   |
| 7. Recreational use will be closely regulated to prevent adverse environmental impacts on sensitive environmental areas.                     | Identify environmentally sensitive areas in need of regulation. Regulate recreational use.  | Forest and Parks   |

## Management Policies

8. The lands or interests in lands to be acquired will be acquired where funds are available for such purchases from willing sellers.
9. In all resource use planning scenic and wild river requirements shall be taken into consideration where a scenic or wild river is involved.
10. A dam or other structure impeding the natural flow of a scenic and wild river may not be constructed, operated, or maintained, and channelization may not be undertaken, unless the Secretary (of DNR) specifically approves.
11. Urban waterfronts along the river should be maintained and enhanced.
12. Provide for public access to the river and acquire scenic easements to points of interest.
13. Activities carried out in the flood plain or wetland area should be done in a manner which minimizes the destruction or degradation of wetlands and preserves and enhances their natural and beneficial fish and wildlife values.
14. Pollutants which detract from the rivers scenic character should be kept from entering the waters of the Pocomoke.
15. A continuing maintenance program for the river should be maintained.
16. The bulk of new development activity will be directed away from the sensitive environmental and ecological areas and situated on lands with the least environmental constraints.

## Requirements

Identify those people who are willing to sell or donate land within the scenic river planning boundaries.

Continue to coordinate with the Maryland Scenic Rivers Program.

A method should be established whereby the Secretary will review permits for such modifications.

Municipalities and/or Counties should provide a plan for the revitalization of waterfronts.

Whenever possible, discourage development on the floodplain and in the wetlands.

Implement recommendations made in the "208" Plan for the Pocomoke.

Prepare and implement river maintenance program.

Protect wetlands and sensitive environmental and ecological areas by zoning regulations.

## Administration

Program Open Space and  
Department of General Services

Water Resources, Coastal  
Zone Unit  
Secretary of Natural Resources

Water Resources, Coastal  
Zone Unit  
Secretary of Natural Resources

Town and/or County Planning

Program Open Space  
Maryland Environmental Trust  
Maryland Historical Trust

Water Resources-Division of  
Wetlands Permits  
Corps of Engineers

Water Resources Administration

Pocomoke River Advisory Committee (PRAC)

County Planning & Zoning

## Management Policies

17. The counties shall assist in the maintenance of water quality by preventing inappropriate land uses in areas where it may degrade water quality.
18. Excavation and borrow sites will be directed away from the scenic corridor.
19. Measures to protect the natural and scenic values of the river shall be implemented.
  
20. Adverse visual impacts will be mitigated and/or corrected.

## Requirements

Encourage Best Management Practices (BMP's) found in the Maryland "208" Plan and in SCS EQ Program.

- a) Seek scenic easements for preservation of unique natural areas and/or areas where development might threaten the integrity of the river.
- b) Initiate a program to protect the natural shoreline.
- c) Use selective cutting to avoid windthrow.
- d) Maintain channel clear of fallen trees and logs.
- e) Preserve canopy.
- f) Establish vegetation buffers where needed.
- g) Assist local units of government in enactment of land use controls.
  
- a) Encourage counties to adequately maintain signs at river crossings and to prosecute violators of county trash and littering ordinances.
- b) Removal of deteriorating structures from scenic corridor.
- c) Encourage the retention of vegetation in the scenic corridor.
- d) Seek cooperative agreements with farmers and landowners to retain or establish vegetation buffers between cropland and river.

## Administration

County Soil Conservation Services

Program Open Space

County Planning & Zoning

SCS and PRAC

Fish and Wildlife

Private landowners

Maryland Environmental Trust

Nature Conservancy

Department of State Planning

County Planning & Zoning

Private landowners

Soil Conservation Service

# Implementation Techniques\*

The following major techniques can be used in accomplishing the wild, scenic and recreational river objectives for the Pocomoke. They are based upon existing legislation.

## ACQUISITION

**Outright Purchase** is a real estate transaction in which property is acquired in fee simple. This technique should be applied when strategic land areas are needed for clearly identifiable river preservation and development purposes and in areas which are programmed for public recreation use. It is the soundest technique for assuring complete protection and development control.

**Installment Purchase** is an acquisition in which a purchaser negotiates a per-acre price with the owner and agrees to buy a certain number of acres per year. The owner is relieved of real property tax responsibilities, commencing at the time the agreement is made. The owner may choose to remain on his land until all is sold and paid in full.

**Long Term Lease with Option to Buy** involves the negotiation of a lease price with the owner and includes conditions for use and eventual purchase of the property in question.

**Purchase & Lease-Back** involves the acquisition of a site while it is still available at low cost. The purchaser then leases the land back to a user for either continuation of its present use or for other uses in accordance with policies for scenic preservation and recreation. The purchase and leaseback can be disadvantageous because it puts the purchaser-lessor in the position of a landlord responsible for property management and maintenance. Also, land, if purchased by a governmental body, is tax exempt. Advantages can be obtained if a public body is willing to accept the responsibility and if a high degree of maintenance is assured.

**Purchase and Resale** is a technique in which land is purchased and re-sold only under conditions or restrictive covenants established by the party re-selling the land. After resale the original buyer is relieved of ownership and maintenance responsibilities. Also, the land is then taxable and offers revenues to public bodies for land purchases in other strategic areas.

**Condemnation** through the right of eminent domain provides governmental jurisdictions with the right to acquire land for a well-defined public purpose. Eminent domain could include full property rights or the acquisition of easements and leases. Condemnation involves the determination of a fair market value for the property and a clear definition of the public purpose for which it is being condemned. This is an approach normally used only if fee simple acquisition is not possible at a fair price and if an owner is reluctant to sell under any circumstances.

**Donations** of land are sometimes made from private owners or organizations interested in a certain cause. Land donations can be encouraged by granting life occupancy and by arranging certain tax advantages.

**Land exchange** is a means of trading the ownership or control of land between one owner and another to obtain mutual advantages.

**Voluntary Agreements** may be applied to commit another use to privately owned agricultural land, large industrial holdings, large forest areas, private utility easements and land under ownership or administration of government agencies. These agreements would be strictly voluntary with permission to use the land only in clearly specified ways.

**Easements** would allow land along rivers to remain in private ownership, but it could be used only for the purpose specified in the easement agreements, including limitations upon the development of the land in question. Only those rights necessary to regulate the use of the property are purchased. A fair price is determined by the difference between market value of the land unrestricted and the value of land subject to the restriction set forth in the easement. The easement technique allows land to remain on the tax rolls and permits continuing use by the present owner. The cost of easement acquisition can be reasonable in some areas but costs in intensively developed areas are normally not feasible. Examples of land that might be acquired include: (1) lands to be used in active recreation; (2) lands which possess outstanding scenic, natural, scientific or other values which can be best protected by placing the land in public ownership; (3) islands, and (4) trails. Lands to be acquired in scenic easements might include: (1) lands highly visible from the water surface; (2) lands adjacent to or across the river from state owned lands; (3) land with foreseeable adverse management practices; (4) environmentally sensitive lands which might be adversely affected by development; (5) lands which possess outstanding scientific, natural and other similar values.

\*From *Scenic Rivers in Maryland*, 1977.

The power to tax can be used as a tool for preserving open space and recreation opportunities along scenic rivers. The property tax is an important device affecting the nature and timing of land development. However, its present uniformity within specific areas and assessment at market value tend to limit its use for open space preservation. Regardless, there are several taxation methods which should be considered as key implementing techniques for the scenic river plans.

**Tax Exemptions** are sometimes authorized for land that provides public benefit such as historic places, public service areas, private lands open to public hunting or fishing or other such public uses. This can be an important device to use by private enterprises with land holdings along river areas. Although the land may not be contemplated for development purposes, it may be needed for other company purposes. Private enterprises could provide public benefits by keeping these lands undeveloped or having them developed in accordance with the scenic rivers plans, while enjoying a tax benefit. Chapter 576 of the Annotated Code of Maryland allows tax credits up to 100 percent of the total property tax if the owner grants a perpetual easement to the county, state or federal governments.

**Preferential Assessment** is an approach under which land presently being taxed because of its use potential is arranged to be kept in its present use for a longer period of time. In this technique, land is assessed at its agricultural or limited use value in order to remove tax pressures on owners to sell at a speculative price for profit. Although this technique does not assure long-range open space preservation, it does give the owner a continuing tax advantage, therefore, not impeding eventual sale by the owner at a considerable profit. This technique requires a clear designation of the restrictions on the land for open space and related uses. A land use plan must be provided and there must be a provision for recapturing the land value increment achieved during the preferential assessment period. Also, the taxing bodies must be compensated for any loss of revenue.

**Tax Foreclosures** are applied to delinquent properties and can be made by taxing bodies. This technique should be pursued if properties are in strategic locations for scenic river purposes or if land exchange possibilities exist.

**Special Districts** for scenic preservation and recreational development involve the delineation of a legal or physiographic boundary and the determination of specific responsibilities. Special districts would have taxing powers and the power to purchase and maintain open space and recreational land. Special scenic corridor districts or conservation districts should be considered.

## PLANNING AND REGULATION

**Comprehensive Planning** provides the framework for land development and use practices along scenic river corridors. The process of comprehensive planning was utilized in the preparation of this scenic rivers report and provides the overall guidelines for the protection, use and development of designated areas along the river corridors. Planning, being a continuing process, should be performed in even greater detail in each local area along river corridors. Planning per se is not touted as an effective implementation device. But there is real value in its use as a guideline for decision-making, in its factual basis, in its forethought and in its logic. Persuasion is the strongest power of implementation through comprehensive planning.

**Zoning** has been in use in the counties and municipalities of Maryland for many years. The concept, as it applies to scenic rivers, is useful for the purpose of regulating the use of the land, the density of development and the protection of areas in which open space and natural characteristics should be preserved. There are several zoning techniques most appropriate for implementing scenic river policies and plans:

*Cluster Zoning*—allows dwelling units to be placed closer together than normally permitted in the district in which they are located, providing the overall density is retained. Open space corridors can therefore be created between clusters of housing. This concept is also very applicable to areas of unique topography where clustering can occur on developable portions of land, leaving natural areas and areas more difficult to develop virtually unobstructed.

*Flood Plain Zoning*—is particularly significant in the preservation of scenic beauty and natural areas along rivers and streams because it provides for the regulation of development in dangerous areas of flooding, thus applying preventive measures against flood damage. It provides secondary benefits by prohibiting development and creating open space characteristics along river banks.

*Other Zoning Approaches*—may be used to regulate land development so that open spaces and natural areas are preserved. Large-lot zoning, agricultural zoning and conservation district zoning are specific examples that are particularly effective in preserving extensive open areas.

**Subdivision Regulations** must work in concert with zoning in the preservation of open space and other scenic and natural features. These regulations apply to the layout of lots, streets, drainage, utilities, and other facilities for land development. Items of interest pertaining to scenic river preservation include the prevention of sewage emission into streams, the prevention of soil erosion and siltation, and the funds for recreation as a part of the land subdivision effort.

**Official Maps** are regulatory devices which outline the locations programmed for public improvements and set forth restrictions on development within these boundaries. In most cases, there is a maximum period within which the land can be held without construction of the public improvements. After a maximum period has passed, the governing agency must either purchase the property or forfeit control and restrictions on its development.

**Public Utility Policies and Staging** is an element of planning and programming which affects significantly the patterns of urban development along our rivers. The staging and construction of utilities to service new development with water, sewer and other utilities will have a profound effect on the ability to protect and enhance river corridors. The following table summarizes various implementation techniques, indicating which techniques are likely to be most effective in accomplishing the objectives of each Use Area shown on the Concept Plans for the five recommended Scenic Rivers. Although the major responsibilities for applying each technique are shown, all techniques could be applied in many instances and special conditions could make techniques not recommended on the table more relevant than those indicated. This schedule of relationships between Use Areas, implementation techniques and responsibilities is intended only as a general guide and should be used very carefully when applied to specific locations and jurisdictions.



# SCENIC RIVERS IMPLEMENTATION SUMMARY

Major Implementation Techniques	Use Areas Where Technique Most Effective*	MAJOR RESPONSIBILITY						
		Private (For Profit)	Semi-Private (Non-Profit)	Semi-Public Groups or Associations	Public			
					Municipal	County	State	Federal
<b>ACQUISITION</b>								
Outright and installment purchase	N, L, M, I	■	■	■	■	■	■	■
Purchase and leaseback or resale	N, L, M, I	■	■	■	■	■		
Easement and purchase or development rights	N, L, M				■	■	■	
Condemnation through right of eminent domain	N, L, M, I				■	■	■	■
Land donations	N, L, M, I	■	■	■				
Voluntary agreements to permit recreational use of land	N, L	■	■	■				
<b>TAXATION</b>								
Tax exemptions	N, L, M				■	■		
Preferential assessment	N, L, M				■	■		
Tax foreclosures	N, L, M, I				■	■		
Creation of special preservation and recreation districts with taxing powers	N, L, M				■	■		
<b>PLANNING AND REGULATION</b>								
Comprehensive Planning	N, L, M, I			■	■	■	■	
Zoning					■	■		
Cluster	N, L, M, I				■	■		
Flood Plain	N, L, M, I				■	■		
Large Lot	N, L				■	■		
Shoreline	N, L, M, I				■	■		
Historic District	N, L, M, I				■	■		
Subdivision Regulations	N, L, M, I				■	■		
Official Map	L, M, I				■	■		
Public Utility Policies and Staging	N, L, M				■	■	■	■

**\*USE AREA CODE**

N-Natural Use                      M-Moderate Human Use  
L-Limited Human Use            I-Intensive Human Use



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