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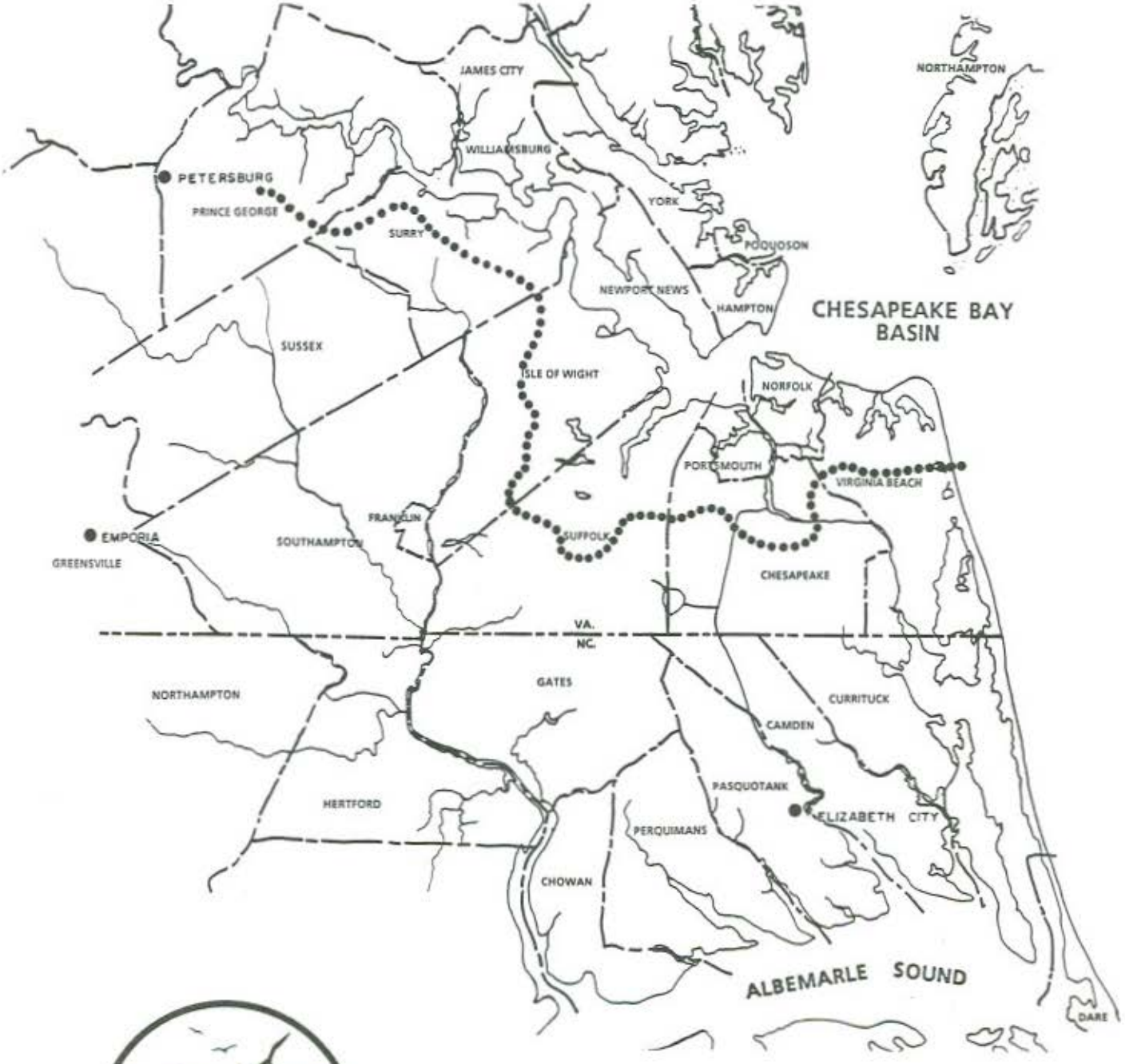

HAMPTON ROADS
PLANNING DISTRICT COMMISSION

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Albemarle-Pamlico Estuarine Study
Report No. 92-18

ENVIRONMENTAL MANAGEMENT PROGRAM FOR THE HAMPTON ROADS VIRGINIA PORTION OF THE ALBEMARLE-PAMLICO ESTUARINE WATERSHED

This project was funded, in part, through financial support from the Albemarle-Pamlico Estuarine Study by the North Carolina Department of Environment, Health and Natural Resources under Contract C-14011 pursuant to a National Estuarine Program Grant from the U.S. Environmental Protection Agency.

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Prepared by the Staff of the
Hampton Roads Planning District Commission

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ABSTRACT

The Albemarle-Pamlico Estuarine System is the second largest estuarine system in the United States. This resource is shared by the citizens of Virginia and North Carolina. Through the National Estuary Program, the State of North Carolina has conducted the Albemarle-Pamlico Estuarine Study to determine the condition of the estuarine system's resources and to devise a management plan to protect and enhance those resources.

The Hampton Roads Region is located at the northern end of the A/P Watershed. Major tributaries to the Watershed - the Blackwater, Meherrin, Nottoway, North Landing and Northwest Rivers and Back Bay - originate in or flow through the Hampton Roads Region. The Region straddles the watershed boundary between the Albemarle-Pamlico to the south and the Chesapeake Bay to the north. The Chesapeake Bay Watershed is also the subject of intensive analysis and management initiatives. Thus, the Hampton Roads region is not only a physical bridge, but also an institutional bridge between the two Watersheds and their management programs.

The Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed attempts to provide this institutional bridge between the two programs. Based on local government experience with the Chesapeake Bay Program and local government evaluation of the draft Comprehensive Conservation Management Plan for the Albemarle-Pamlico Estuarine Study (CCMP), a program has been developed which reflects the unique environmental setting and institutional structure of the Hampton Roads Region.

This report describes the Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed. It analyzes local development goals and regulations to determine areas of support and conflict with adopted environmental goals, including those of the CCMP. Critical resources within the watershed are identified and a management approach for protecting and managing them is recommended. Alternative management approaches, including the Virginia Chesapeake Bay Preservation Act and the draft Comprehensive Conservation Management Plan's recommendations are evaluated. Recommendations for improved management of the watershed's resources, focusing on local government activities, are made.

The Environmental Management Program addresses the needs and capabilities of local governments within the Hampton Roads Region, as they relate to the Albemarle-Pamlico Estuarine System. It does not address management needs in the balance of the Virginia portion of the A/P Watershed. However, recommendations would appear to be generally applicable in those areas as well.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

GLOSSARY

(List of Acronyms)

A significant number of acronyms are used in this study, especially in the section entitled, "Recommended Environmental Management Program." All acronyms are defined in the Glossary, which is being placed at the beginning of the report to assist the reader. In addition, the first time that one of these acronyms is used in the text, the name is spelled out entirely and the acronym is placed in parentheses immediately after the term.

APES Program	Albemarle Pamlico Estuarine Study Program
A/P Watershed	The Watershed of the Albemarle - Pamlico Estuarine System
BMP	Best Management Practice
CBLAB	Chesapeake Bay Local Assistance Board
CBLAD	Chesapeake Bay Local Assistance Department
CBPA	Chesapeake Bay Preservation Act
CCMP	Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study
CGIA	North Carolina Center of Geographic Information and Analysis
DAPC	Virginia Department of Air Pollution Control
DCR	Virginia Department of Conservation and Recreation
DCR-DSWC	DCR Division of Soil and Water Conservation
DCR-DNH	DCR Division of Natural Heritage
DCR-DPRR	DCR Division of Planning and Recreation Resources
DEHNR	North Carolina Department of Environment, Health and Natural Resources
DGIF	Virginia Department of Game and Inland Fisheries
DWM	Virginia Department of Waste Management

EPA	U.S. Environmental Protection Agency
GIS	Geographic Information System
HRPDC	Hampton Roads Planning District Commission
HRSD	Hampton Roads Sanitation District
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source Pollution
PDC	Planning District Commission
VCOE	Virginia Council on the Environment
VCRMP	Virginia Coastal Resources Management Program
VDOT	Virginia Department of Transportation
VIMS	Virginia Institute of Marine Science
VMRC	Virginia Marine Resources Commission
VPDES	Virginia Pollutant Discharge Elimination System, represents Virginia's Program to implement the federal NPDES Permit Program
SPSA	Southeastern Public Service Authority of Virginia
SWCB	Virginia State Water Control Board

EXECUTIVE SUMMARY

The Albemarle-Pamlico Estuarine System is the second largest estuarine system in the United States. This resource - its potential and its problems - is shared by the citizens of North Carolina and Virginia. To address a number of environmental concerns with the estuarine system and its resources, the State of North Carolina, with financial assistance from the U.S. Environmental Protection Agency through the National Estuary Program, has undertaken the Albemarle-Pamlico Estuarine Study. The resulting management program has potential implications for environmental management throughout that portion of southern Virginia, including the Hampton Roads region, which lies within the A/P Watershed.

The Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed has been prepared by the HRPDC with financial assistance from the State of North Carolina through the Albemarle-Pamlico Estuarine Study. It represents a locally-driven plan for improved environmental management in the Hampton Roads Virginia portion of the A/P Watershed. As such, it represents the type of environmental management activities that could and should be undertaken by watershed localities.

The A/P Watershed includes nineteen (19) cities and counties and thirty-four (34) towns in Virginia. All of these localities are potentially affected by any management initiative resulting from the APES Program. The Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed only addresses the needs and concerns of six (6) of those cities and counties, specifically. Those six communities are the Cities of Chesapeake, Franklin, Suffolk and Virginia Beach and the Counties of Isle of Wight and Southampton, which are members of the Hampton Roads Planning District Commission (HRPDC). Although many elements of this program appear to be applicable to the balance of the watershed, only the members of the HRPDC have participated in its development.

METHODOLOGY

Development of the recommended Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed involved technical review and evaluation of a number of issues and studies and a consensus building effort to develop the management recommendations. This report documents the results of that effort. It includes:

- Review of prior studies addressing the Hampton Roads portion of the A/P Watershed.
- Review of environmental and water quality conditions in the Virginia portion of the A/P Watershed.

- o Analysis of local government development goals and regulatory programs.

- o Analysis of state and local government institutional response to environmental management issues in the Virginia portion of the A/P Watershed.

- o Analysis of potential approaches to critical area management in the Hampton Roads portion of the A/P Watershed.

- o Analysis of the Virginia Chesapeake Bay Preservation Act and North Carolina APES Comprehensive Conservation Management Plan to determine their applicability to environmental management in the Hampton Roads portion of the A/P Watershed.

The Environmental Management Program integrates the conclusions of these analyses into a recommended implementation program for the Hampton Roads portion of the A/P Watershed. The implementation program reflects a consensus of staff from the local governments of Hampton Roads.

FINDINGS

The Albemarle-Pamlico Estuarine System is an important resource shared by the citizens of North Carolina and Virginia. The system includes a significant portion of southern Virginia as well as northeastern North Carolina. Environmental concerns within the estuarine system reflect contributions from throughout the tributary watershed.

Environmental conditions within the Virginia portion of the A/P Watershed are generally good. This reflects the generally undeveloped character of the watershed as well as the benefits of historic and ongoing water quality management efforts. There are relatively few significant point source discharges to the Virginia tributaries to the A/P Watershed. This is especially true of the eastern tributaries - the Currituck Sound Basin. Water quality conditions are attributable primarily to the natural characteristics of the watershed and nonpoint source pollution. Some "hot spots" of water quality impairment, typically associated with point source discharges, exist. Point source related problems are found in the western tributaries - the Chowan River Basin. Nonpoint source problems can be expected to increase in importance as development occurs in the upper watershed and in the small tributaries.

There are a number of instances of potential conflict between environmental quality and development goals. This appears to be true at all levels of government. Cases of direct conflict or complete compatibility between goals are relatively few. Generally, it appears that management programs can minimize the degree of conflict between environmental and development goals at all levels of government.

A complex institutional structure to manage development and environmental quality in the Hampton Roads portion of the A/P Watershed is in place. The complexity of the institutional structure is compounded by the interstate nature of the Watershed. Historically, local government has emphasized land use and state agencies have stressed water quality in their environmental management activities. These lines of distinction have blurred as agencies at both levels increase their attention to issues which have been the traditional focus of the other.

A wide range of regulatory programs are in place to manage this complex environment. However, there are areas of potential conflict within and between many of them. It appears that these potential conflicts are inherent in the nature of government and the regulatory programs. Only careful decision-making can achieve the balance necessary to resolve them. Techniques are available to enhance regulatory tools to assist in this effort.

It appears that a watershed-wide approach to environmental management is the most technically and scientifically defensible one. Within the watershed, however, certain resources and land uses require special management attention. Thus, a tiered critical management area is recommended with each tier or resource subject to different levels of management attention.

The Hampton Roads region is presently subject, in part, to the requirements of the Virginia Chesapeake Bay Preservation Act. A portion of the region may be governed by a new program, developed in response to the Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study. Both programs contain technical criteria and management approaches that are potentially applicable to the Hampton Roads portion of the A/P Watershed. Both also contain elements which would require modification to suit the unique environmental and institutional conditions found in the Hampton Roads portion of the A/P Watershed.

To meet the environmental management needs of the Hampton Roads portion of the A/P Watershed, certain program and institutional enhancements are warranted. There does not appear to be a need to develop an entirely new management program or to undertake a wholesale restructuring of institutional arrangements to achieve environmental management goals.

RECOMMENDED ENVIRONMENTAL MANAGEMENT PROGRAM

The Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed recommends a cooperative state, local, and regional program to manage environmental quality in the Hampton Roads portion of the Watershed. Recommendations include new, enhanced and continuation programs. Specific recommendations for improved management in the following areas are made:

- **Institutional Structure**, including a Bi-State "A/P Watershed Agreement," intrastate interagency coordination, enabling legislation, financing and modifications to local land development regulatory programs.

- **Watershed-Wide Environmental Management**, based on a "Critical Management Area" approach with special management attention being given to critical natural resources, water supply watersheds and land use activities that pose the greatest risk for adverse environmental impacts.

- **Point Source Pollution Control**, emphasizing continued implementation of current programs at the state, local and regional level.

- **Nonpoint Source Management**, based on compliance with state and federal regulatory and voluntary management programs, implementation of Best Management Practices for all development, improved local operational and maintenance programs, use of recently developed regional technical guidance and improved coordination of state management programs.

- **Waterfront Development**, including local planning efforts, modifications to local regulatory programs and improved operational practices at marinas.

- **Water Supply Protection**, including the "Critical Management Area," implementation of local watershed protection programs and continued implementation of local water conservation programs.

- **Groundwater Management**, including continuation of state and regional groundwater management programs and studies and increased local government involvement in state groundwater protection planning activities.

- **Solid and Hazardous Waste Management**, including continued implementation of local and regional programs in these areas, increased attention in local regulatory programs and expansion of successful state assistance programs.

- **Habitat Management**, emphasizing continued local government participation in the variety of natural resource and habitat protection initiatives being undertaken in the Watershed.

- **Air Pollution**, emphasizing improved coordination between state air and water agencies, especially with respect to "abrasive blasting" activities.

- **Information System**, specifically continued bi-state and intrastate coordination of system development and enhancement efforts.

- **Public Education**, including encouragement for "good-housekeeping" programs, integration of public education programs being conducted

through all environmental management programs and better information dissemination.

- o **Monitoring and Future Studies**, including stormwater and groundwater quantity and quality analyses, ambient water quality monitoring and analyses, preparation of a state water quality plan for the watershed and completion of state and federal resource studies to assist local governments in environmental management activities

CONCLUSION

The Environmental Management Program for the Hampton Roads Portion of the A/P Watershed has been developed from the perspective of, and in cooperation with, the region's local governments. The Environmental Management Program builds upon a framework which has been established through a variety of environmental programs conducted at the state, local and regional levels. It reflects the Hampton Roads region's experience with the Chesapeake Bay Program as well as other issue-specific environmental management programs. It reflects the considerable progress which has been made as well as the deficiencies of past efforts. The Environmental Management Program is structured to respond to the unique institutional experience and characteristics as well as the unique environmental setting of the Hampton Roads region. Concurrently, many of the recommendations would seem to be applicable to the balance of the Virginia portion of the A/P Watershed and may be applicable to the North Carolina portion as well.

The recommended Environmental Management Program reflects the premise that good stewardship of the region's environmental resources is necessary to ensure the long-term viability of those resources. In turn, that will have both direct and indirect benefit to downstream resources. This concept appears to be a viable approach for other subbasin plans to be developed within the framework of the Comprehensive Conservation Management Plan for the Albemarle Pamlico Estuarine Study.

The success of this ambitious program depends upon cooperation among agencies at all levels of government and in the private sector, but most importantly between Virginia and North Carolina state and local governments. It requires a delicate balancing act in state and local decision-making to achieve goals in the areas of social responsiveness, economic development and environmental protection. It requires new levels of local initiative supported by an informed public and by a state government that grants local governments the tools, both regulatory and financial, to accomplish this difficult mission. The recommended Environmental Management Program provides an approach to accomplishing this for the Hampton Roads Portion of the A/P Watershed.

INTRODUCTION

Section 320 of the 1987 Clean Water Act established the National Estuary Program. This program provided funding to assist states in developing Comprehensive Conservation Management Plans, which were to establish the means of restoring, where degraded, and maintaining, where possible, the nation's critical estuarine resources. Inherent in this charge was an assumption that improved management of these resources was necessary.

The State of North Carolina received funding under the National Estuary Program to develop such a Plan for the estuarine system known as the Albemarle and Pamlico Sounds and their tributary watersheds (A/P Watershed). The planning program was a five year effort focusing on scientific research and data collection necessary to determine the status of the resources and trends in resource conditions. It included an intensive effort to convey that information to the public and to provide opportunities for the public to provide input to the study process. The research effort to characterize the status and trends of the estuarine system and its resources culminated in 1990 with the release of the Status and Trends Report of the Albemarle-Pamlico Estuarine Study. Since that time, study activities have focused on development of a program to manage these resources to meet a variety of goals, while supporting additional research on critical issues.

The Study Area boundary defined by the APES Program encompasses all of the watershed tributary to the Sounds, upstream to the first impoundment. The Study Area is shown on Figure 1. This includes a sizable area in southern Virginia, including all or portions of nineteen (19) cities and counties, as well as thirty-four (34) towns. Included within the watershed is a significant portion of Virginia's second largest metropolitan area, Hampton Roads. This region includes the Cities of Chesapeake, Franklin, Suffolk and Virginia Beach and the Counties of Isle of Wight and Southampton, which lie, at least in part, within the watershed. Indirectly, the study area also includes the City of Norfolk, because of its dependence on the watershed's water resources for a portion of its water supply. While the City of Portsmouth lies outside the A/P Watershed and does not use any of the watershed's surface waters for water supply, it is vitally interested in the program.

The Hampton Roads region also lies partially within the watershed of the Chesapeake Bay. In fact, only the City of Franklin and Southampton County of the region's APES communities do not also lie within the Chesapeake Bay Watershed. Thus, the Hampton Roads region is a physical bridge between the two estuaries. Both estuarine systems are experiencing intense development pressure and are witnessing the development and evolution of new management measures to address that development.

For these reasons, the Hampton Roads Planning District Commission and its predecessor, the Southeastern Virginia Planning District Commission, became involved in the APES Program. The agency has attempted to serve as a liaison between the

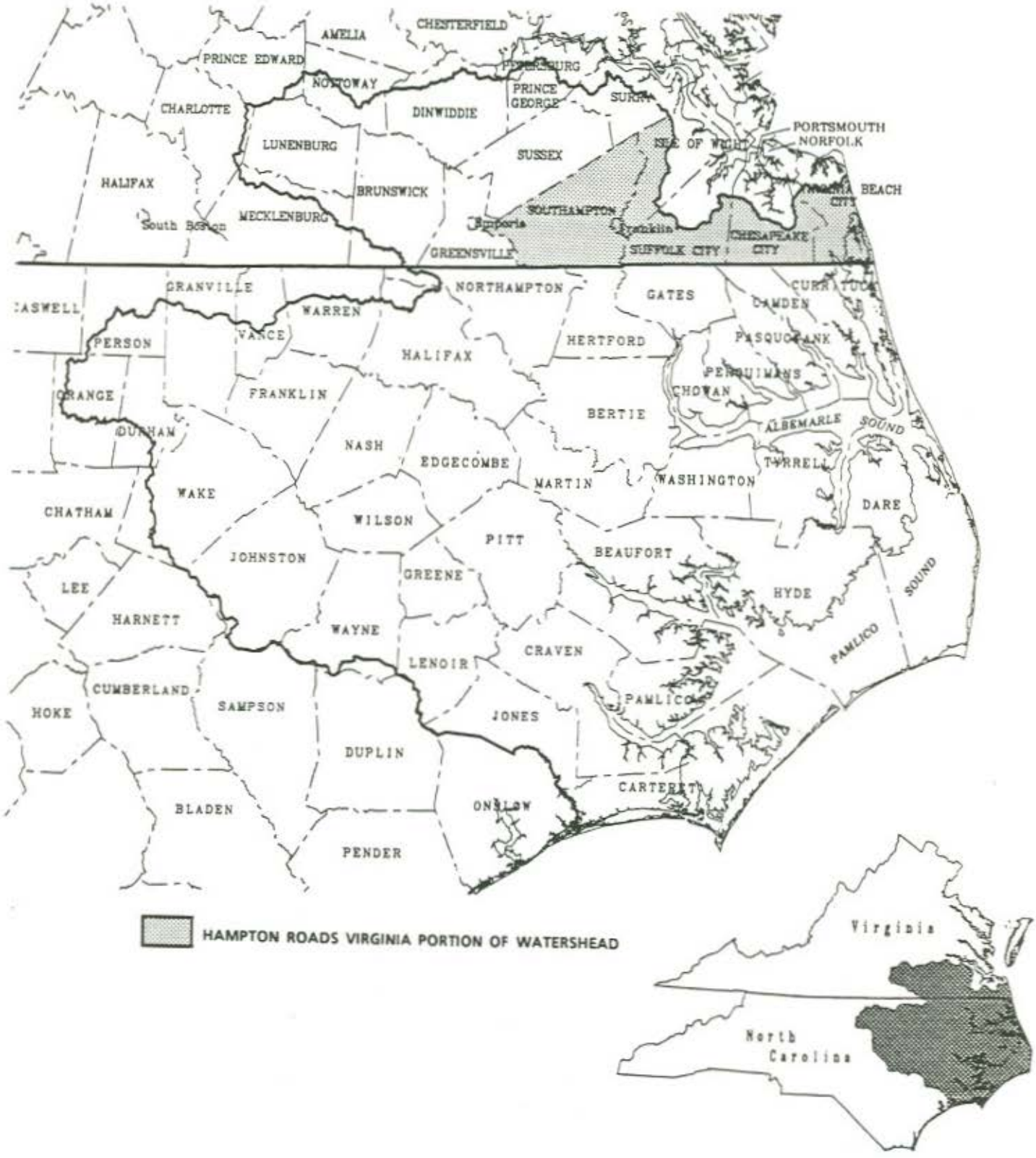
region's localities and the APES Program to ensure that the localities and citizens of Hampton Roads Virginia are educated about and aware of the Program and its implications for the region. The HRPDC has also worked to ensure that the concerns of the region's localities are conveyed to the APES Program and are considered in the development of the Comprehensive Conservation Management Plan. The general activities undertaken in support of the program are documented in Institutional Enhancement and Public Involvement Program for Southeastern Virginia: Final Report, Fiscal Years 1989-90 through 1991-92.

In addition, the HRPDC has undertaken the development of an Environmental Management Program for the Hampton Roads Virginia portion of the A/P Watershed. The process of developing that Program and its recommendations are documented in this report. The Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed is directly applicable only to those localities that are members of the HRPDC. Figure 1 also shows that portion of the A/P Watershed to which the recommended Environmental Management Program for the Hampton Roads region is directly applicable. It should be noted, however, that many of the conclusions and recommendations for management activities should be generally applicable throughout the watershed.

This report describes the Environmental Management Program for the Hampton Roads Virginia portion of the A/P Watershed. It analyzes local development goals and regulations to determine areas of support and conflict with APES Program Goals, as documented in the Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study (First and Second Public Drafts). Critical resources within the watershed are identified. Alternative management approaches are evaluated in terms of their applicability to this watershed. It includes recommendations for improved local management of the watershed's resources.

The basic premise underlying this Environmental Management Program is that it should reflect local conditions and needs. It should focus on stewardship of the environmental resources of the Hampton Roads Virginia portion of the A/P Watershed. To the extent that those resources are protected and managed in a rational manner, the downstream resources will also be protected. This program also recognizes that water supply is and will continue to be an important use of several of the Hampton Roads region's tributaries to the A/P Watershed. It is also generally felt that any management program should build on and not duplicate existing management structures.

FIGURE 1
STUDY AREA MAP



Source: Base map provided by APES Program, 1992.

BACKGROUND

HISTORICAL STUDIES

Over the past two decades, the tributaries to the A/P Watershed, which are located in the Hampton Roads region of Virginia, have been analyzed in a number of studies, undertaken by state, regional and local agencies. These studies have documented a variety of problems and opportunities in the Hampton Roads Virginia tributaries. Of particular importance to the current study are the following studies, prepared by regional and local agencies:

Hampton Roads Water Quality Management Plan, 1978.

Hampton Roads Water Quality Management Plan: 1983 Implementation Status Report and HRWQMP Plan Update, 1983.

A Water Quality Study of the Northwest River, Virginia, 1982.

Water Quality Trends in the Northwest River, 1982.

The Waters of Southeastern Virginia, 1988.

A Management Plan for Back Bay, Virginia Beach, Virginia, 1985.

The following discussion provides a brief review of each of the above-noted studies. It should be noted that a number of other studies, which deal, in part, with particular issues affecting the watershed, have also been conducted. They are not summarized in this discussion, but are reflected throughout this report.

The Hampton Roads Water Quality Management Plan (HRWQMP) was the first study to take a comprehensive look at the relative roles of point and nonpoint source pollution to the health of area water bodies, including all of the tributaries in the A/P Watershed. Unfortunately, funding limitations precluded the Hampton Roads Water Quality Agency from completing comprehensive field monitoring and water quality modelling analyses of water quality conditions in the watershed. The HRWQMP did recommend development and/or upgrade of a number of wastewater treatment facilities in the watershed, implementation of nonpoint source pollution controls on sources that were suspected to be significant and application of some thirty-three general recommendations to watershed activities.

Because of its importance as a source of potable water to the City of Chesapeake, water quality studies of the Northwest River were undertaken in 1982 by the Hampton Roads Water Quality Agency. They are A Water Quality Study of the Northwest River, Virginia, and Water Quality Trends in the Northwest River. Water quality monitoring to support development of a water quality model was conducted. The water quality model was determined to be sufficient for qualitative assessment of the water quality impacts associated with land use development alternatives. The

water quality studies confirmed that the Northwest River has naturally low dissolved oxygen levels under summer conditions and that it has a relatively low waste assimilative capacity. The report recommended a number of future research and management activities.

The Hampton Roads Water Quality Management Plan: 1983 Implementation Status Report and HRWQMP Plan Update documented activities that had been undertaken between 1979 and 1983 to implement the initial HRWQMP recommendations. That report indicated that significant progress had been made in accomplishing a number of the recommendations. However, it also noted that much remained to be done. Many of the recommendations for future study in the A/P Watershed tributaries were still waiting action due to continuing funding constraints and the higher priorities that had been placed on other waterbodies due to development pressure. It also recommended that a number of activities be undertaken to address identified deficiencies. Chief among these were recommendations that a Comprehensive Water Quality Management Plan for the Chowan Basin and a Back Bay Management Plan be prepared.

The Management Plan for Back Bay, Virginia was completed in 1985. It was prepared by a consultant, on behalf of the City of Virginia Beach, with funding obtained through the Hampton Roads Water Quality Agency. It was designed to address one of the identified deficiencies in the earlier water quality planning process. The Back Bay Watershed was and is a priority resource management issue for the City of Virginia Beach. The Plan summarized existing resource and water quality information about Back Bay and its tributary watershed. Based on that information, it recommended alternative approaches to land use management in the watershed, as well as specific steps to be undertaken to enhance water quality in Back Bay.

The Waters of Southeastern Virginia is a comprehensive assessment of public recreational access to the region's waterways and waterfront lands. It documents the characteristics of each of those waterways. Actions, including development of a regional scenic waterways system, to enhance recreational access to the waterbodies are recommended. It does not include water quality recommendations, but does describe then-current water quality characteristics.

CURRENT ACTIVITIES

Interest in and concern about the Hampton Roads Virginia tributaries has grown significantly over the last several years. In part, this can be attributed to the elevated interest in the Albemarle-Pamlico Estuarine System, evidenced by the Albemarle-Pamlico Estuarine Study. This can also be attributed to increasing awareness, on the part of the region's citizens and policy-makers, of the importance of these resources. Also, the increasing number of environmental programs that have an impact on local planning and development activities have heightened citizen and policy-maker interest in these resources and related management issues. Most of these activities have focused on the eastern portion of the region due to the larger population and greater

growth pressures. Significant initiatives that have been undertaken are described in the following paragraphs.

The City of Virginia Beach has adopted a **Southern Watershed Management Ordinance** to address the impacts of development in the southern portion of the city. This ordinance applies to development in the watersheds of Back Bay and the North Landing River. Development of this ordinance resulted from concerns about protection of critical natural resources and the City's ability to provide urban services to this area if urban development were to occur. The Virginia Beach Southern Watershed Management Ordinance is discussed in more detail in the "Alternative Management Programs" section of this report.

In Spring 1992, the HRPDC, in cooperation with the Virginia Council on the Environment, instituted a process to prepare a **Southern Watershed Special Area Management Plan** for the Currituck Sound Watershed. This process involved representatives of key state and federal agencies and the Cities of Chesapeake and Virginia Beach. It resulted in development of a proposal for funding through the Virginia Coastal Resources Management Program under the Section 309 Coastal Zone Enhancement Grants Program. The proposed project was designed to address a number of unanswered questions dealing with water quality and habitat/sensitive environmental resource management. It was expected to result in development of specific management initiatives and adoption of "enforceable policies" by the participating state agencies. Although, the project was not funded, it has resulted in several of the activities that are described in the ensuing discussion.

In part, as a result of the Section 309 project described above, the U.S. Environmental Protection Agency has instituted the "Tidewater Habitat Demonstration Project." That project is focusing on improved habitat management and public education in the watershed. It also includes discussion of the need for improved coordination and management of all resource-related projects in the watershed.

State and federal agencies have embarked on an intensive land acquisition and enhancement program in the Currituck Watershed. Acquisition and management programs have been instituted or expanded by the U.S. Fish and Wildlife Service, Virginia Department of Conservation and Recreation - Division of Natural Heritage, Virginia Department of Game and Inland Fisheries and The Nature Conservancy. Each of these programs is designed to protect sensitive environmental resources that have been identified in planning programs conducted by each of these entities. They reflect the fact that this watershed contains a unique assemblage of such resources and has been identified by The Nature Conservancy as one of the most important environmental areas in Virginia.

The Comprehensive Plans of each of the localities in the Hampton Roads portion of the A/P Watershed have been revised over the past three years. These revised plans place increased emphasis on environmental issues and management. Associated with this emphasis has been increased consideration of environmental

issues in developing and implementing land use regulations. This increased emphasis is discussed further in the Goals and Regulatory Analyses sections of this report.

The North American Waterfowl Management Plan identified a number of key areas throughout the nation that were critical to the maintenance and restoration of waterfowl populations. The Back Bay and North Landing River watersheds were designated as Focal Areas for this program. To facilitate implementation of the North American Plan's recommendations, the Commonwealth of Virginia established the Joint Venture Board. The Board was charged with overseeing programs in each of the designated focal areas within the Commonwealth. Focal Area Committees, involving participants from state and federal resource management agencies, local governments and the private sector, have been established for each of the areas. The Back Bay/North Landing River Focal Area Committee was established in early 1992. Its efforts, to date, have stressed development of a mission statement. The mission statement focuses on protection of wetlands and adjacent upland buffers and education. To date, this process has resulted in efforts to coordinate water quality management and environmental education programs in the watershed. The Committee has also recommended expansion of the focal area to include the Northwest River and portions of the Great Dismal Swamp.

The North Landing River and several of its tributaries were designated in 1985 by the City of Virginia Beach as scenic waterways. They have since been designated as a State Scenic River by the Virginia General Assembly and a Scenic River Advisory Board has been established. The Virginia Department of Conservation and Recreation has received funding from the Virginia Coastal Resources Management Program to prepare a public access plan and assessment of visual resources for this river and its tributaries. This project is expected to be completed in 1993. It involves coordination of recreational access with access to and management of the watershed's natural heritage resources.

Other rivers within the Hampton Roads portion of the A/P Watershed have also been designated, or considered for designation, as scenic rivers. Back Bay and its tributaries are included within the Virginia Beach Scenic Waterway System. The City of Chesapeake has designated the Northwest and North Landing Rivers and their tributaries as well as the Dismal Swamp Canal as scenic waterways and canoe trails. A portion of the Nottoway River has been examined for inclusion in the State Scenic River System, although legislative action on this has not yet been accomplished. All of the watershed's rivers are included in the Regional Scenic Waterway System, the establishment of which was recommended in The Waters of Southeastern Virginia.

The U.S. Geological Survey has begun development of the Albemarle-Pamlico portion of the National Water Quality Assessment (NAWQA). A number Hampton Roads Virginia agencies and local governments are participants in this process.

RECENT STUDIES

Over the last three years, the HRPDC, in cooperation with its member local governments, has undertaken several projects that are directly applicable to environmental management in the Hampton Roads Virginia portion of the A/P Watershed. Each of these projects addresses issues identified in previous studies as needing consideration on a regional basis to ensure consistency among local management programs. They are:

- o Best Management Practices Design Guidance Manual for Hampton Roads, 1991.
- o Model Environmental Assessment Procedure, 1992.
- o Vegetative Practices Guide for Nonpoint Source Pollution Management, 1992.
- o Citizen's Guide to Nonpoint Source Pollution, 1993.
- o Shoreline Element of Comprehensive Plans, in progress.

The Best Management Practices Design Guidance Manual for Hampton Roads provides guidance for local governments to use in addressing the stormwater performance criteria of the Chesapeake Bay Preservation Act, the Virginia Stormwater Management Act and the EPA Stormwater Permitting Program. This document provides information for use by local government staff and the development community in designing and developing stormwater management facilities in urban and developing areas. It includes design, operational and effectiveness information on best management practices for small sites, primarily residential and small commercial, and for regional detention and retention facilities. Practices and facilities are generally applicable to development conditions in the A/P Watershed.

In the Model Environmental Assessment Procedure, the HRPDC outlined one approach to evaluating the environmental impacts of development proposals. This study provides a comprehensive examination of environmental issues and management programs that may affect development activities. It also includes a detailed discussion and recommendations on conducting the water quality impact assessments required under the Chesapeake Bay Preservation Act. That discussion would also be applicable to water quality evaluation under locally-developed programs for the A/P Watershed.

Based on evaluation of the CBPA requirements and experience with structural BMPs on small residential sites, it became apparent to a number of local staff that guidance on the use of vegetation in stormwater and nonpoint source management was necessary. To assist in addressing that need, the HRPDC prepared the report, Vegetative Practices Guide for Nonpoint Source Pollution Management. This document provides recommendations on the use of vegetation in meeting stormwater

management requirements and in meeting the buffer area requirements of the Chesapeake Bay Preservation Act. It provides extensive listings of plants that can be used for these purposes. Most are equally adapted to conditions in the A/P Watershed.

A Citizen's Guide to Nonpoint Source Pollution has been prepared to provide information for use by the general public. It is a popular summary of information contained in the BMP Guidance Manual and in the Vegetative Practices Guidance. It also provides general information on stormwater management and nonpoint source pollution issues.

The Virginia Chesapeake Bay Preservation Act requires that affected local governments revise their comprehensive plans to address a number of issues. These include shoreline erosion and the control thereof and public and private water access, including appropriate standards for the density of docks and piers. Through the "Shoreline Element of Comprehensive Plans," the HRPDC will examine erosion and access conditions throughout the Chesapeake Bay portion of the region. This project will also examine conditions in the Back Bay and North Landing River portions of the A/P Watershed. This study is expected to be complete in late 1993.

ENVIRONMENTAL SETTING

SYSTEM CHARACTERISTICS

For water quality planning purposes, the Commonwealth of Virginia includes the entire Virginia portion of the A/P Watershed within the Chowan River and Dismal Swamp Basins. This Basin encompasses 4,076 square miles or about 10% of Virginia's land area. The Chowan River and Dismal Swamp Basins are shown on Figure 2.

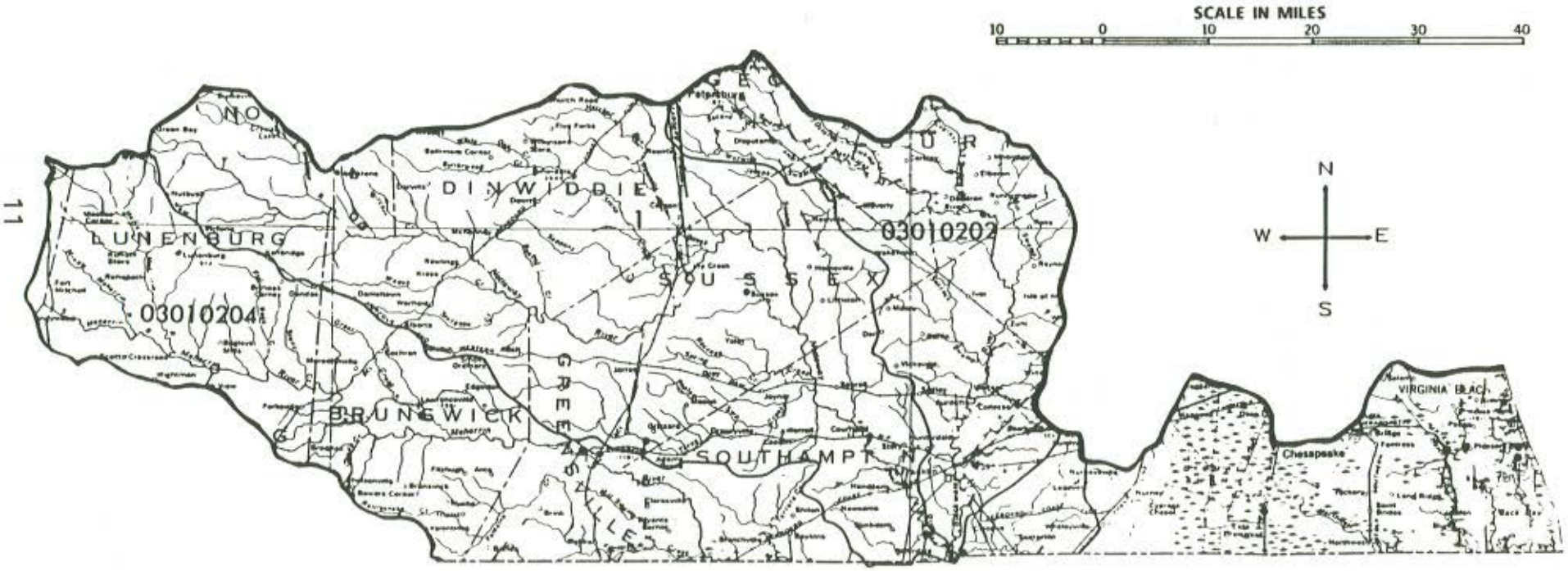
All of the Basin, considered in this study, lies entirely within the Coastal Plain. A portion of the Chowan Basin, outside of Hampton Roads, lies partially within the Piedmont. The surface of the Coastal Plain consists of a series of relatively flat terraces separated by scarps. The elevation of these terraces becomes progressively lower from west to east, with elevations in Chesapeake and Virginia Beach rarely exceeding twenty-five (25) feet. These represent former sea levels and shorelines. The rivers on the Coastal Plain are characterized by slow, sluggish movement through swampy areas. Typically, these rivers have small tributary watersheds. The Currituck Sound tributaries are influenced by wind tides as is the Lower Blackwater River.

The Virginia tributaries to the A/P Watershed can be divided into two categories. The eastern tributaries, Back Bay and the North Landing and Northwest Rivers, are referred to in this study as the Currituck Sound Watershed. The western tributaries, Blackwater, Nottoway and Meherrin Rivers and Somerton Creek, constitute the Chowan River Watershed. All are tributaries to the Albemarle Sound portion of the Albemarle-Pamlico Estuarine System.

These tributaries are used for a variety of purposes, including water supply, recreation, navigation, habitat support and irrigation. To a limited degree, they are also used for waste disposal from both municipal and industrial sources. The North Landing River and the Dismal Swamp Canal are integral components of the Atlantic Intracoastal Waterway and are heavily used by both recreational and commercial vessels. Dredging to maintain navigable channels has been accomplished on the North Landing River, the Blackwater River below the City of Franklin and on the Dismal Swamp Canal. All of the waterways constitute important scenic resources for the region.

FIGURE 2

WATERSHED MAP



Source: SWCB, Virginia Water Quality Assessment for 1992, 1992.

WATER QUALITY CONDITIONS

Historical Conditions

All of the Virginia tributaries to the A/P Watershed have experienced historical water quality problems and have been implicated to some degree in the water quality problems of the North Carolina portion of the A/P Watershed. In light of the fact that the Virginia tributaries constitute a sizable portion of the watershed of both the Currituck Sound and the Chowan River, this should not be surprising. Many of the perceived water quality problems are attributable to the natural characteristics, including topographic relief and swamp drainage, of the tributaries and their watersheds.

Back Bay has experienced water quality and living resource problems that are not significantly different from those experienced in the Currituck Sound. They include elevated sediment and nutrient levels and declining populations of submerged aquatic vegetation and fish resources. Water quality conditions in the North Landing and Northwest Rivers are not well documented, but appear to be largely attributable to natural conditions. Water quality conditions in the Chowan River tributaries are also largely attributable to natural conditions, except on the lower Blackwater River, where two large point sources are located. Conditions on the Blackwater River have been historically implicated in water quality problems, specifically algal blooms, on the Chowan River.

Current Conditions

No new water quality sampling has been undertaken as part of this study. Characterization of instream or ambient water quality is based on the conclusions reached by other studies. Specifically, the Virginia Water Quality Assessments (305(b) Reports) for 1990 and 1992, prepared by the Virginia State Water Control Board (SWCB) have been used to document current water quality conditions. For the purpose of this study, the following definitions are applicable:

1. Fishable/Swimmable Goals - These are the Fishable and Swimmable Goals of the federal Clean Water Act.

2. Effluent Limited - This term applies to stream segments where water quality standards will be met by compliance with effluent limits contained in a facility's Virginia Pollution Discharge Elimination System Permit from the State Water Control Board. Effluent limits are established by the U.S. Environmental Protection Agency and are generally applicable on the basis of facility type.

3. Water Quality Limited - This terms applies to stream segments where water quality standards will not be met by compliance with effluent limits alone. More stringent treatment requirements will be necessary in order to achieve water quality standards in these segments.

Eastern Tributaries - Currituck Sound Watershed

Most of the waters of the Currituck Sound Watershed fully support the fishable/swimmable goal of the Clean Water Act, as well as designated uses, including fish and wildlife support, agriculture, industry and some forms of recreation. Nonpoint sources and natural conditions are the dominant influences on water quality conditions.

It should be noted that the SWCB considers Lake Drummond and the Great Dismal Swamp to be a separate segment for planning purposes. This segment is classified as water quality limited. There is one water quality monitoring station located on the Dismal Swamp Canal. Monitoring indicates routine violation of the pH standard, attributed to natural conditions. Occasional violations of the dissolved oxygen standard are noted as are elevated levels of zinc and lead. These are below the chronic criteria. There are no point source discharges to the segment. The status of the Lake and related waterbodies was not assessed in the 305(b) report for 1992 to determine whether the fishable and swimmable goals were supported.

Back Bay

The waters of Back Bay are classified by the SWCB as water quality limited. Ambient water quality monitoring stations in Back Bay are maintained by the Virginia Department of Game and Inland Fisheries, the Back Bay Restoration Foundation and by the SWCB. The waters of the watershed fully support the swimmable goal of the Clean Water Act. Approximately 50% of the waters fully support and the balance partially support the fishable goal.

There are two point source discharges to the Bay and its tributaries. These are considered to be minor discharges and have only localized water quality impacts. As indicated previously, nonpoint source pollution is considered to be the dominant cause of water quality problems in the watershed. Primary problems are elevated nutrient and suspended solids loads, which are attributed to runoff from agricultural lands and residential development.

Resource declines, manifested in losses of submerged aquatic vegetation and declines in fish and waterfowl populations, have been linked, in part, to reduced tidal flushing in Back Bay. Historically, it was believed that turbidity could be reduced and water quality improved if salinity in the Bay was increased. Concomitant improvement in other indicators of ecosystem health could be expected to result. In hopes of achieving such improvements, the City of Virginia Beach operated a salt water pump-over from 1964-1987. Due to a lack of demonstrated benefits, this pump-over ceased operation in 1987. There are continuing concerns about salinity levels in the Back Bay - Currituck Sound System.

North Landing River

The North Landing River and its tributaries are also classified by the SWCB as water quality limited. Four ambient water quality stations are maintained by the SWCB. The waters of this watershed fully support the Clean Water Act goal of swimmable and all but 2.0 river miles fully support the fishable goal. These 2.0 river miles partially support this latter goal.

There are six minor point source discharges to the River and its tributaries. Monitoring indicates minor violations of the dissolved oxygen standard and elevated lead concentrations in the sediment at one station.

Stumpy Lake is located on the upper North Landing River. This 210 acre reservoir is part of the public water supply system of the City of Norfolk. There are no point source discharges to the lake or its tributaries. However, nonpoint sources and natural conditions contribute to elevated nutrient levels and occasionally elevated fecal coliform levels. The Lake and its tributaries fully support the fishable goal and partially support the swimmable goal.

Northwest River

The Northwest River and its tributaries are classified as water quality limited. The Northwest River serves as the primary source of potable water supply for the City of Chesapeake.

One water quality monitoring station is maintained by the SWCB. In addition, the City of Chesapeake monitors river water quality at its water supply intake. The river and its tributaries fully support the swimmable goal and most of the system fully supports the fishable goal, with the balance partially supporting that goal. City of Chesapeake monitoring data indicates high chloride levels at the water intake during drought conditions. This appears to be primarily a problem to the water supply system.

SWCB monitoring indicates fairly routine violations of the dissolved oxygen standard and regular violations of the pH standard. These are attributed to nonpoint source pollution and to natural conditions. There are five minor point source discharges to the River and its tributaries.

Western Tributaries - Chowan River Watershed

Blackwater River

The Blackwater River and its tributaries within Southeastern Virginia encompass two segments. The upper segment and its tributaries extend upstream from Franklin to the headwaters. The lower segment extends downstream from Franklin to the North Carolina State Line. More than 90% of the upper segment fully supports the

fishable/swimmable goals and the balance of the segment partially supports these goals.

There are eight minor municipal point source discharges to this segment. They appear to have only minor localized impacts. It should be noted that the dissolved oxygen standards were violated 29% of the time at one monitoring station within this segment. Monitoring in this segment also indicates frequent elevated pH levels and occasionally elevated fecal coliform levels. This appears to be attributable largely to natural conditions and nonpoint sources.

The lower segment extends from the City of Franklin to the North Carolina State Line. Two major point source discharges and two minor discharges are located along this segment. In addition, there are several significant animal waste facilities in the tributary area. This segment is designated as nutrient enriched by the SWCB. Approximately 50% of the segment's stream miles fully support the fishable/swimmable goal, while the balance only partially support the goal due to violations of dissolved oxygen, pH, nutrient standards and the presence of metals. Most of these violations appear to be attributable to natural conditions and nonpoint source loadings.

Special efforts are being undertaken to manage the discharge from the Union-Camp Paper Mill at Franklin. This is the major point source discharge to this segment. The firm has undertaken major capital improvements to reduce its discharge of toxic substances. To accomplish this reduction, Union-Camp has recently switched from a chlorine bleaching process to a patented ozone bleaching process. The firm has also made regular process and equipment improvements over the past two decades, enabling it to increase production while reducing the volume of water use and wastewater discharge. Additional improvements will be required by the SWCB in the VPDES Permit for this facility when it is renewed.

The City of Norfolk operates a water withdrawal on the Blackwater River within the upper segment. This withdrawal involves a maximum of 24 million gallons per day (MGD) from the River at Burdette.

A health advisory was issued for consumption of sport fish taken from the lower five miles of the segment in 1990. This advisory is due to concern about dioxin levels in the fish and is consistent with a similar advisory issued for the Chowan River in North Carolina. It is expected that the above-noted improvements at the Union-Camp facility will result in reductions in dioxin levels.

Somerton Creek is a tributary to the Chowan River in North Carolina. However, its watershed is largely in Virginia. It is considered to be a subbasin of the Blackwater River by the SWCB. It is classified as water quality limited. There are no monitoring stations or point sources on this segment. Nonpoint sources and natural conditions dominate water quality conditions.

Nottoway River

The Nottoway River and its tributaries, within Hampton Roads Virginia, encompass two segments. The SWCB currently operates four monitoring stations on these segments. The water body is classified as effluent limited. The lower Nottoway is designated as nutrient enriched. The upper segment, which encompasses Assamoosick Swamp and tributaries, fully supports the fishable and swimmable goals. More than 95% of the lower segment fully supports the fishable goal and 100% of this segment fully supports the swimmable goal.

Water quality in these segments is influenced largely by the swampy conditions of the watershed, seasonal fluctuations and storm-related nonpoint source loadings from agricultural and silvicultural activities. There are eight point source discharges to these segments. Most are minor and have only localized water quality impacts. One major industrial discharge is located on the lower Nottoway near Franklin. An Individual Control Strategy will be incorporated into its permit on renewal. In addition, this segment is the location of a withdrawal by the City of Norfolk for potable water supply. This withdrawal is for a maximum of 24 MGD at Courtland.

Meherrin River

The Meherrin River in Virginia is included within two segments for water quality planning purposes. These segments are classified as effluent limited. Water quality in the Meherrin River itself in this area is dominated by natural conditions and nonpoint source loadings. The Tarrara Creek subbasin is influenced by point source discharges. Studies to analyze potential toxics problems in this subbasin are underway. Efforts to upgrade municipal facilities are also underway. Most of the watershed fully supports the fishable/swimmable goal, with approximately 16 miles partially supporting that goal.

LAND USE CONDITIONS

Table 1 summarizes land use information for the Chowan River and Dismal Swamp Basins in Virginia. As can be seen from this information, the basin remains largely undeveloped. Approximately 18% of the Virginia portion of the A/P Watershed is in agricultural use. Nearly 81% is undeveloped. This category includes land in silviculture, wetlands and vacant lands. Vacant land may include fallow agricultural land as well as land being held for future development. The undeveloped category also includes lands which have been protected from future development through ownership by state, federal and local agencies and private sector conservation organizations. This broad category is used in this report due to the lack of comparability in land use statistics, reported in the Comprehensive Plans of the jurisdictions in the Virginia portion of the A/P Watershed.

Only 1% of the Virginia portion of the A/P Watershed is devoted to urban land uses, including residential, commercial and industrial uses. While developed lands within the watershed encompass only a minute fraction of the entire watershed, they

may include a sizable portion of some sub-watersheds. Specific examples include the headwaters of both Back Bay and the North Landing River. Population projections indicate that development will increase in those areas as well as in the headwaters of the Northwest River and scattered areas in the Chowan Basin adjacent to existing communities, such as Franklin.

TABLE 1

LAND USE BY WATERSHED:
VIRGINIA PORTION OF THE A/P WATERSHED

	Back Bay		North Landing		Northwest		Currituck Sound Tributaries Total	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Water	25,100	37.60%	2,841	3.81%			27,941	13.44%
Undeveloped	24,834	37.20%	26,164	35.06%	46,356	69.77%	97,354	46.84%
Agriculture	13,811	20.69%	32,633	43.72%	16,527	24.88%	62,971	30.30%
Developed	3,005	4.50%	12,997	17.41%	3,554	5.35%	19,556	9.41%
TOTAL	66,750		74,636		66,437		207,823	

	Blackwater		Meherrin		Nottoway		Chowan River Tributaries Total	
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Water							0	0.00%
Undeveloped	392,448	73.00%	553,792	85.00%	948,856	87.16%	1,895,096	83.20%
Agriculture	139,776	26.00%	91,213	14.00%	138,008	12.68%	368,997	16.20%
Developed	5,376	1.00%	6,515	1.00%	1,775	0.16%	13,667	0.60%
TOTAL	537,600		651,520		1,088,640		2,277,760	

	Currituck Sound Tributaries		Chowan River Tributaries		Totals for the Virginia Portion of the A/P Study Area	
	Acres	Percent	Acres	Percent	Acres	Percent
Water	27,941	13.44%	0		27,941	1.12%
Undeveloped	97,354	46.84%	1,895,096	83.20%	1,992,451	80.16%
Agriculture	62,971	30.30%	368,997	16.20%	431,968	17.38%
Developed	19,556	9.41%	13,667	0.60%	33,223	1.34%
TOTAL	207,823		2,277,760		2,485,583	

Source: Hampton Roads Planning District Commission, 1992

NONPOINT SOURCE LOADINGS

As indicated above, the Virginia portion of the A/P Watershed contains relatively few point source discharges. In fact, the only significant such discharges are located on the lower Blackwater and Nottoway Rivers. Water Quality in most of the surface waters is dominated by nonpoint source loadings and natural conditions. Based on the land use characteristics and previous analyses, it is logical to assume that urban runoff has only a very minor impact on the overall water quality of the watershed. However, nonpoint source loadings from urban areas in the watershed may have significant localized impacts, especially in the small tributaries.

Previous analyses of nonpoint source loadings and water quality conditions are consistent with the findings in the SWCB 305(b) Report, discussed above. However, it should be noted that no comprehensive water quality monitoring program, which included stormwater sampling, has been conducted. Also, no water quality modelling program to analyze the relative contributions of various point and nonpoint sources to water quality conditions has been completed. Dominant water quality problems throughout the watershed reflect the importance of nonpoint sources and natural conditions. They are related to elevated levels of nutrients and oxygen-demanding materials.

The Virginia Section 319 Nonpoint Source Assessment has characterized the nonpoint source water quality conditions in each of the stream segments in the state. Figure 3 depicts the nonpoint source water quality priorities for each of the sub-basins/segments in the Virginia portion of the A/P Watershed. Based on that characterization, the segments have been ranked as high, medium and low for existing and potential nonpoint source-related problems. The three eastern tributaries (Currituck Sound Watershed) are all ranked high on this assessment. Within Hampton Roads Virginia, most segments of the Chowan Basin are ranked in the medium category. Most segments of the Chowan Basin located upstream of the Hampton Roads region are rated low. Finally, within the region, a portion of the Meherrin River is also rated as low. These rankings are used in establishing priorities for allocation of cost-share and technical assistance in addressing nonpoint source problems.

SUMMARY CHARACTERIZATION OF WATERSHED

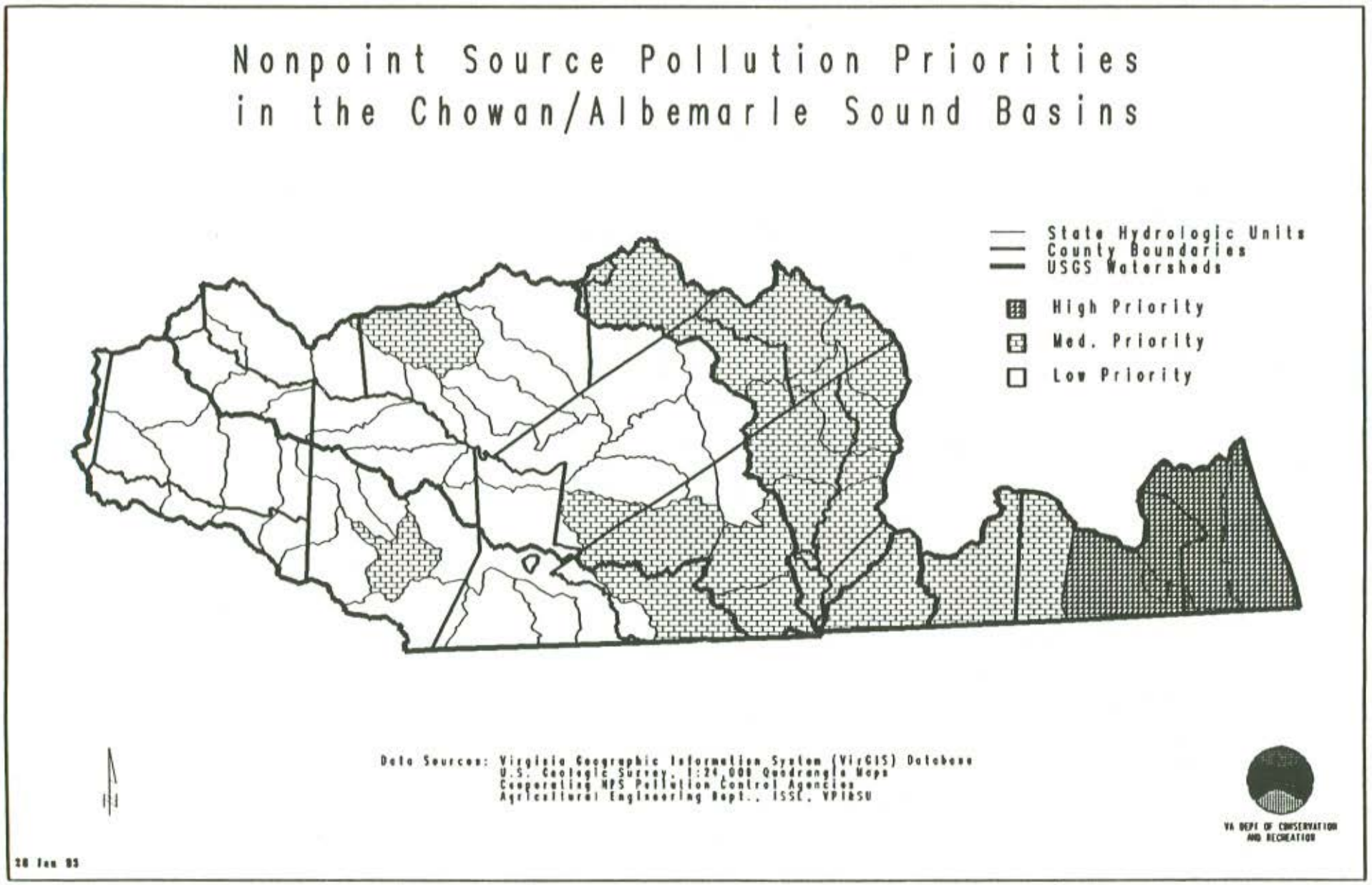
This section has characterized water quality and land use conditions in the Virginia portion of the A/P Watershed. Throughout the watershed, water quality is generally good in terms of meeting the fishable/swimmable goals of the Clean Water Act. This is especially true of the free-flowing streams.

There are "hot spots" of current or historic pollution problems, typically located downstream from major point source discharges. Typical problems in these areas include elevated nutrient levels, low dissolved oxygen and, in one instance, elevated toxics levels. Point source control programs instituted in response to discharge permit limits and discharger initiative appear to be reducing the severity and extent of these water problems.

As might be expected of surface waters that receive very few point source discharges, water quality conditions are dominated by natural conditions and nonpoint source pollution. Water quality problems attributable to natural conditions reflect the swampy character of the watershed. This is especially true of the eastern tributaries and the upper watershed of the western tributaries. Both the eastern and lower western tributaries are affected by wind tides. The eastern tributaries receive relatively little freshwater input due to their relatively small contributing drainage areas. This, in combination with wind tides, results in poor flushing. As a result, pollutants tend to have a fairly long residence time.

Nonpoint source pollution throughout the Virginia portion of the A/P Watershed is associated with agricultural and silvicultural activities, including intensive animal feeding operations. Increasingly, the eastern tributaries are affected by nonpoint source pollution associated with urban development. Similarly, some small tributaries in the western portion of the region are beginning to exhibit problems typically associated with nonpoint source pollution from urban development. Typically, nonpoint source pollution problems are manifested in elevated nutrients, suspended solids and fecal coliforms.

FIGURE 3



SOURCE: Department of Conservation and Recreation, Division of Soil and Water Conservation, 1993.

GOALS COMPATIBILITY ANALYSIS

WATER QUALITY GOALS

Federal and state laws have established water quality goals for all surface waters, including the Currituck Sound and Chowan River Basins. The federal goal was established in the Federal Water Pollution Control Act Amendments of 1972 and reaffirmed in subsequent amendments to and reauthorizations of this Act. State water quality goals for Virginia are established in the State Water Control Law. Although the goals statements are worded slightly differently in these two statutes, the basic intent is the same:

- To restore water quality to the point that surface waters are "fishable and swimmable:" and,

- To maintain the quality of all surface waters at that level.

Over the last two decades, the federal and state water quality statutes have been amended a number of times. In each case, the goal was reaffirmed.

Through its draft Comprehensive Conservation Management Plan for the Albemarle-Pamlico Estuarine Study (CCMP), the APES Program has established more specific goals for the A/P Watershed. These goals relate directly to the areas of concern that guided the APES Program from the outset and reflect the concerns identified in the APES Status and Trends Report. Table 2 summarizes these goals. Each of these goals is, in turn, amplified through a series of objectives. The objectives represent the specific steps or combinations of actions necessary to achieve the adopted goals. The reader, who desires further information or background on the goals and objectives of the CCMP, is referred to that document.

TABLE 2

GOALS OF THE COMPREHENSIVE CONSERVATION MANAGEMENT PLAN OF THE ALBEMARLE-PAMLICO ESTUARINE STUDY

1. Minimize adverse impacts of human activities.
2. Recognize and implement public trust rights in natural resources.
3. Protect essential habitat and rare natural communities.
4. Conserve, protect and enhance the acreage, function, and value of wetlands.
5. Protect living aquatic resources from toxic or deleterious effects of excessive nutrient loadings or imbalance.
6. Protect living aquatic resources from the toxic effects of contaminants.
7. Restore all "prohibited," "restricted," or "conditionally approved" shellfish waters to "approved" status.
8. Improve the ability to test for potential human health hazards resulting from the ingestion of shellfish.
9. Protect aquatic living resources through direct protection of species and communities and through the protection and restoration of water quality.
10. Restore or maintain fisheries resources to provide for long-term, optimum, sustainable, public utilization.
11. Maintain an adequate quantity of vital fish and shellfish habitats.
12. Minimize the impact of any anthropogenic factors which contribute to fish kills and disease.
13. Provide comprehensive primary school environmental science curricula.
14. Provide pertinent information on environmental and economic issues to allow for more informed decision making and promote the exchange of information and management ideas.
15. Promote an understanding and appreciation of the Albemarle-Pamlico System and related environmental issues and regulations.
16. Maintain direct public involvement in environmental research, policy and management.

SOURCE: Adapted by HRPDC from APES Program, Comprehensive Conservation Management Plan for the Albemarle-Pamlico Estuarine Study (Public Review Draft), 1992/1993.

LOCAL DEVELOPMENT GOALS

The Currituck Sound and Chowan River Watersheds, within the Hampton Roads Planning District, encompass all or portions of four cities and two counties - Chesapeake, Franklin, Isle of Wight, Southampton, Suffolk and Virginia Beach. Also, the City of Norfolk relies, in part, on the waters of this system for potable water supply. Each of these communities has an adopted Comprehensive Plan, which generally contains the City's or County's official statement of development and environmental quality goals. In all cases, regulatory measures and functional plans contain additional, more specific statements of goals.

In all communities, the basic Comprehensive Plan goal is derived from Sections 15.1-427 and 15.1-489 of the Code of Virginia - to promote the health, safety and general welfare of the public. In addition, the Cities of Chesapeake, Norfolk, Suffolk and Virginia Beach and Isle of Wight County are governed by the Chesapeake Bay Preservation Act (Section 10.1-2100, et. seq. of the Code of Virginia) and have adopted goals statements reflecting the goals of that legislation. Statements of environmental goals, adopted by the region's localities, are applicable throughout the locality and are generally consistent with the broad goals of the Chesapeake Bay Preservation Act (CBPA). In addition, goals adopted by the two localities, that are not governed by the CBPA, are generally consistent with the CBPA goals. All other goals statements follow from these requirements. In the broadest terms, local goals, as they relate to the A/P Watershed, can be summarized as follows:

- To promote economic development in order to increase employment opportunities and to increase the economic stability of the community.
- To guide future development into a form which is efficient in terms of service provision and which protects the environment.
- To provide housing opportunities for all residents of the community.
- To protect water quality in the waterbodies of the community.
- To maintain and enhance environmental quality in the community in order to maintain the high quality of life for which the region is noteworthy.
- To provide increased opportunity for public access to the water for both recreation and aesthetic purposes.
- To protect fragile or especially valuable elements of the environment, including surface and ground waters, agricultural lands, wetlands, and other sensitive environmental resources.
- To protect surface and ground waters that are presently, or in the future might be, used for water supply.

- To provide adequate infrastructure to support economic development and environmental protection.

These goals are the products of an ongoing planning process. Over the last four years, each of the region's communities in the A/P Watershed has completed a major revision of its Comprehensive Plan. In addition, each of the communities that lies within the Chesapeake Bay Basin will be updating its Comprehensive Plan during the next year to conform to the requirements of the Chesapeake Bay Preservation Act. This effort affects the Cities of Chesapeake, Norfolk, Portsmouth, Suffolk and Virginia Beach and Isle of Wight County. This process is expected to result in a further increase in the emphasis placed on environmental protection in local Comprehensive Plans. Both the City of Franklin and Southampton County adopted revised Comprehensive Plans in 1989, which incorporated specific environmental quality goals.

GOALS COMPATIBILITY ANALYSIS

At the inception of the effort to develop an Environmental Management Program for the Hampton Roads Virginia portion of the A/P Watershed, it was believed that goals competition and conflict played an important role in determining the region's ability to achieve water quality goals. Therefore, it was believed that an initial step in the planning process should be to define areas of goals conflict and compatibility. It is recognized that goals may not translate directly into supporting programmatic activities and, thus, may be less important than specific program activities. However, obvious conflicts should be viewed as areas of concern that warrant consideration. Management recommendations should attempt to reconcile such areas of conflict.

The Comprehensive Plans of the region's six communities in the A/P Watershed have been reviewed in light of adopted state and federal water quality goals and the goals contained in the draft CCMP. In completing this review, the relationship between the adopted development goals of the six communities and the state and federal water quality goals and the CCMP goals has been identified. This relationship has been characterized as Compatibility, Potential Conflict or Conflict.

Goals conflict was defined as a situation where the achievement of one goal was likely to have an adverse impact on the ability to achieve another goal or to preclude its achievement altogether. Potential conflict occurred when achievement of one goal would have an adverse impact on achievement of another goal unless management intervention occurred. Goals were compatible when achievement of one goal would either have no impact on achievement of the other or where the two goals were mutually supportive.

Figure 4 summarizes the results of the compatibility analysis. The review of individual local goals revealed a few minor cases of goals conflict. For example, preservation of all nontidal wetlands in a community is likely to preclude or impair achievement of many of the economic development goals and vice versa. Local

environmental quality goals are generally compatible with both the water quality goals and with the CCMP goals. In most cases, the potential for conflict between development and water quality and habitat goals exists. There is potential conflict between development and water supply protection goals as well. Thus, it appears that specific management activities must be undertaken to ensure that both sets of goals are achieved with a minimum of adverse impact.

No attempt has been made to ascertain the potential for conflict among state or federal development and environmental quality goals. However, it is obvious that a similar situation does exist. For example, both the state and the federal government have the goal of maintaining navigation on the Intracoastal Waterway and the Lower Blackwater River, while concurrently maintaining and improving water quality in these waterbodies. Again, management efforts are required to simultaneously achieve these goals. Even state and federal legislation enacted specifically for water quality purposes contains this dichotomous goals relationship. This issue is recognized in a number of the management recommendations contained in the CCMP.

Earlier studies undertaken through the region's 208 Areawide Water Quality Management Planning process and related efforts recommended that all localities in Hampton Roads adopt water quality protection as a goal of their comprehensive plans. These earlier studies noted that this action would provide the legal and logical basis for incorporating water quality protection into their land use regulatory measures. All localities in the region have now adopted water quality protection as a goal of the comprehensive plan. A number of them have expanded this to include consideration of a broad range of environmental issues, including wetland protection, air quality protection and so forth. In carrying out the requirements of the Chesapeake Bay Preservation Act to incorporate water quality protection into the comprehensive plan and related regulatory measures, further emphasis is being placed on the role of water and environmental quality in community development. It should be noted that, even in those communities, that are not covered by the CBPA, environmental protection has been given greater consideration in the comprehensive plan and related regulations. Finally, the CBPA and Virginia planning legislation both recognize the integral relationship between water quality and a healthy economy. Thus, the need to manage the potential conflict between these goals has been formally recognized as an issue in water quality management and in local comprehensive planning in the Hampton Roads region.

FIGURE 4

GOALS COMPATIBILITY ANALYSIS

DEVELOPMENT GOALS	WATER QUALITY/CCMP GOALS					
	To restore and/or maintain water Quality in the estuarine system at a level sufficient for fishing and swimming.	To minimize the adverse impacts of human activities.	To protect and restore water quality in all waters of the estuarine system.	To protect and enhance essential habitat and rare natural communities.	To protect, restore, or maintain aquatic living resources, including finfish and shellfish.	To provide for public education about and involvement in management of the estuarine system.
To promote economic development in order to increase employment opportunities and to ensure economic stability.	☒	☒	☒	☒	☒	☐
To guide future development into a cost-effective, environmentally sound pattern.	☒	☒	☒	☒	☒	☐
To protect all existing and potential sources of potable water supply.	☐	☐	☐	☒	☒	☐
To provide housing opportunities for all community residents.	☒	☒	☒	☒	☒	☐
To protect water quality in all water-bodies of the community.	☐	☐	☐	☐	☐	☐
To maintain and enhance environmental quality in order to maintain the region's high quality of life.	☐	☐	☐	☐	☐	☐
To provide increased opportunity for public access to the water for aesthetic and recreation purposes.	☒	☒	☒	☒	☒	☐
To protect fragile or especially valuable environmental resources.	☐	☐	☐	☐	☐	☐
To provide adequate infrastructure to support economic development and environmental protection.	☒	☒	☒	☒	☒	☐

Legend:

☐ Compatible

☒ Potential Conflict

⧈ Conflict

Source: Hampton Roads Planning District Commission, 1992.

REGULATORY ANALYSIS

The goals compatibility analysis indicates that specific local government activities are necessary to ensure concurrent achievement of local environmental and development goals and to minimize areas of potential conflict between those local goals and various state and federal goals. It also appears that local programs must be supplemented and supported by state management actions. This section describes the existing institutional structure for environmental management in the Hampton Roads Virginia portion of the A/P Watershed. It reviews major state and federal regulatory initiatives and local regulatory programs. While the discussion of the institutional structure addresses environmental management in a comprehensive fashion, the regulatory discussion focuses on land use and water quality management programs. Finally, areas of potential conflict between local development regulations and management programs and water quality goals are identified.

INSTITUTIONAL STRUCTURE

A variety of federal, state, local and regional agencies are involved in land and water resource management as they affect the resources of the Hampton Roads Virginia portion of the A/P Watershed. Table 3 depicts the array of primary agencies and their area(s) of responsibility. This listing is not meant to be all inclusive.

The existing institutional structure for environmental management in the Hampton Roads Virginia portion of the A/P Watershed is fairly complex. This is especially true at the state level where agencies have been created, reorganized or given new programmatic responsibilities. Of particular significance to the Hampton Roads region is the Chesapeake Bay Local Assistance Board and Department, whose programs affect the northern or Chesapeake Bay portion of the region. The Virginia Department of Environmental Quality, merging the existing Virginia Council on the Environment, Department of Air Pollution Control, Department of Waste Management and State Water Control Board, will begin operation on April 1, 1993. Its activities will affect the entire Virginia portion of the A/P Watershed, including Hampton Roads. The proposed Albemarle-Pamlico Estuarine Council may potentially have a significant impact on environmental management activities in the southern portion of the region. However, pending formalization of Virginia's role in long-term cooperative management of the A/P Watershed, through a Bi-State Agreement or some similar mechanism, its full significance cannot be determined.

TABLE 3

EXISTING INSTITUTIONAL STRUCTURE FOR ENVIRONMENTAL MANAGEMENT A/P WATERSHED - HAMPTON ROADS

AGENCY	RESPONSIBILITY
Federal Agencies	
U.S. Environmental Protection Agency	Air Quality, Water Quality (Point and Nonpoint Source) Solid and Hazardous Waste, Wetlands Resources, Groundwater
U.S. Navy	Facilities and environmental management as a property owner or lessor
U.S. Army, Corps of Engineers	Dredging, Wetlands, Navigation Improvements
U.S. Coast Guard	Spill Prevention and Cleanup
U.S. Department of Agriculture	Soils information, farm plans, forestry plans and management practices
U.S. Department of Commerce	Coastal Resources Management Program, oceanographic and atmospheric research, fisheries management, coastal nonpoint source management
U.S. Department of Interior	Fisheries, Wetlands Resources, Endangered Species, National Wildlife Refuges

TABLE 3 (Continued)

EXISTING INSTITUTIONAL STRUCTURE
FOR ENVIRONMENTAL MANAGEMENT
A/P WATERSHED - HAMPTON ROADS

AGENCY	RESPONSIBILITY
Virginia State Agencies	
Council on the Environment	Coastal Resources Management Program, Environmental Impact Review and Coordination
State Water Control Board	Water Quality, Water Supply, Groundwater, Point Source and Stormwater Discharge Permits, Wetlands, Related Issues
Department of Air Pollution Control	Air Quality
Department of Health	Water and Wastewater Facility Design, Drinking Water, Shellfish Sanitation, Shoreline Sanitation
Department of Waste Management	Solid Waste, Hazardous Waste, Nuclear Waste, Litter Control, Hazardous Materials Emergency Planning (with Emergency Services), Superfund
Department of Conservation and Recreation	Soil Erosion, Nonpoint Source Management, Recreation and Public Access, Stormwater Management, Agriculture (technical and financial assistance), Natural Heritage
Marine Resources Commission	Wetlands, Subaqueous Lands, Marine Fisheries, Primary Sand Dunes
Department of Game and Inland Fisheries	Freshwater Fisheries, Public Access, Wildlife Management

TABLE 3 (Continued)

EXISTING INSTITUTIONAL STRUCTURE
FOR ENVIRONMENTAL MANAGEMENT
A/P WATERSHED - HAMPTON ROADS

AGENCY	RESPONSIBILITY
Chesapeake Bay Local Assistance Department	Water Quality, Nonpoint Sources, Sensitive Areas, Land Use
Department of Forestry	Forest Resources Management
Department of Historic Resources	Historic Resources
Department of Agriculture and Consumer Services	Agriculture, Pesticide Management
Department of Transportation	Highway Facilities, Related Environmental Management Issues
Cooperative Extension Service	Education and technical assistance on agricultural, silvicultural and horticultural issues
Virginia Institute of Marine Science	Scientific research and policy advice on aquatic resource issues in coastal and estuarine areas
Regional Agencies	
Hampton Roads Planning District Commission	Regional Comprehensive Planning and Technical Assistance
Hampton Roads Sanitation District	Wastewater Treatment
Southeastern Public Service Authority of Virginia	Solid Waste Disposal, Hazardous Waste Management, Recycling

TABLE 3 (Continued)

EXISTING INSTITUTIONAL STRUCTURE
FOR ENVIRONMENTAL MANAGEMENT
A/P WATERSHED - HAMPTON ROADS

AGENCY	RESPONSIBILITY
Local Agencies	
Cities of Chesapeake, Franklin, Suffolk and Virginia Beach, Counties of Isle of Wight and Southampton	Planning, Development Regulation, Service Provision
Peanut, J.R. Horsley and Virginia Dare Soil and Water Conservation Districts	Agriculture, Nonpoint Sources, Soil Erosion

NOTES: 1. The Towns of Boykins, Branchville, Capron, Courtland, Ivor, and Newsoms are located in Southampton County and are responsible for planning and service provision within town boundaries. For many activities, the County and Towns cooperate in these endeavors. Both Isle of Wight and Southampton Counties have also established Water and Sewer Authorities to facilitate provision of those services to both incorporated and unincorporated areas of the Counties.

2. Effective April 1, 1993, the Virginia Department of Environmental Quality will be established. It will include the following agencies: Virginia Council on the Environment, State Water Control Board, Department of Waste Management and Department of Air Pollution Control and the related citizens boards that guide those agencies. The citizen board of the Council on the Environment will be abolished.

SOURCE: Hampton Roads Planning District Commission, 1992.

The federal institutional structure affecting environmental management in the Hampton Roads portion of the A/P Watershed is virtually identical to the federal structure in the balance of the A/P Watershed. The primary difference in the presence of the U.S. Navy as a major landholder and manager in the northern portion of the watershed. The Navy's role in the Hampton Roads portion of the A/P Watershed is essentially the same as that of the Marine Corps in the Pamlico Sound portion of the watershed.

While institutional complexity has increased at the state level in recent years, the local institutional structure has become somewhat more streamlined. In all basin localities, a Deputy City Manager, Assistant County Administrator or equivalent position has been given day-to-day responsibility for coordinating the activities of all departments involved in physical development. This organizational structure facilitates development review, resolution of inter-departmental conflicts and focuses responsibility for land development. Each community has placed overall responsibility for coordinating environmental issues with respect to development in the planning department. However, some departments with responsibility for environmental and resource management do not fall within the development management sphere. As a result, institutional barriers to coordination of local environmental management remain.

REGULATORY FRAMEWORK

A wide variety of regulatory and incentive programs has been adopted by essentially all of the agencies included in the complex institutional structure, described above. Historically, the most important of these for both land use development and nonpoint source pollution control have been found at the local level. These local programs include zoning, subdivision control, wetlands management, erosion and sediment control ordinances and regulations and public facility design criteria. Recent local innovations have included stormwater management and buffering and landscaping requirements. In addition, those localities within the Chesapeake Bay Basin have enacted local programs to comply with the provisions of the CBPA.

State and Federal Programs

New state and federal programs affecting management of land use development and nonpoint source pollution have been created over the last several years. These include the EPA Stormwater Discharge Permitting Regulations, Chesapeake Bay Local Assistance Board regulations implementing the CBPA, the Virginia Stormwater Management Act and state and federal regulation of activities affecting wetlands.

The EPA Stormwater Discharge Permitting Regulations is being implemented in Virginia by the State Water Control Board. That program presently requires municipalities with populations in excess of 100,000 and certain industrial, including construction, activities, to obtain permits for their stormwater discharges. In the future, localities with populations less than 100,000 and other land use activities may also be governed by these regulations. The Chesapeake Bay Preservation Act is a comprehensive land use/water quality management program. It is discussed in detail

in the "Alternative Management Programs" section of this report. The Virginia Stormwater Management Act, which formally enables local governments to address stormwater quality as well as quantity, is a significant enhancement of local ability to address the areas of potential conflict between development and environmental protection.

Several programs, which will affect environmental management in the Hampton Roads region, are presently being developed. They include:

- The Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study.
- The Section 6217 Coastal Nonpoint Source Pollution Program, under the Virginia Coastal Resources Management Program.
- The Chesapeake Bay Program Tributaries Strategy.

The former two programs are likely to have a direct influence on future management initiatives within the Hampton Roads portion of the A/P Watershed. Both programs are discussed in further detail later in this report. The latter program will not have a direct impact, but can serve as an important model in developing and refining programs affecting the watershed. A variety of activities in the areas of environmental protection, development management, public access to the water and institutional coordination resulted from the 1987 Chesapeake Bay Agreement. A similar array of new initiatives is expected to result from adoption of the Comprehensive Conservation Management Plan, as well as from efforts to develop a Bi-State Agreement between Virginia and North Carolina.

The thrust of the above-noted state and federal programs is to elevate the importance of water quality protection in the local land use regulatory process. Because the EPA program requires local governments to assume legal responsibility for discharges from their storm sewers, they have become increasingly concerned with the quality of discharges to those storm sewers and other drainage facilities. The state stormwater program and the CBPA program provide, in part, the necessary authorization for local governments to adopt a regulatory approach to ensuring that discharges from their stormwater systems do not violate EPA requirements because of land use activities in the watershed. Concurrently, local governments are increasingly concerned that the stormwater management criteria and standards contained in these programs are not consistent. Efforts are underway at both the state (Virginia) and regional levels to address this consistency issue.

Local Programs

Throughout the Hampton Roads portion of the A/P Watershed, the array of local government management tools that have been adopted is not appreciably different than was the case, when earlier (late 1970s, early 1980s) water quality and environmental management plans were being prepared for this area. All Hampton

Roads localities have adopted Zoning Ordinances, Subdivision Regulations, Erosion and Sediment Control Ordinances and Programs, Flood Plain Protection, Site Plan Review and Wetlands Zoning. They have also developed the public facility design standards necessary to implement these programs. Increasingly, the localities are using buffering and landscaping requirements to mitigate instances of incompatibility between adjacent developments.

Major regulatory initiatives have been or are being undertaken by each of the basin's local governments. Concurrently with local efforts to revise their comprehensive plans, all localities within the Hampton Roads region have developed, or are developing, comprehensive revisions to their Zoning Ordinances. Based on the nature of the Comprehensive Plan revisions, these ordinances include increased consideration of environmental protection. This is especially true of those jurisdictions affected by the CBPA.

Major steps have been taken to increase local regulatory consideration of water quality protection. They include adoption by:

- Virginia Beach of a Stormwater Management Ordinance which requires implementation of Best Management Practices in most significant land development throughout the city;

- Virginia Beach of the Southern Watershed Management Ordinance which establishes a variety of land use development and environmental protection requirements for activities in the Back Bay and North Landing River watersheds;

- Southampton County of a new Zoning Ordinance which includes provisions for improved development management and environmental protection;

- Franklin of a Stormwater Management Ordinance.

COMPATIBILITY ANALYSIS

A complex institutional structure for dealing with land use development and environmental protection issues is in place. While none of the existing institutions is specifically charged with all facets of environmental management in the Virginia portion of the A/P Watershed, each has responsibility for an area that includes some portion of the Watershed and/or some aspects of environmental management. Historically, state and federal agencies have been only peripherally involved in land use management; their emphasis has been water quality. Conversely, local institutions have focused on land use and only secondarily on the regulation of water quality and environmental protection.

The line of distinction between state and federal program emphasis on the one hand and local program emphasis on the other has blurred considerably in the recent

past as institutions at all levels have increased the scope of their regulatory endeavors. However, their focus of attention has not changed markedly. State and federal agencies have increased their involvement in land use decision-making from a water quality regulatory perspective. Local governments are increasingly concerned with water quality, but from a land use perspective. Also, state enabling legislation has been enacted which permits local governments to actively address water quality in their land use decisions.

As in the goals compatibility analysis, this study has examined local development regulations to determine their compatibility with water quality protection. The relationship between development regulations and water quality goals has been categorized as follows: Conflict, Potential Conflict and Compatibility. No instance of direct conflict between local development regulations and water quality goals was identified. Many local regulations, including wetlands and flood plain regulations, and public facility standards requiring connection to the municipal sewer system, are mutually supportive of the achievement of water quality goals.

Several local regulatory programs present potential conflict with water quality goals. These include Zoning Ordinances and Subdivision Regulations. The areas of potential conflict within these regulations appear to be inherent in their broad and somewhat divergent purposes. Under state enabling legislation, these regulations are to achieve many governmental objectives, including public health, safety and welfare, economic development, environmental protection and governmental efficiency and responsiveness. This broad spectrum of goals can only be achieved through a reasoned and balanced decision-making process.

Local government's ability to accomplish this difficult balancing act has been enhanced by the relatively recent enactment of state legislation that specifically enables local government to address water quality in the land use regulatory process. Local programs, such as the Virginia Beach Stormwater Management and Southern Watershed Management Ordinances, the Franklin Stormwater Management Ordinance and the Southampton County Zoning Ordinance, indicate local government's willingness and ability to use these powers. While various sections of this report describe areas in which local programs could be modified to increase their effectiveness in protecting water quality, there is a concomitant need for legislative support to ensure that local governments are given the powers necessary to modify their programs to achieve this goal. There is also a need for administrative and/or legislative action to ensure consistency among state and federal program requirements.

CRITICAL MANAGEMENT AREA

In recent years, considerable public attention has been directed at the concept of designating defined areas of watersheds as "critical management areas" for purposes of environmental and water quality management. This approach has been used with some degree of success in the Maryland "Critical Areas Program" and the Virginia Chesapeake Bay Preservation Act for managing development in the Chesapeake Bay Watershed and in the North Carolina Coastal Area Management Act. Aspects of a critical management area approach are also included in the recommendations of the draft Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study.

In the Elizabeth River Basin Environmental Management Program, the HRPDC analyzed a variety of alternative critical area approaches. Based on this evaluation, a "tiered critical management area" was recommended for the Elizabeth River Basin. The recommended area included the entire basin as the broadest management unit, in which nonpoint source and stormwater management strategies would be implemented. Special management attention would be given to three types of resources or uses within that area:

- Natural resources of concern, such as Tidal Wetlands, Subaqueous Lands, other critical aquatic resources, and lands to be designated under the then-proposed CBPA Regulations.

- Transitional parcels that could be expected to go from low intensity uses to higher intensity urban use.

- Land uses involving the existing or historic use or storage of hazardous materials and wastes.

This recommendation was consistent with the conclusions reached by scientific researchers that a watershed-wide approach to water quality management is the most technically defensible alternative. Within that watershed-wide management system, certain resources and uses should receive special management attention. This approach was also consistent with the then-evolving EPA Stormwater Permitting Program and the Chesapeake Bay Preservation Act.

CHESAPEAKE BAY PRESERVATION ACT

Virginia's Chesapeake Bay Preservation Act entails a "Critical Management Area" approach to water quality management in the Chesapeake Bay Watershed of Virginia. Specifically, Chesapeake Bay Preservation Areas are to be designated and specific controls applied to development within them.

The CBPA regulations provide for designation of a two-tiered Management Area, including Resource Protection Areas and Resource Management Areas. They also provide for an optional third tier - Intensely Developed Areas.

CBPA Resource Protection Areas are to be delineated by local governments to include:

- Tidal Wetlands
- Non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams.
- Tidal Shores.
- Other lands as appropriate in the eyes of the local government and necessary to protect the quality of state waters.
- Buffer areas not less than 100 feet in width located adjacent to and landward of the above features and along both sides of tributary streams.

Resource Management Areas are to be designated contiguous to the entire RPA and are to include:

- Floodplains.
- Highly erodible soils, including steep slopes.
- Highly permeable soils
- Non-tidal wetlands not included in the Resource Protection Area.
- Other lands as appropriate in the eyes of the local government and necessary to protect the quality of state waters.

Specific development controls and performance standards apply to development in both the RPA and the RMA. In addition, only water-dependent facilities and redevelopment activities are permitted in the RPA.

The CBPA also allows local governments to designate areas known as Intensely Developed Areas (IDA). The IDA designation may apply to any CBPA Resource Protection or Management Area, where little of the natural environment remains and the following conditions are met:

- Development has severely altered the natural state of the area such that it has more than 50% impervious surface.

- o Public sewer and water is constructed and currently serves the area.

- o Housing density is equal to or greater than four dwelling units per acre.

The following chapter describes the Chesapeake Bay Preservation Act in more detail and evaluates its applicability to the Hampton Roads Virginia Portion of the A/P Watershed.

COMPREHENSIVE CONSERVATION MANAGEMENT PLAN OF THE ALBEMARLE-PAMLICO ESTUARINE STUDY

The CCMP does not specifically recommend a regulatory approach to critical area management in the A/P Watershed. It does recommend a number of actions that, taken in concert, could be construed to represent a "critical management area" approach. By examining each of the Action Plans, resources deemed by the Management Conference to be critical can be identified and the elements of a "critical management area" strategy determined.

Based on this review, it appears that the following areas and features could constitute a critical management area for the A/P Watershed.

- o Waters classified as "Outstanding Resource Waters."

- o Waters containing or potentially containing Submerged Aquatic Vegetation Beds, Nursery Areas and Shellfish Beds.

- o Shorelines - riverine and estuarine.

- o Tidal and Nontidal Wetlands.

- o Uplands adjacent to Submerged Aquatic Vegetation Beds, Nursery Areas and Shellfish beds.

- o Vegetated Buffer.

- o Heritage resources, including habitat for endangered flora and fauna.

- o Areas with certain soil characteristics.

- o Barrier Island Habitat.

Specific management actions, including planning, regulations, incentives and acquisition, are recommended to address each of these resources.

Other elements of the CCMP are described in the following chapter. The applicability of the CCMP recommendations to the Hampton Roads Virginia portion of the A/P Watershed is also evaluated.

LOCALLY-IDENTIFIED CRITICAL RESOURCES

In addition to the variety of natural resource areas included in the CBPA Regulations and identified from the CCMP recommendations, local governments in Hampton Roads have identified other resource areas or land uses that require special management consideration. They include:

- Watersheds tributary to public water supply sources. Areas affected by the presence of public water supply sources have been identified on the Blackwater, Nottoway, North Landing and Northwest Rivers.

- Land uses involving hazardous materials and/or hazardous wastes.

- Land uses involving outside storage of materials, whether they are hazardous or not. This latter category includes sand and gravel as well as chemicals and other materials used in fertilizer and pesticide manufacture or formulation.

BUFFER AREAS

Common to all of the critical management area approaches that have been identified is a recommendation that vegetated buffer areas should be delineated and that development activities should be precluded or managed intensively in these areas. The Virginia CBPA requires that a 100 foot vegetated buffer be delineated landward of the key features included in the Resource Protection Area, as well as on either side of certain perennial streams. The North Carolina Coastal Area Management Act program requires that buffers of varying widths be delineated around certain Areas of Environmental Concern. The CCMP recommends that a 20 foot vegetated buffer be delineated along all waterbodies and perennial streams.

The literature provides mixed guidance on the effectiveness of buffer areas for water quality protection. Most scientific research, to date, appears to focus on the use of buffers in agricultural areas. There has been very little research on the use of buffers in urban and suburban areas. The literature also indicates significant differences of opinion in the scientific community concerning the minimum width of buffer areas necessary for water quality protection and/or improvement. Minimum widths, recommended in the literature, vary from 50 to more than 200 feet. However, the literature generally supports the contention that buffers provide a variety of other resource values, such as wildlife habitat and aesthetics. Increasingly, researchers and policy makers appear to be calling for the designation of variable width buffers reflecting site or area-specific soil, slope and vegetation characteristics, when those buffers are being established for water quality purposes.

In its review of the CCMP, the APES Advisory Committee of the HRPDC indicated its belief that the CCMP-recommended 20 foot buffer area was inadequate. The Committee recommended that a minimum 50 foot buffer area, landward of designated natural resource features be designated to optimize water quality as well

as other resource benefits. It went on to recommend that additional research be undertaken to support development of a sliding scale approach to buffer area requirements that reflects site-specific conditions. From a scientific standpoint, this is still a valid position. It should be noted, however, that the issue of equitable treatment of landowners is likely to arise if varying width buffer areas are required. For this reason, a uniform width buffer is probably preferable. In that case, the buffer width should be justified on the basis of habitat and other resource values as well as water quality.

RECOMMENDATION

Based on the above evaluation of critical management area approaches, it is recommended that a watershed-wide management approach be followed. Within that watershed-wide management structure, it is recommended that certain features and uses receive increased management attention.

The recommended "Critical Management Area" can be summarized as follows:

- o A/P Watershed in Virginia. This is the broadest management unit, wherein uniform stormwater and nonpoint source management measures would be implemented. This area is depicted in Figure 5.

- o Natural Resource Areas. Depicted on Figure 5, these areas would be subjected to current resource management and regulatory programs. It is worth noting that these resources tend to be concentrated in corridors along the major waterways and their tributaries.

- o High Intensity Land Uses. These are site-specific activities that exhibit potential for significant water quality impacts if not carefully managed.

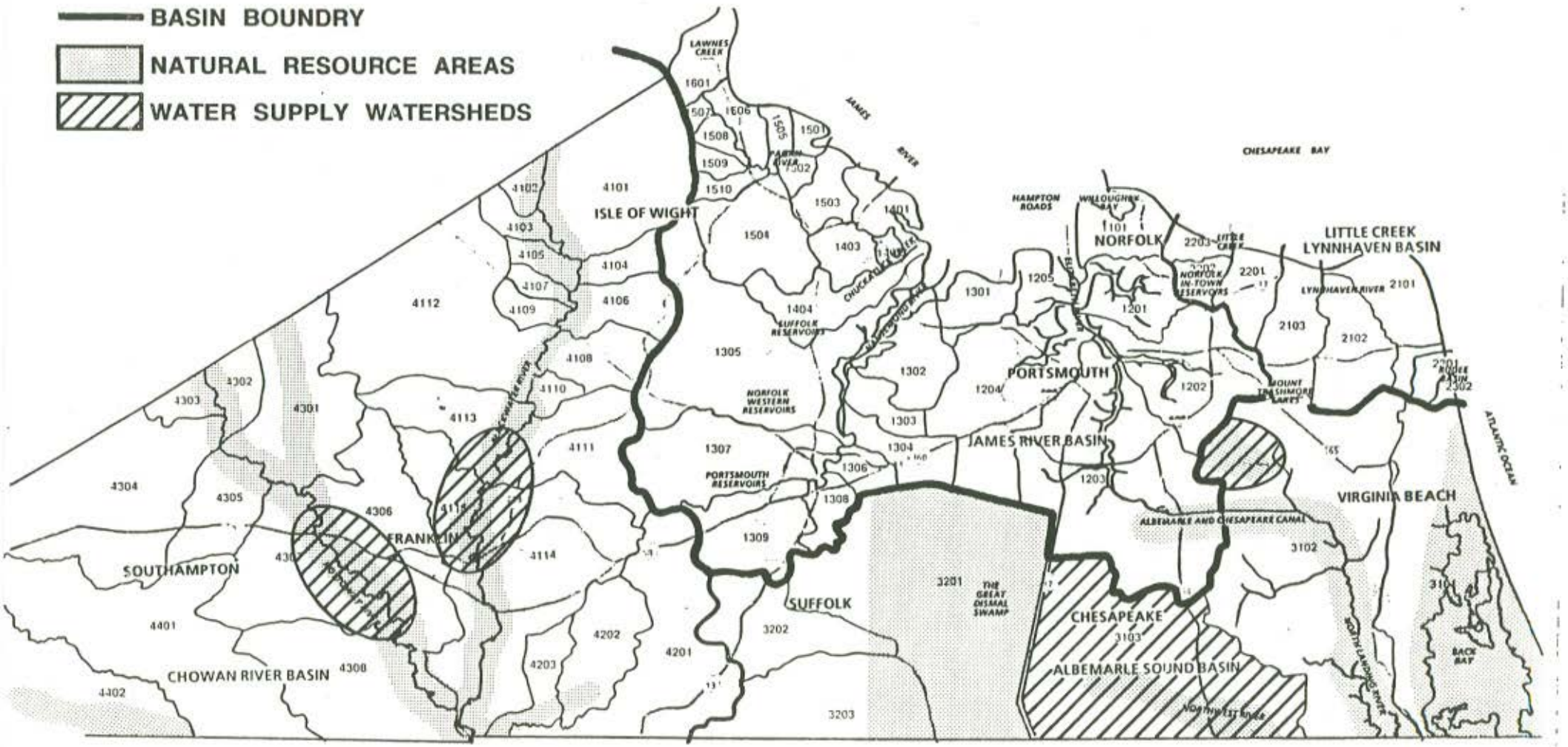
- o Water Supply Watersheds. Because of the critical regional concern in Hampton Roads with water supply, these watersheds, depicted in Figure 5, should be subject to special management attention.

- o Buffer Areas. This minimum fifty-foot (50') wide area would be located landward of the critical natural resource areas along the waterways.

This recommended approach is consistent with the scientific literature and with the recommendations in the CCMP. It also reflects previous studies for the Hampton Roads region, as well as the region's experience with other environmental management programs. The recommended "critical management area" for the Hampton Roads Virginia Portion of the A/P Watershed is described in detail in the "Environmental Management Program" section of this report.

FIGURE 5

CRITICAL MANAGEMENT AREA



SOURCE: Baldwin and Gregg/Henningson, Durham and Richardson, Regional StormDrainage Basin Study - Phase I, 1974

PREPARED BY HAMPTON ROADS PLANNING DISTRICT COMMISSION 1993

ALTERNATIVE MANAGEMENT PROGRAMS

The Hampton Roads region is currently or potentially affected by two comprehensive environmental management programs: Virginia's Chesapeake Bay Preservation Act Program and North Carolina's Albemarle-Pamlico Estuarine Study CCMP. The previous chapter described the resources that are identified in these programs as being critical and worthy of management attention. This chapter briefly describes the two programs and evaluates their applicability to environmental management in the Hampton Roads Virginia portion of the A/P Watershed. Given the magnitude of the two programs, it is impossible to adequately address either of them in one short chapter. Therefore, the interested reader is referred to the major program documents produced by these programs for more detailed discussion.

CHESAPEAKE BAY PRESERVATION ACT

Virginia's Chesapeake Bay Preservation Act is one of a number of results of the comprehensive EPA-State Chesapeake Bay Program. As indicated previously, that program served as a model for the National Estuary Program, including the Albemarle-Pamlico Estuarine Study. In 1983, the Environmental Protection Agency, the States of Maryland, Pennsylvania and Virginia and the District of Columbia signed the Chesapeake Bay Agreement, which committed each of the parties to a variety of actions to restore and maintain the quality of the Chesapeake Bay and its tributaries. The Chesapeake Bay Agreement was expanded and strengthened in 1987.

In 1986, the Commonwealth of Virginia convened the Chesapeake Bay Land Use Roundtable, which was comprised of representatives of state and local government, environmental groups and various industries, including agriculture and development. The Roundtable was charged with developing improved methods of managing land use to protect water quality. The Roundtable developed a consensus approach to achieving this goal. It was translated into legislation during the 1988 session of the Virginia General Assembly and is known as the Chesapeake Bay Preservation Act.

Program Description

The Chesapeake Bay Preservation Act established a cooperative program, involving state and local government, to protect the quality of the Chesapeake Bay and its tributaries through improved land use development and management. The Act established a nine member citizen board, the Chesapeake Bay Local Assistance Board, to direct the program. It also established the Chesapeake Bay Local Assistance Department to provide staff for the CBLA Board. The Board and Department were charged with developing regulations to implement the Act, including criteria for designating Chesapeake Bay Preservation Areas, with providing financial and technical assistance to local governments and with taking steps to ensure local compliance with the Act and Regulations. Under the Act, the eighty-nine local governments (cities, counties and towns) in Tidewater Virginia, as defined in the Code of Virginia, were to

delineate Chesapeake Bay Preservation Areas and to incorporate the performance standards contained in the Regulations into local comprehensive plans and development regulations. Figure 6 depicts the area encompassed by the Chesapeake Bay Preservation Act requirements.

Regulations to implement the Chesapeake Bay Preservation Act were adopted initially in September 1989. All local programs were to be in full compliance with the Act and Regulations by November 1991. Litigation and other problems have delayed full implementation of the program. Virtually all localities have now delineated Chesapeake Bay Preservation Areas and incorporated the performance standards into their land use development regulations. Some programs are still subject to the state review process to determine consistency of area delineations and ordinances with the requirements of the Act and Regulations. The programs of a number of localities have been found provisionally consistent, with full consistency to be determined following additional study and possible ordinance modifications. To date, no programs have been found to be inconsistent with the Program's requirements. All localities have begun the process of revising comprehensive plans and related ordinances to achieve full compliance with the Act and Regulations.

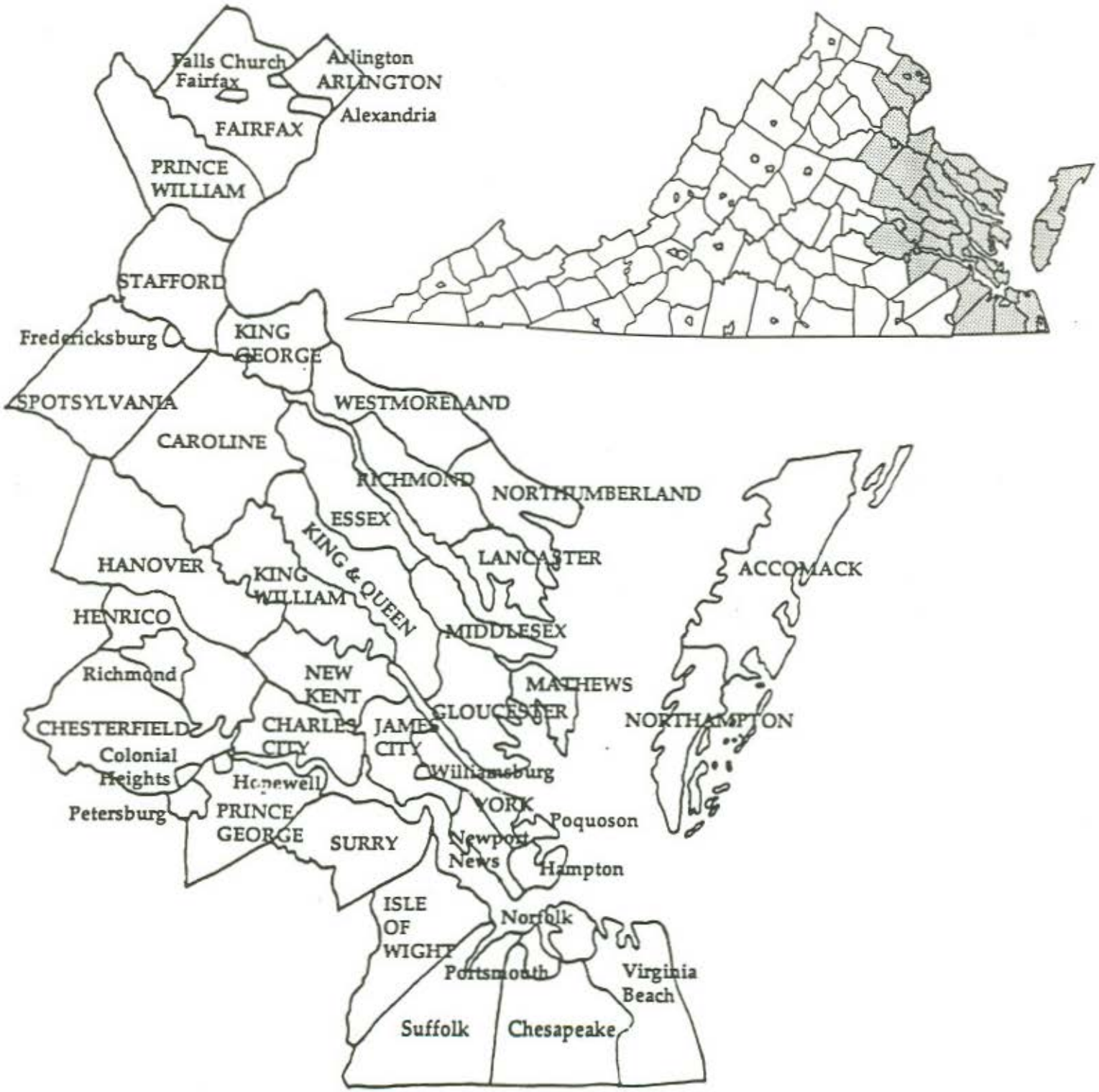
The CBPA Act requires localities to delineate Chesapeake Bay Preservation Areas, including Resource Protection Areas and Resource Management Areas. Resource Protection Areas are defined as "sensitive lands at or near the shoreline that have an intrinsic water quality value due to the ecological and biological processes they perform or are sensitive to impacts which may cause significant degradation to the quality of state waters. In their natural condition, these lands provide for the removal, reduction, or assimilation of sediments, nutrients and potentially harmful or toxic substances in runoff entering the Bay and its tributaries and minimize the adverse effects of human activities on state waters and aquatic resources." They shall include tidal wetlands, nontidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams, tidal shores, other lands necessary to protect water quality and a 100 foot vegetated buffer.

Resource Management Areas (RMA) are defined as "land types that, if improperly used or developed, have a potential for causing significant water quality degradation or for diminishing the functional value of the Resource Protection Area." In delineating RMAs, local governments are to consider floodplains, highly erodible soils, including steep slopes, highly permeable soils, other nontidal wetlands (not in the RPA), and other lands. The area is to be large enough to provide significant water quality protection. Figure 7 depicts the theoretical relationship between the RPA and RMA features.

FIGURE 6
TIDEWATER VIRGINIA

LOCALITIES GOVERNED BY THE CHESAPEAKE BAY PRESERVATION ACT

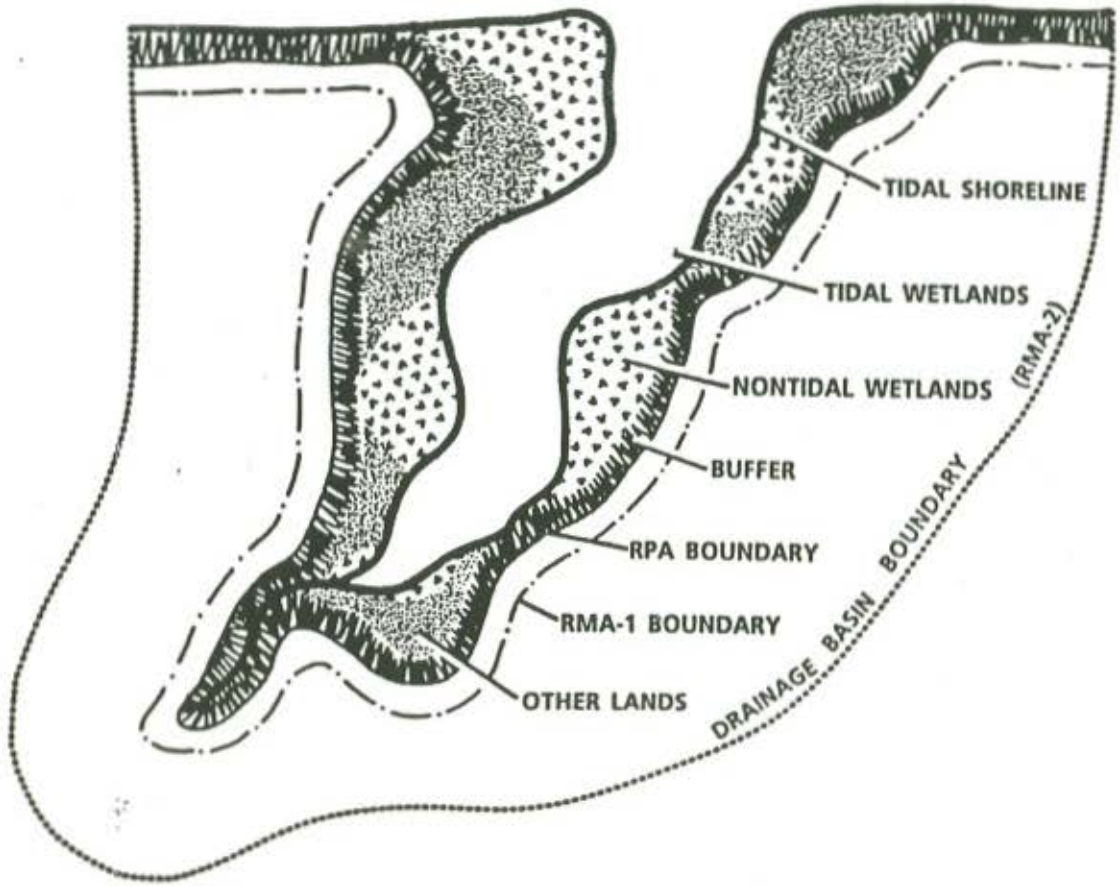
CHESAPEAKE BAY LOCAL ASSISTANCE DEPARTMENT,
LOCAL ASSISTANCE MANUAL, Various Dates



Source: Hampton Roads Planning District Commission, 1992.

FIGURE 7

THEORETICAL RELATIONSHIP CHESAPEAKE BAY PRESERVATION AREAS



Source: Hampton Roads Planning District Commission, 1990.

As indicated previously, localities are also given the option of designating Intensely Developed Areas if certain conditions are met. These are areas of existing development and infill sites where little of the natural environment remains and the following conditions are met:

- o Development has severely altered the natural state of the area such that it has more than 50% impervious surface.
- o Public sewer and water is constructed and currently serves the area.
- o Housing density is equal to or greater than four dwelling units per acre.

An IDA is to be an area where redevelopment is concentrated.

The CBPA also requires localities to adopt performance standards that apply to development occurring within these areas. The preceding chapter describes the features that are to be included within CBPAs. Performance standards include:

1. Minimize land disturbance.
2. Minimize the amount of impervious cover.
3. Preserve indigenous vegetation to the maximum extent possible.
4. Maintenance of best management practices will be ensured by maintenance agreements or some other mechanism between the local government and the owner or developer.
5. All development exceeding 2,500 square feet of land disturbance shall be accomplished through a plan of development (site plan) review process.
6. Any land disturbance exceeding 2,500 square feet shall comply with the requirements of the local erosion and sediment control ordinance.
7. On-site sewage treatment systems not requiring a discharge permit shall provide for pump-out once every five years and, in cases of new development, shall include a reserve sewage disposal site with equivalent disposal capacity.
8. Implement stormwater management practices which achieve a no net increase in pollutant loading from new development and a 10% reduction in loading from redevelopment. (Alternative approaches to achieving the standard are specified in the Regulations.)

9. Evidence that all wetlands permits have been obtained shall be provided prior to issuance of any local government authorization to begin on-site land disturbing activities.

Additional performance criteria apply to agricultural and silvicultural activities:

1. Agricultural activities must have a soil and water quality conservation plan prior to January 1, 1995.

2. Silvicultural activities are exempt from the regulations provided operations are conducted in conformance with the Department of Forestry's BMP Handbook.

These criteria were reevaluated in 1991 and remain in effect at this time. Future reevaluation is anticipated and these performance criteria may be modified.

In addition to the criteria discussed above, specific requirements apply to all development in the Resource Protection Area. Only water-dependent activities and redevelopment are allowed in the RPA. Public roads complying with detailed standards may be allowed in the RPA.

Separate performance criteria are also established for the RPA Buffer Area. The Buffer Area requirements indicate that "a 100 foot buffer area of vegetation that is effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff shall be retained if present and established where it does not exist." Within the buffer area, indigenous vegetation may be removed only to provide for reasonable sight lines, access paths, general woodlot management and best management practices in accordance with specific criteria. In addition, modifications to the buffer are permitted for lots that were recorded prior to the effective date of the regulations. In such cases, the buffer area can not be reduced to less than 50 feet and equivalent stormwater control must be provided on site through Best Management Practices or vegetated areas. Redevelopment within Intensely Developed Areas is exempt from the buffer requirement, although efforts to reestablish a buffer are to be incorporated where possible. Finally, agricultural buffers may be managed and may be reduced to:

- 50 feet when adjacent lands are enrolled in an agricultural BMP program that in combination achieves the equivalent water quality benefit of the 100 foot buffer.

- 25 feet in accordance with implementation of an approved soil and water quality conservation plan.

For the purpose of regulating land development, the CBPA Regulations also establish a variety of procedural requirements, covering development review and appeals, exemptions and waivers. They also establish requirements for local governments to amend their comprehensive plans and related development

ordinances.

Insofar as comprehensive planning is concerned, the CBPA requirements are in addition to those already established under the Local Planning section of the Code of Virginia. Specific requirements include:

1. Establishment of an information base necessary to support environmentally sound land use decision-making. It should include information used in designating CBPAs, information about other marine resources, shoreline erosion problems and structure location, conflicts between existing and proposed land uses and water quality protection and related maps.

2. Policy statements should be prepared on the following issues:

    a. Physical limitations to development, including solid limitations for septic tank use.

    b. Protection of potable water supply, including groundwater.

    c. Relationship of land use to commercial and recreational fisheries.

    d. Appropriate density of docks and piers.

    e. Public and private access to waterfront areas and effect on water quality.

    f. Existing pollution sources.

    g. Potential water quality improvement through the redevelopment of IDAs.

3. The Plan should address the process of developing the various policy statements.

4. The Plan should address consistency between the plan and other ordinances and policies, including budgetary and taxation.

The locality is required to review and revise its zoning and subdivision ordinances to include the performance criteria and to reflect water quality considerations. Finally, the local management program is to include a requirement that a Water Quality Impact Assessment be prepared for all proposed development within the RPA, consistent with the performance criteria, and for all other development within Chesapeake Bay Preservation Areas that may warrant such an assessment due to unique site characteristics or development intensity.

Program Evaluation

Through the CBPA Regulatory Study Group, the Chesapeake Bay Local Assistance Department has recently completed a review of the CBPA Program. The Study Group effort was a consensus building approach to addressing major program issues that had been identified by the CBLA Board and Department, as well as by affected local governments and other interested parties. A number of recommendations for fine-tuning the program were made by the Study Group and are being considered by the CBLA Board.

Recommendations focused on the Performance Standards and Program Equivalency, Stormwater Management, Designation of Preservation Areas and Performance Standards and Consistency of local programs with state requirements. The Study Group also considered expansion of program coverage to the entire Chesapeake Bay Watershed in Virginia. These recommendations when acted on by the CBLA Board should obviously be considered in applying the CBPA to the Hampton Roads portion of the A/P Watershed.

Generally speaking, resources identified by the CBPA as being critical to water quality are also found in the A/P Watershed. As such, the critical area aspects of the program appear to be applicable to this watershed. However, the topography, soils and development characteristics of the two watersheds do differ. Therefore, management approaches may not be directly transferable. The performance standards established by the CBPA do appear to be generally applicable to the A/P Watershed.

The region's localities have indicated, based on their experience with this program, that:

1. The Program is and should be a partnership between the state and localities. As such, it must continue to provide flexibility to local governments to address particular local concerns and conditions.

2. Increased attention should be placed on state agency compliance with and support for local CBPA requirements.

3. Concurrently, state agencies including the Chesapeake Bay Local Assistance Department, the State Water Control Board and the Department of Conservation and Recreation Division of Soil and Water Conservation should work to coordinate their differing requirements especially as they relate to stormwater management.

4. Financial and technical assistance will continue to be needed by localities to address program requirements. This will become increasingly important during program implementation. The focus will then be on inspections and enforcement.

5. As the program shifts from delineation of areas and adoption of the performance standards, the broad purpose and goals of local comprehensive planning must be remembered. Development patterns and goals must reflect broader issues than water quality protection alone. Also, there should not be a strict focus on instantaneous consistency between the comprehensive plan and development regulations. The plan should continue to serve as a working guide to long-term goals and development and should not be a rigid legalistic document.

6. Specific criteria for determining program equivalency must be developed. For example, a jurisdiction-wide stormwater management program may be more beneficial to water quality than designation of a jurisdiction-wide Resource Management Area.

7. Improved coordination at the state level is necessary to achieve compliance with the agricultural and silvicultural requirements.

8. There will be a continuing need for public information and education.

The preceding points are a capsule summary of current local concerns with the Chesapeake Bay Preservation Act program. They must be considered in the development of a management program for the Hampton Roads Virginia portion of the A/P Watershed.

COMPREHENSIVE CONSERVATION MANAGEMENT PLAN OF THE ALBEMARLE-PAMLICO ESTUARINE STUDY

The Albemarle-Pamlico Estuarine Study is one of the original estuaries designated under the National Estuary Program. The Study goal is "to provide the scientific knowledge and public awareness needed to make rational management decisions so that the A/P estuarine system can continue to supply citizens with natural resources, recreational opportunities, and aesthetic enjoyment." Following a five-year consensus building process, the APES Program released the Comprehensive Conservation Management Plan of the Albemarle-Pamlico Estuarine Study (First Public Draft) in 1992. A Second Public Draft was released in early 1993.

The following, all too brief, review of the CCMP focuses on recommendations that currently, or might in the future, fall within the purview of local government in Virginia, especially the localities of Hampton Roads. It reflects the involvement of the HRPDC staff in the process of CCMP development and review of the two Public Drafts of the CCMP. It is not inclusive of all recommendations in the CCMP.

Program Description

The CCMP is considered to be a "blueprint for maintaining and restoring the biological, physical and chemical integrity of the A/P estuarine system." Based on

analyses of environmental problems in the system, which reflects five years of scientific research, and goals and objectives, which resulted from the consensus building process, the CCMP recommends a wide variety of actions. These actions are comprehensive and address each of the issue areas identified at the outset of the APES Program. They include:

- Human Environment - Population Growth
- Vital Terrestrial Areas and Wetlands
- Water Quality
- Fisheries
- Public Education and Involvement.

The CCMP also includes specific recommendations for Monitoring, Research and Date Management to support each of the five issue-specific Action Plans. The following discussion highlights those recommendations that affect or fall within the purview of local government action.

Human Environment

Local governments should develop local land and water use plans to guide growth within the community. These plans should be enforceable, regularly updated, and meet some state-established minimum standard. They should consider short and long-term individual and cumulative impacts of growth. They should promote natural area preservation and conservation. The land use element should reflect economic and demographic, land use and natural resource data. Relevant policy statements and implementation strategies should be identified. Local development regulations and other implementation techniques should be consistent with the adopted plans.

Local water use plans should address both surface and groundwater. They should include water supply and wastewater disposal, both public and private. It is also recommended that multiple water use plans be prepared. These plans would focus on all uses of the water including recreation and resource-dependent activities, such as fishing.

Minimum state standards for local land and water use plans should be developed and a state process established to ensure consistency with the standards. Technical and financial assistance, including regional planning, should be provided.

To support the local planning process, the North Carolina Geographic Information System, housed in the Center for Geographic Information and Analysis, should be used to provide data support and all GIS-related activities should be coordinated through that system.

Comprehensive public trust legislation should be developed. Based on that legislation, a comprehensive state public access plan should be developed. A more proactive stance should be adopted to management of private uses of public waters.

Land and water use planning and other environmental planning activities should be more closely coordinated among state, federal, local and regional agencies.

Finally, the CCMP recommends that the Commonwealth of Virginia evaluate its local comprehensive planning requirements to ensure that the recommendations of the CCMP for land and water use plans are considered in local comprehensive plans in the Virginia portion of the A/P Watershed.

Vital Terrestrial Areas and Wetlands

The CCMP recommends development of a comprehensive state wetlands protection program to include regulation of activities in certain areas, and increased efforts, through incentives and acquisition, to protect and restore other wetlands areas. This program is to reflect improved mapping and inventory of the watershed's wetland resources. The program is to also include acquisition and management efforts to protect natural heritage areas - both wetlands and non-wetlands. Increased efforts at public education are recommended. Finally, the CCMP recommends that the above-noted local land and water use plans specifically incorporate identification and protection of vital terrestrial areas and wetlands.

Water Quality

A number of the water quality recommendations in the CCMP directly or indirectly affect local government activities. It is recommended that water quality classifications and criteria be expanded or refined to ensure protection of aquatic resources, particularly special communities. Standards to be considered include sediment, nutrients, transparency, toxics, biotic indicators and fish habitat. Once adopted, such new standards will affect discharge permit limits and nonpoint source/stormwater management programs.

The CCMP recommends that a number of activities to expand the agricultural BMP program, including increased cost-share assistance, be undertaken. It recommends specific measures to be implemented as BMPs and that concentrated animal (feed lots) waste operations be classified and regulated as non-dischargers. Integrated pest management and nutrient management programs are also recommended. Cost-share assistance for BMP implementation in non-agricultural activities, such as forestry and urban development, is recommended.

Steps to improve on-site waste management are recommended. Additional research to determine the contribution of on-lot waste disposal to water quality conditions and to determine the effectiveness of alternative (to septic tanks) systems is recommended. Increased inspection and enforcement activities to ensure better management of on-lot disposal is recommended. Localities are encouraged to

consider large lot zoning for areas served by septic tanks and on-site wells. Programs to provide central sewerage are also recommended.

The CCMP recommends the maintenance of a minimum twenty foot (20') undisturbed buffer of endemic vegetation along all perennial streams, rivers and tidal water bodies. It notes that there is a need for scientific study to establish specific regulations for the buffer, including width, vegetation type, and maintenance practices. The recommended buffer is viewed as one element of an integrated management system.

Expansion of the state (North Carolina) stormwater management regulations statewide is recommended. These currently apply only to the twenty coastal counties governed by the CAMA Program.

Development of a comprehensive marina siting and management policy is recommended. This policy and related guidelines should be coordinated among the various agencies with regulatory purview. Financial assistance for retrofitting of older marinas with pump-out facilities is recommended.

Point source recommendations address permit limits based on allocation of assimilative capacity, waste reduction and prevention, and facility management.

Fisheries

The CCMP includes comprehensive recommendations for improved fisheries management, including preparation of fishery-specific management plans. Recommendations also address fishing practices, fishing gear and habitat restoration. Generally, these issues fall outside the purview of local government program implementation and will not be discussed further.

Public Education and Involvement

The CCMP recommendations address development of improved environmental education programs in the North Carolina public school system. In this respect, they are similar to developing programs in Virginia. This section also recommends actions to ensure public awareness of environmental issues and opportunities for public involvement in planning and regulatory matters. Of significance is the recommendation that the North Carolina Councils of Government in the A/P Watershed hold quarterly public meetings to discuss local and regional environmental issues. Each component of the CCMP also addresses other issue-specific education needs.

Research

Many of the recommended research activities are necessary to assist in refining CCMP recommendations and developing implementing regulations. A number of these study needs have also been identified in local (Hampton Roads Virginia) planning

efforts as critical to support local planning and decision-making. They include development of appropriate standards for estuarine systems, characteristics of buffer strips, the impacts of BMPs on groundwater quality, and cumulative impact assessment methodologies.

Program Evaluation

The CCMP for the Albemarle-Pamlico Estuarine System is presently at roughly the same stage of development that the Chesapeake Bay Program was in 1983 with the release of Chesapeake Bay: A Framework for Action. As such, it includes broad policy recommendations, but does not yet include specific new legislative or regulatory recommendations or programs. This is particularly true in those cases where recommended actions could apply to Virginia as well as to North Carolina. In that context, it appears to be too early to fully evaluate the potential impact of this program on the localities of Hampton Roads Virginia.

However, the various recommendations, outlined above, have been evaluated to determine their applicability to the region's local governments. Generally, the various local land use planning recommendations appear to be consistent with current local planning requirements in Virginia insofar as the Chesapeake Bay localities are concerned. As such, local governments in the Chesapeake Bay portion of the Hampton Roads region should be able to comply with these requirements without undue difficulty. However, most localities in the A/P Watershed are governed by comprehensive planning requirements that are somewhat less stringent, insofar as environmental issues are concerned. Achievement of these requirements in those localities would, therefore, be somewhat more difficult. Generally, compliance with the water supply/wastewater disposal planning requirements would not create an undue burden on the localities in the Hampton Roads region. The recommended water use planning is not currently required by Virginia law. Achievement of this requirement would be generally more difficult throughout the Virginia portion of the A/P Watershed. As new state mandates, these recommendations should be accompanied by appropriate levels of funding to enable localities to accomplish the necessary planning and implementation.

Nonpoint source and vital terrestrial areas management recommendations contained in the CCMP, appear to be generally consistent with current Virginia programs. As such, the region's localities are already implementing many of these recommendations to one degree or another. Again, additional technical and financial resources would appear to be warranted to permit full implementation in a timely fashion.

In September 1992, the local government members of the Hampton Roads Planning District Commission's APES Advisory Committee evaluated the first public draft of the CCMP and provided a number of comments on that document. That review constitutes a portion of the evaluation of the applicability of this program to the Hampton Roads Virginia portion of the A/P Watershed. The following comments were provided:

1. Local governments and regional agencies should have a strong formalized role in implementation and refinement of the CCMP.

2. To facilitate local government implementation activities, including program enforcement, sufficient technical and financial resources must be provided.

3. A minimum 50 foot buffer, extending landward of some specified natural features, should be established to optimize water quality and other resource benefits. Also, additional research should be undertaken to support development of a sliding scale approach to buffer areas requirements that reflects site-specific conditions.

4. The Bi-State Agreement should provide a means of linking all elements of the CCMP across state lines. It should build on existing efforts to integrate activities across state lines, including the Bi-State Coordination Forum, established through the HRPDC projects.

5. Local environmental management programs are focusing on stewardship of resources located within the region. These programs are and will continue to be of benefit to the environmental quality of the A/P Watershed.

These comments have begun the formal process of evaluating the implications of the APES Program to the localities of the Hampton Roads region. Concurrently, they represent the first step in what will be an intensive process to evaluate the applicability of that program to environmental management in the region.

VIRGINIA BEACH SOUTHERN WATERSHED MANAGEMENT PROGRAM

Earlier in the report, it was indicated that the City of Virginia Beach has adopted a Southern Watershed Management Ordinance. Development of that Ordinance and the Comprehensive Plan element upon which it is based, involved an intensive program development and evaluation process. In part, that evaluation focused on the applicability of the Chesapeake Bay Preservation Act Program to the City's Southern Watersheds - Back Bay and the North Landing River. Those watersheds are integral components of the Currituck Sound Watershed. The adopted program may provide important guidance to development of a management program for the entire Hampton Roads Virginia portion of the A/P Watershed.

The Virginia Beach Southern Watershed Management Area Report was completed in 1991. It had its genesis in the City's efforts to revise its Comprehensive Plan and to develop a local CBPA Program. It was the product of an intensive staff effort, guided by considerable public input and discussion. The purpose of the program is to protect water quality from further degradation and to enhance water quality, where feasible. Typical of local planning efforts, the Report notes the need to achieve balance between environmental and economic interests.

The report noted that the Southern Watersheds differed from the Chesapeake Bay Watershed in a number of ways. The topography is flatter, which results in more extensive areas of poor drainage and poorly-drained soils. Waterways are typically shallower than those in the Chesapeake Bay system and are influenced primarily by wind tides rather than lunar tides. Most waterways have natural swampy buffers.

Primary water quality problems appear to be associated with elevated nutrient levels, especially in the tributary creeks. Turbidity or suspended sediments is noted to be a particular problem, due to its impacts on submerged aquatic vegetation. The report notes that there is relatively little coordination of water quality monitoring efforts. Although phosphorus appears to be the key limiting nutrient, there is still debate in the scientific community. Also, there are significant problems in pinpointing specific nonpoint sources as the cause of particular problems.

The report recommended, among other things, that the City of Virginia Beach:

1. Establish a water quality monitoring program through the City's stormwater management program to provide the basis for future management decisions.

2. Establish an educational program.

3. Amend the comprehensive plan to increase attention on water quality and stormwater management issues.

4. Create a wetlands mitigation banking program.

5. Enhance aesthetic attributes where possible.

6. Complete the Natural Area Inventory, use the results in planning and development decisions, and work with conservation organizations and agencies in land acquisition programs.

7. Explore use of innovative BMPs, including sediment basins in ditches and mechanical devices in ditches to create sheet flow through natural buffers, use of swales and other vegetated practices, and streambank stabilization.

8. Promote use of state and federal cost-share programs and increased coordination of state and federal management activities.

9. Implement "Adopt a Stream" and "Adopt a Shoreline" programs.

The report also recommended a number of items for future consideration. The Comprehensive Plan was subsequently amended to incorporate the basic elements of the Southern Watershed Management Area Report.

Based on this report and the Comprehensive Plan amendments, the City adopted the Southern Watershed Management Ordinance. This Ordinance applies to all development upon lands within these watersheds as well as to some agricultural activities. Most of the requirements are nearly identical to those in the CBPA. Performance standards include:

1. Development involving more than 2,500 square feet of land disturbance must comply with the City's Erosion and Sediment Control Ordinance.

2. A reserve drainfield will be provided on all lots greater than one acre if not served by public sewer. Exceptions are included.

3. A fifty foot vegetated buffer landward of any wetland or shoreline shall be maintained. Water dependent facilities and paths may be constructed within the fifty foot buffer if land disturbance is minimized and the stormwater filter value of the buffer is maintained. Specific standards for maintenance or enhancement of the buffer are established.

4. Post development runoff shall approximate pre-development runoff and to the extent practicable natural conditions unless runoff is discharged into a regional BMP.

5. Several other qualitative performance standards, including buffering between incompatible land uses, are established.

The Ordinance establishes specific design criteria for drainage facilities, erosion and sediment control, streambank stabilization, stormwater management facilities, BMPs and related activities.

The Ordinance requires any developer to submit a Southern Watershed Management Plan to serve as the basis for evaluating compliance with the Ordinance. Agricultural activities are encouraged to utilize all technical and financial resources available to implement conservation practices.

The Virginia Beach Southern Watershed Management Ordinance has been in effect for six months, as of the date of this report. Because of slow economic conditions, it is too early to determine how effective the Ordinance has been or will be in achieving water quality goals. It does represent a reasoned attempt to apply CBPA-like requirements to one component of the Hampton Roads Virginia portion of the A/P Watershed.

INSTITUTIONAL AND PROGRAM ALTERNATIVES

The Regulatory Analysis section of this report described the existing institutional structure for environmental management in the Hampton Roads Virginia portion of the A/P Watershed and the environmental management programs which have been adopted by those institutions. That structure is fairly complex and involves a variety of state, federal and local agencies, as well as regional planning and service delivery agencies. The programs that have been developed and are being implemented also represent a widespread attempt to address improved environmental management. Those programs are constrained by the institutional complexity. There is presently no formal Bi-State institution for environmental management in the A/P Watershed.

PROGRAMMATIC ALTERNATIVES

A variety of program options for environmental management in the Hampton Roads Portion of the A/P Watershed are available. They include:

- Status Quo. This option assumes that the current management programs are achieving the objectives of resource protection. Alternatively, it assumes that whether current programs are working or not, no modification is politically achievable.

- Program Enhancement. This option assumes that the current management programs are not achieving the objectives of resource protection. It assumes that the programs are generally adequate, but require certain enhancements to accomplish the objectives. Examples of options that were examined include:

  -increased staffing (implied by each of the following options)

  -better enforcement

  -better inspections

  -better review of projects at the local plan review stage and in state permitting decisions

  -increased coordination among programs

- New Program. This option assumes that the current management programs are not achieving the objectives of resource protection and that entirely new programs are required to do that. Program enhancements would not, by themselves, be adequate to achieve these objectives. A number of alternatives appear to be available.

The results of the work of the Virginia Commission on Population Growth and Development and the process of developing a Bi-State Agreement will have a significant impact on any programmatic option that is chosen. In that context, the programmatic alternatives enumerated above, have been evaluated, using the following criteria:

- Is the option necessary in order to achieve resource protection objectives? Will it be more effective than current programs?
- Is the option applicable to the landscape characteristics of the Hampton Roads Virginia portion of the A/P Watershed?
- Is the option politically feasible? As a sub-component of this question, is the option compatible with existing institutional structures and/or programs? Is it compatible with potentially evolving structures?
- What are the financial implications of implementing a particular management option? Cost to local governments? Cost to private sector?
- Can the objectives be achieved in a more efficient and less costly manner?

Based on this evaluation, a combination program is recommended. This program includes the following elements:

1. Enhancement of existing programs with an emphasis on improvements to local and state review of projects and better inspections and enforcement.
2. Establishment of a watershed-wide management program involving basic performance standards governing development and special attention to resources and uses of concern.
3. Establishment of an intergovernmental process to improve coordination of programs with cross-cutting requirements.

As is true of the institutional alternatives discussed below, the recommended program improvements should benefit from increased bi-state cooperation, resulting from a Bi-State Agreement. The watershed-wide management program borrows heavily from the existing CBPA Program and from the recommendations of the CCMP. Programmatic recommendations developed by the Virginia Commission on Population, Growth and Development could be accommodated by the recommended program. It is likely that the recommendations would be mutually supportive. The following chapter discusses the recommended program in more detail.

INSTITUTIONAL ALTERNATIVES

A variety of institutional structures or modifications to existing institutions could be used to implement the management program recommendations. They include:

- o Existing Virginia state, local and regional institutions.
- o New Regional agency, covering:

  -the Virginia Portion of the A/P Watershed.

  -the Hampton Roads Portion of the A/P Watershed.
- o New Virginia State Agency or Expanded role for existing state agency.
- o Bi-State Alternatives, including

  -informal, using Bi-State Coordination Forum

  -formalized Bi-State mechanism, which could be accomplished through a relatively simple memorandum of agreement or a formal Bi-State Commission.

It should be noted that, as a further outcome of the Chesapeake Bay Agreement and as a response to perceived problems in institutional coordination, the Commonwealth of Virginia has established a Commission on Population Growth and Development. That Commission is addressing a variety of issues inherent in improved coordination of planning across intergovernmental lines. It is expected that recommendations on modifications to the Commonwealth's intergovernmental planning and regulatory system (institutions and programs) will be forthcoming in the future. Those recommendations could have a significant impact on any institutional modifications resulting from the recommended Environmental Management Program for the Hampton Roads portion of the A/P Watershed. Therefore, to accommodate the likelihood of institutional recommendations resulting from the work of the Virginia Commission on Population, Growth and Development, institutional recommendations for the Environmental Management Program for the Hampton Roads portion of the A/P Watershed must be flexible.

Also, the CCMP recommends that a Bi-State Agreement be developed between Virginia and North Carolina to establish the framework for future participation by the Commonwealth in implementation of the CCMP. Obviously, that Agreement, when developed will have a significant impact on the future institutional structure for environmental management of these important bi-state resources.

With that preface, the institutional alternatives enumerated above, have been evaluated, using the following criteria:

- o Is the option necessary in order to achieve resource protection objectives? Will it be more effective than current programs and institutions?

- o Is the option applicable to the landscape and institutional characteristics of the Hampton Roads Virginia portion of the A/P Watershed?

- o Is the option politically feasible? As a sub-component of this question, is the option compatible with existing institutional structures and/or programs? Is it compatible with potentially evolving structures?

- o What are the financial implications of implementing a particular management option? Cost to local governments? Cost to private sector?

- o Can the objectives be achieved in a more efficient and less costly manner?

Based on this evaluation, a combination option stands out as immediately implementable. It involves:

1. Existing institutions focusing on local government land use management and state resource management programs. This option allows for program enhancements where necessary.

2. Bi-State Agreement to establish a basis for future Virginia involvement in CCMP implementation. This is necessary to formally recognize the importance of this shared resource to both states.

The two components of the recommended institutional structure are mutually supportive. They reflect and build on the existing institutions as well as on Virginia's experience with the Chesapeake Bay Program. Through the Bi-State Agreement, this option also lays the foundation for broader cooperation among the two states and their local governments in environmental management, transportation, economic development and other activities. This option is sufficiently flexible to accommodate institutional recommendations emanating from the Virginia Commission on Population, Growth and Development. The following chapter discusses the details of the recommendation.

CONCLUSION

In developing both institutional and programmatic recommendations, this report has focused on the needs and concerns of the Hampton Roads localities. This focus represents the charge to the HRPDC from both its member local governments and

from its relationship to the APES Program. It is recognized that the Virginia portion of the A/P Watershed encompasses a significantly larger land area and thirteen (13) more cities and counties than does the Hampton Roads Planning District portion of the Watershed. While the recommended Environmental Management Program for the Hampton Roads portion of the A/P Watershed does not specifically address that larger area or the needs of those jurisdictions, several points are worth noting:

1. The institutional recommendations should be generally compatible with the broader Watershed issues and should be flexible enough to accommodate the needs of those jurisdictions.

2. Due to its higher degree of urbanization, Hampton Roads is the area with the greatest potential impact on the estuarine system. Therefore, implementation of the recommended environmental management program is likely to have the most immediate benefit to the resources of the A/P Watershed.

3. Programmatic recommendations addressed at state agency programs should be of equal benefit to the non-HRPDC jurisdictions and to the resources of the entire A/P Watershed.

4. The process of developing the Bi-State Agreement appears to be the most appropriate mechanism for involving the balance of the Virginia portion of the A/P Watershed in program implementation.

RECOMMENDED ENVIRONMENTAL MANAGEMENT PROGRAM

Preparation of an environmental management program for the Hampton Roads Virginia portion of the A/P Watershed has been an evolutionary process. The recommended program, which is outlined in this section, builds upon a framework which has been established through a variety of environmental programs conducted at the state, regional and local levels. It reflects the considerable progress which has been made as well as the deficiencies of past efforts. The success of this ambitious program depends upon cooperation among agencies at all levels of government and in the private sector, but most importantly between Virginia and North Carolina state and local governments. As noted previously, the recommended program specifically addresses the needs of the Hampton Roads region, but is sufficiently flexible to accommodate the needs of the balance of the Virginia portion of the A/P Watershed.

Throughout the discussion of the recommended Environmental Management Program, recommendations have been categorized according to whether they involve new program initiatives, enhancements of existing programs or continuation of a current program. In the following section, recommendations that involve establishment of new programs are highlighted in **bold** print; recommendations involving enhancement of existing programs are printed in italics; recommendations involving continuation of current programs are not highlighted.

INSTITUTIONAL RECOMMENDATIONS

This report has documented a complex institutional structure for environmental management in the Hampton Roads Virginia portion of the A/P Watershed. Federal, state, local, and regional governmental agencies and the private sector all play significant roles. Frequently, environmental management is not viewed as a partnership among the various entities. Also, there are gaps and redundancies in the regulatory programs which the various agencies implement. There is a need for increased institutional coordination to more effectively manage the Watershed's environment. In a number of instances, local governments have identified the need for specific legislative authorization to support desired and necessary implementation activities. New legislative authority should resolve questions of program duplication, conflict and gaps. Recommendations are structured to meet that need. Unlike other environmental management programs that have been developed for the Hampton Roads region, the institutional structure inherent in this program is complicated by the interstate nature of the watershed.

In each set of the following recommendations, the focus must be on improvements to existing programs and regulations. As indicated previously, an institutional structure and regulatory system is in place to manage the environmental impacts associated with development and to protect critical resources. These programs need to be refined through improved coordination, enforcement and process streamlining.

Bi-State Programs

The Watershed of the Albemarle-Pamlico Estuarine System is an important resource shared by the citizens of both Virginia and North Carolina. This fact is recognized in the draft Comprehensive Conservation Management Plan for the Albemarle-Pamlico Estuarine Study. Specifically, the CCMP recommends that a Bi-State Agreement be developed between the two states to establish the foundation for future cooperation in the management of this resource. As a subset of that recommendation, the CCMP recommends that Virginia receive a seat on the Albemarle-Pamlico Estuarine Council, which is to be established to coordinate future management efforts.

The importance of cooperative management activities has been recognized throughout the development of the HRPDC Involvement and Management Programs. In fact, a major initiative undertaken through those programs was the establishment of the Bi-State Coordination Forum. The Forum involves quarterly meetings of North Carolina and Virginia state and regional agencies to discuss program coordination. Frequently, local governments from the two states have participated in these meetings.

Based on the CCMP recommendations and experience with the Bi-State Coordination Forum, the following steps to increase bi-state cooperation should be taken.

- **An implementation agreement should be developed between North Carolina, Virginia and the U.S. Environmental Protection Agency. This Agreement should recognize that management of the watershed is a shared right and responsibility and not the exclusive responsibility or privilege of any one entity. It is believed that the Chesapeake Bay Agreement is an appropriate model to use in structuring the "A/P Watershed Agreement." Specifically, the "A/P Watershed Agreement" should include:**

  -Signatories should be the Governors of the two states and the Administrator of the U.S. Environmental Protection Agency.

  -Operational coordination of the interstate management structure should be assigned to the Administrator of the U.S. Environmental Protection Agency, the North Carolina Secretary of Environment, Health and Natural Resources and the Virginia Secretary of Natural Resources, or their designees. (The EPA Administrator should be responsible for determining the appropriate roles of the EPA Regional Administrators (Regions III and IV) in this program.)

-Annual meetings of the Signatories and representatives of the appropriate legislative Committees or Commissions in each state should be held to discuss common issues.

-Issue-specific technical management teams should be assembled, as necessary and appropriate, from among the state and local agencies with lead responsibility for the issue.

-A Bi-State Technical Advisory Committee should be established with representatives from the appropriate state management agencies or divisions, federal agencies, local governments and the scientific community.

-A Bi-State Local Government Advisory Committee should be established with representation from cities, counties and towns in both states.

-A Bi-State Citizens Advisory Committee should be established with representation from organizations and interests in both states.

Within this overall policy and management framework, each state would be responsible for devising the most appropriate management structure to develop and implement programs meeting agreed-upon goals and consistent with state and local needs and conditions. Pending finalization of the Bi-State "A/P Watershed Agreement," the informal Bi-State Coordination Forum should continue to facilitate coordination of activities among state agencies and local governments in the two states.

It is recognized that the recommended structure could be cumbersome and result in significant numbers of meetings. However, the localities of Hampton Roads have indicated, through the APES Advisory Committee of the HRPDC, their belief that this type of structure is necessary to ensure the active and meaningful participation of all agencies, institutions and individuals. This broad representation will facilitate development and implementation of a program that provides the necessary balance among competing interests.

Virginia State Programs

The role of Virginia state government, in managing environmental quality in the Virginia portion of the A/P Watershed, can be categorized as follows: program implementation; legislative, technical and financial support for local programs and activities; and, coordination, including both bi-state and intrastate coordination. (It should be noted that the Virginia Department of Environmental Quality can be expected to assume the responsibilities recommended for its individual components - Virginia Council on the Environment, State Water Control Board, Department of Air Pollution Control and Department of Waste Management.) To accomplish each of these:

- State agencies must continue to implement the regulatory and incentive programs that fall within their respective purview.

- *Institutional links between state agencies operating related programs must be strengthened and formalized. These linkages must increase program coordination and reduce duplication. This is particularly true in the areas of:*

  -Nonpoint Source and Stormwater Management - SWCB, DCR - DSWC and CBLAD.
  -Toxics Management - SWCB, DAPC and DWM.
  -Local Assistance - VCOE and CBLAD.
  -Habitat and Resource Management - DCR and DGIF.

- *Similarly, the institutional links between state agencies, regional agencies and local governments operating programs in these functional areas must be strengthened and formalized.*

- *The Virginia Council on the Environment should continue and expand its current activities to coordinate state program activities and state technical assistance to local governments on environmental issues. This responsibility should be accomplished in a proactive manner.*

- *The Virginia Council on the Environment should assume lead responsibility for ensuring that all local and regional entities in the Virginia portion of the A/P Watershed are involved directly in development of the CCMP implementation program, especially as it relates to the Virginia portion of the A/P Watershed.*

- *The cognizant state agency (ies) must continue to ensure that an opportunity to play an active role in implementing the CCMP is provided for local governments.*

- **The Virginia General Assembly needs to ensure that local governments are granted the legislative authority and financial resources to carry out their environmental management responsibilities. Areas of particular concern include:**

  -Authority to implement the recommendations of the CCMP, as appropriate.

  -Stormwater System Management, including authority to issue permits for discharges to local systems and to require maintenance of privately-owned components of those systems.

  -Authority to require the provision of an environmental audit as one element in the subdivision and site plan review processes, where

potential problems with historic or current use of hazardous substances are suspected.

-Financial assistance to carry out environmental mandates and to enhance local stormwater and nonpoint source management programs, as well as any new initiatives resulting from implementation of the CCMP and any resulting Bi-State "A/P Watershed Agreement."

Local Programs

Previous studies have recommended that local governments adopt water quality protection as a goal of their Comprehensive Plans and incorporate that goal into their land use development regulations. That recommendation has been accomplished.

- Watershed local governments must continue efforts to translate that comprehensive plan goal into meaningful regulatory and operational programs. These programs need to address areas of potential conflict between environmental quality and development goals. Concurrently, local operational programs must emphasize achievement of the goal as well.

- *Local governments should consider designating one department or office as the coordinator of all local government environmental and resource management programs.*

- **Local governments should adopt Stormwater Management Ordinances establishing the legislative basis for implementing the Regional Stormwater Management Strategy. The Virginia Beach and Franklin Ordinances provide good examples of such an ordinance.**

- *Local governments should modify their Zoning, Subdivision and Site Plan Review Ordinances to accomplish the specific recommendations in this Environmental Management Program. Particular attention should be placed on use of the Conditional Use Permit provisions of the Zoning Ordinance.*

- The Soil and Water Conservation Districts in the Virginia portion of the A/P Watershed should continue to implement agricultural planning, assistance and education programs and to coordinate their activities with the watershed's cities, counties and towns.

Regional Programs

Local governments have enacted a wide variety of programs to assist in managing the complex environment of the Hampton Roads Virginia portion of the A/P Watershed. However, those programs and activities have not been formally coordinated throughout the watershed. To accomplish this, it is recommended that:

- *HRPDC should strengthen its efforts to facilitate the coordination of local environmental planning and management programs. Initially, this should include hosting quarterly coordination meetings among the local government staffs involved in Environmental Management in the Hampton Roads Virginia Portion of the A/P Watershed. This is an expansion of the Commission's current APES Advisory Committee and mirrors the Commission's Chesapeake Bay and Coastal Resources Management Program activities.*

- HRPDC should continue its efforts to assist local government environmental management activities by undertaking technical studies that provide consistent information for use in local planning and related programs.

- HRPDC should continue to work with the local governments to implement and use recent regional technical studies in stormwater and nonpoint source management.

- *HRPDC and VCOE should cooperatively develop a routine process for coordinating local and state efforts to improve environmental management in the Virginia Portion of the A/P Watershed. This activity is a continuation of the efforts undertaken in support of the APES Program and of the efforts to develop a Southern Watershed Special Area Management Plan.*

- *HRPDC, based on its prior involvement in the APES Program, should work with VCOE and the three PDCs in the balance of the Virginia portion of the A/P Watershed to involve other watershed localities and regional entities in program development and implementation.*

CRITICAL MANAGEMENT AREA RECOMMENDATION

Previous studies and recommendations for the establishment of a "Critical Management Area" approach to environmental management in specific watersheds have been reevaluated during this study. Based on that reevaluation and in light of recent state and federal legislation and programs dealing with critical area designations and nonpoint source management, those previous recommendations have been modified.

- **The following "Critical Management Area," as depicted in Figure 5, should be implemented in the Hampton Roads Virginia Portion of the A/P Watershed:**

  -A/P Watershed - Implement the recommended Stormwater Management Strategy, including the Erosion and Sediment Control Program, application of Best Management Practices to all new development, and retrofitting of BMPs in specific situations. Efforts should be consistent

with the local Stormwater Management Programs required by the NPDES Stormwater Permitting Program.

-Natural Resource Areas - Implement the requirements of existing regulatory programs, including the Virginia Wetlands Act, Flood Plain Ordinances and State Water Laws governing use of Subaqueous Lands. Apply the Wetlands and Subaqueous Lands Guidelines developed by the VMRC and the VIMS. Expand these programs to include the critical resources addressed by the CBPA and the CCMP.

-High Intensity Land Uses - Devote intensified local regulatory attention to those land use activities, which have historically been associated with negative environmental impacts. They include land uses involving outside storage of materials, use and handling of hazardous materials and wastes, and sites which have been used in the past for such activities.

-Water Supply Watersheds - Implement land use regulations and development performance standards in watersheds that are tributary to existing and potential public water supplies.

-Buffer Areas - Delineate a buffer area, at least fifty feet in width, landward of the natural resources delineated as critical resources. Recognize that this buffer serves a variety of functions including water quality. Specific delineation and performance criteria should be developed based on additional scientific studies.

POINT SOURCE RECOMMENDATIONS

Past water quality studies have attempted to deal with both point and nonpoint source management. Municipal wastewater facilities in the watershed are provided through a combination of local governments and the Hampton Roads Sanitation District. Development of the Environmental Management Program for the Hampton Roads portion of the A/P Watershed did not entail an analysis of point source pollution or of municipal wastewater system operations. However, a number of general recommendations, contained in previous water quality studies, are still appropriate to guide implementation and future planning activities. Specifically:

- o The SWCB should continue to implement the Virginia Pollution Discharge Elimination System (NPDES) permit program within the basin. Emphasis should be placed on the control of animal wastes and toxic discharges.

- o The SWCB should continue its inspection and enforcement efforts in the A/P Watershed.

Earlier regional studies, especially the Hampton Roads Water Quality Management Plan and its 1983 Update contained a number of recommendations

dealing with control of pollution from point sources. While action to implement most of these is underway, many of the recommendations remain valid. They include:

- All sanitary sewerage collection systems and their components should be upgraded to meet Virginia Sewerage Regulations Class I Reliability standards.

- *Public sewerage facilities should be extended to all feasible parts of the basin as development, environmental conditions and/or health needs dictate.*

- The HRSD, local jurisdictions and U.S. Department of Defense should continue present efforts to eliminate infiltration and inflow to the public sewerage collection and transmission system.

During 1987, the Southeastern Virginia PDC (predecessor to the HRPDC) adopted a "Policy Statement on Provision of Sewage Collection and Treatment Facilities". The Policy established guidelines for the provision of new wastewater collection and treatment facilities throughout Hampton Roads Virginia.

- *The region's localities, the SWCB and the Department of Health should endorse and implement the guidelines in the HRPDC "Policy Statement on Provision of Sewage Collection and Treatment Facilities." Those guidelines provide that:*

  -No new private point source discharges of wastewater should be permitted to waterways which:

  contain productive or potentially productive shellfish grounds, whether presently condemned or not.

  are used for primary contact recreation.

  are existing or potential potable water supply sources.

  -New private point source discharges that would degrade the ambient water quality of the receiving waterbody will not be permitted.

  -Where new sewage treatment capacity is needed, centralized regional facilities are preferred.

  -All new facilities treating domestic wastewater should be owned and operated by the public sector-HRSD or the local jurisdiction.

-Where provision of centralized wastewater treatment facilities is infeasible, on-lot septic systems would be used if soils and development density are suitable for such use. In all cases, the requirements of the Virginia Department of Health must be followed.

-Private facilities having a discharge to surface waters and serving one dwelling unit are acceptable only if no other service options are available and only if strict conditions are met.

The City of Franklin and Southampton County operate the only local municipal wastewater treatment facilities that discharge to surface waters in the Hampton Roads portion of the A/P Watershed. Both localities are planning to upgrade existing facilities at Franklin and Courtland. The city and county are currently evaluating expansion of city wastewater service to the community of Edgehill. Service expansion will eliminate an existing discharge to the Blackwater River. In addition, Southampton County is developing a regional system to serve the Towns of Boykins, Branchville and Newsoms. This system will eliminate a number of environmental and health-related problems in the Meherrin River Basin. In cooperation with the Hampton Roads Sanitation District, each of the basin localities is considering extension of regional sewer facilities to serve portions of the A/P Watershed.

- *To the extent that facility extensions and upgrades and service area expansions are financially feasible, they should be supported for their generally beneficial impact to water quality in the tributaries to the A/P Watershed.*

- The Hampton Roads Sanitation District is implementing a number of innovative pro/grams to ensure the safety and reliability of the municipal wastewater system. The HRSD should continue to implement these programs. They include:

  -Industrial Waste Discharge Permit Program, including requirements for permits prior to discharge, laboratory testing of material to be discharged and enforcement.

  -System Reliability Program. This program increases HRSD's attention to system maintenance and performance on a day-to-day basis.

Much of the existing development in the rural portions of the watershed is served by on-lot wastewater disposal systems. In those areas outside the planned service area for municipal, central wastewater facilities, continued use of on-lot disposal systems is anticipated. Because of historic concerns with water quality, health and future institutional impacts associated with on-lot disposal, several recommendations are appropriate:

- *The HRPDC "Policy Statement on Provision of Sewage Collection and Treatment Facilities," described above, should be implemented by watershed localities.*

- **Reserve drainfields, equal in capacity to the primary drainfield, should be provided for future septic system installations. Specific criteria for design, installation and maintenance of these systems should be developed to reflect the variety of site-specific conditions found in the watershed.**

- **Additional research to quantify the impacts of on-lot wastewater disposal should be undertaken and used as the basis for further refining recommendations.**

- **Additional research on the effectiveness of alternative on-lot wastewater disposal systems and management approaches, including septic tanks pumpout programs, should be undertaken. Management strategies governing the use of such systems should be developed on the basis of that research and in a manner which is consistent with the above-noted HRPDC "Policy Statement."**

NONPOINT SOURCE RECOMMENDATIONS

In 1983, the Hampton Roads Water Quality Agency, in cooperation with the Southeastern Virginia PDC, completed development of the Nonpoint Source Control Strategy for the Hampton Roads Area. That strategy served as the overall framework for nonpoint source pollution management in the region until 1989. Through the Elizabeth River Basin Environmental Management Program and the Regional Stormwater Management Strategy for Southeastern Virginia, that framework was updated to reflect recently passed legislation and new local initiatives. The Regional Stormwater Management Strategy recommends implementation of a Stormwater Impact Monitoring Program, Institutional Initiatives and both Structural and Non-structural Controls.

- *The Regional Stormwater Management Strategy should be recognized as the overall framework for nonpoint source pollution management in the region. It includes:*

  -A minimum stormwater management strategy consisting of compliance with the EPA Stormwater Permitting Regulations and the CBPA Management Criteria, insofar as the region's localities draining to the Chesapeake Bay are concerned. For the A/P Watershed, this minimum strategy consists of compliance with the EPA Stormwater Permitting Regulations and the recommendations of this report.

-A preferred management strategy consisting of a watershed-wide stormwater management program and the Critical Management Area recommended above.

o The stormwater strategy for urban development consists of the following:

-Require Best Management Practices (BMPs) on all new development in the Basin subject to the requirements of the Erosion and Sediment Control Ordinance. While the Strategy indicates a preference for wet detention basins for urban stormwater management in Hampton Roads Virginia, specific practices should be determined on a site and development-specific basis.

-Undertake rigorous implementation and enforcement of erosion and sediment control ordinances.

-Establish new and maintain existing programs for routine storm drainage maintenance to ensure the continued effectiveness of existing drainage facilities and the best management practices required on all new development.

-Implement a source control program focusing on "good housekeeping" programs and reduction of pollutants available for introduction to surface waters.

-Require BMPs for all activities involving outside materials storage and the use or storage of hazardous materials and wastes.

-Establish a permit program covering all private stormwater discharges to the municipal system.

-Use alternative site design practices, such as clustering, which are useful in reducing development-induced stormwater runoff.

-Use landscape design and maintenance practices on public projects to reduce development-induced stormwater runoff and nonpoint source pollution. Guidance on these practices, which is specific to conditions in Hampton Roads is contained in Vegetative Practices Guide for Nonpoint Source Pollution Management.

-Require retrofitting of BMPs on all land uses in highly impervious areas, using the methodology described in Best Management Practices Design Guidance Manual for Hampton Roads.

As indicated earlier, previous studies recommended that the HRPDC, in cooperation with its member local governments, develop a coordinated set of

guidelines and standards for design and implementation of BMPs. The initial BMP Guidance Manual was completed in 1991. Companion guidance on water quality impact assessment and use of vegetative practices in nonpoint source management was completed in 1992. Ongoing efforts by the HRPDC and its member localities will further supplement this guidance in the future.

- *It is recommended that in their development review and stormwater management activities, watershed localities continue to use:*

  -Best Management Practices Design Guidance Manual for Hampton Roads, 1991.

  -Model Environmental Assessment Procedure, 1992.

  -Vegetative Practices Guide for Nonpoint Source Pollution Management, 1992.

Through the Chesapeake Bay Agreement process, a Commitment Report, Chesapeake Bay Watershed Development Policies and Guidelines was prepared. That report contains a wide variety of specific development guidelines and management techniques for use in the Chesapeake Bay Basin. While not specifically prepared for the A/P Watershed, these guidelines are generally mutually supportive with the Regional Stormwater Management Strategy. The recommended policies provide for the design, location and construction of new developments in a manner that controls the introduction of sediment, nutrients and toxic substances into the Bay and its tributaries, that minimizes alterations of the natural hydrologic cycle and that minimizes the destruction and degradation of important habitats for plants and animals and that is protective of natural resources. Specific guidelines for accomplishing these policies are described.

- **Basin local governments should incorporate those guidelines into their development and regulatory programs.**

The SWCB, the DCR - DSWC and the CBLAB have also addressed the issue of nonpoint source management in their programs. Each of those programs has been incorporated into the Regional Stormwater Management Strategy and into this Environmental Management Program. However, it should be noted that the requirements of these three programs are not consistent. This situation could be ameliorated or further complicated by the evolving Section 6217 Coastal NPS Program. Local governments have indicated serious concerns about the conflicts and overlap among these programs and have urged the three agencies to coordinate and integrate them.

- *The SWCB, the DCR - DSWC and the CBLAD should continue to pursue efforts to coordinate and/or integrate the stormwater management requirements of their respective programs. Because of the operational experience of local governments in implementing these programs, local*

government input should be sought and incorporated into the future coordinated stormwater management programs.

The DCR - DSWC has been charged with development and implementation of nonpoint source management programs in Virginia. The Virginia program, described in Virginia Nonpoint Source Management Program, details a variety of voluntary approaches to implementation of BMPs and public education programs. Specific management plans have been developed for agriculture, forestry, construction activities, urban nonpoint sources, resource extraction, hydrologic modifications and land treatment and disposal. Insofar as urban nonpoint sources/stormwater and construction activities are concerned, those plans are supplemental to the recommended actions, described above. Specific steps have been and are being taken by other agencies to implement the recommendations contained in this program. For all other sources, the Virginia program should be implemented.

- *The DCR - DSWC, in cooperation with other state agencies and local governments, should continue to refine and implement the recommendations of the Virginia Nonpoint Source Management Program.*

The 1990 Amendments to the Coastal Zone Management Act established a new program under Section 6217, entitled the Coastal Nonpoint Source Management Program. This program is administered jointly at the federal level by the U.S. EPA and the NOAA. Through funding from the Virginia Coastal Resources Management Program, the DCR - DSWC is charged with developing Virginia's program to implement this new federal initiative, which will apply to the state's coastal zone. (It should be noted that within the Hampton Roads region, the City of Franklin and Southampton County are not presently part of Virginia's coastal zone and would not be governed directly by this program.) The Section 6217 Coastal NPS PRogram represents another mechanism to support local government nonpoint source and stormwater management programs. Without care in program development, however, it could further exacerbate inconsistency and confusion over the various stormwater management programs and criteria.

- *The DCR - DSWC should develop the Section 6217 Coastal NPS Program in cooperation with local governments, the SWCB and the CBLAD to ensure that stormwater management programs are consistent and provide maximum support to local government implementation efforts.*

The Regional Stormwater Management Strategy for Southeastern Virginia did not address the issue of nonpoint source pollution management associated with agriculture, silviculture or other nonurban activities. Nonpoint source management for those activities has been addressed in the Hampton Roads Water Quality Management Plan and in the Virginia Nonpoint Source Management Program. The focus of both of those efforts is on implementation of current BMP Programs for agriculture and silviculture. Those programs are administered on a largely volunteer basis by the DCR-DSWC and the Department of Forestry. In addition, within the area governed by the

Chesapeake Bay Preservation Act, development of farm conservation plans, buffer area delineation and use of forestry BMPs are required.

- The DCR-DSWC and basin Soil and Water Conservation Districts should continue to work with the agriculture community to develop farm conservation plans and to encourage implementation of appropriate agricultural conservation practices. The agricultural cost-share program appears to be a viable approach to accomplishing this.

- The Department of Forestry should continue to work with the silviculture community to encourage the implementation of Forestry BMPs.

- The effectiveness of the voluntary BMP approach to agricultural and silvicultural NPS management should be evaluated on a regular basis. To minimize program impacts, this evaluation should be accomplished in conjunction with evaluation already required under the CBPA. Program modifications, if warranted, should reflect the results of that effectiveness evaluation.

- The SWCB should continue to implement its Virginia Pollution Abatement Permit Program for non-discharging animal feeding operations.

- **In conjunction with local implementation of a watershed-wide stormwater management/nonpoint source management program, new legislation will be necessary to enable local governments to:**

  -Establish permit and/or enforcement programs to ensure that stormwater discharges meet water quality standards.

  -Increase sanctions and penalties for violations of the Erosion and Sediment Control Law and local ordinances to ensure that they are a sufficient incentive for compliance. Specific penalties should be established based on experience with the current program. Legislation, directed at this issue, is being considered by the 1993 Session of the Virginia General Assembly.

  -Ensure that local governments are able to implement the "critical management area" program and other facets of the CCMP recommendations, including elements of the proposed Bi-State "A/P Watershed Agreement."

WATERFRONT RECOMMENDATIONS

The many-faceted Chesapeake Bay Program has focused additional attention on provision of public access to the waters of the Chesapeake Bay and its tributaries. Similarly, the draft CCMP recommends a number of specific actions be taken by North Carolina state and local governments to increase public access to the Sounds and their

tributaries. Previous local and regional planning efforts in the Hampton Roads region have also emphasized the public access issue. Those efforts should be continued and strengthened.

- *Localities within the Hampton Roads portion of the A/P Watershed should prepare Shoreline Plans as components of their Comprehensive Plans. These Plans should be coordinated on a regional basis to the maximum extent possible. To facilitate regional coordination of these plans, the HRPDC has completed The Waters of Southeastern Virginia and, through its Coastal Resources and Chesapeake Bay Programs, is currently undertaking a comprehensive study of the region's waterways. That study, which addresses both shoreline erosion and public and private access to the waters, will facilitate development of local shoreline plans.*

- **To facilitate implementation of the Shoreline Plans, local governments should incorporate the recommendation of the Chesapeake Bay Watershed Development Policies and Guidelines, concerning reserving the waterfront for water-dependent uses into their plans and regulations.**

- Hampton Roads localities and the Commonwealth of Virginia should continue their efforts to implement the recommendations contained in The Waters of Southeastern Virginia.

- *Through their site plan and other development reviews, local jurisdictions should ensure that both physical and visual public access to the region's tributaries to the A/P Watershed, is provided and/or maintained. Where warranted, such access should be provided through public acquisition of specific parcels or easements.*

- *Local governments and waterfront property owners should ensure that the waters and their shorelines are maintained in a state of cleanliness in order to maintain the viability of these aesthetic resources for the enjoyment of the citizens.*

- *Local governments should continue to work with Department of Conservation and Recreation Divisions of Planning and Recreation Resources and Natural Heritage to complete the public access plan and visual assessment for the North Landing River and to implement, as appropriate, the recommendations of that plan.*

- *Local governments should continue to work with the Commonwealth and the U.S. Army Corps of Engineers to evaluate alternatives for the disposal of material dredged from area waterbodies, including the Blackwater and North Landing Rivers and the Dismal Swamp Canal.*

- o **Local governments should develop water use plans for waterbodies lying within their jurisdictions. Where waterbodies are shared by two or more localities, these plans should be prepared cooperatively.**

Closely related to the preceding recommendation is the need to control the introduction of sediments and toxic substances through appropriate nonpoint source pollution controls. Such efforts will reduce future maintenance dredging requirements and should increase the environmental compatibility of dredged material requiring disposal.

Frequently, efforts to increase public access are criticized as being counter-productive due to perceived and actual increases in pollution due to boating and other waterfront activities. To alleviate the criticism and the pollution, several activities are necessary.

- o *Public and private entities should work to increase the number of pump-out facilities in the Hampton Roads tributaries to the A/P Watershed.*

- o **Runoff controls should be required at marinas to prevent residuals from boat maintenance activities from being washed into receiving waters by stormwater runoff or from being flushed into surface waters during routine facility cleanup. Periodic removal and proper disposal of residual materials would also be required. Public and private entities should work together to develop environmentally sound and cost-effective BMPs for the boat maintenance and repair activities typically undertaken at marinas.**

- o *Guidance on measures to minimize spills during fueling/refueling operations at marinas should be modified if available or developed.*

- o The SWCB and the U.S. Coast Guard should strictly enforce existing regulations to control discharges from vessels as well other regulations to control littering and other waste disposal in the waters.

At the present time, the establishment of "no-discharge zones" in the Hampton Roads tributaries to the A/P Watershed is not believed to be necessary. This reflects the absence of shellfish beds in these waters as well as the nature of boating activities in these tributaries. It may be appropriate, in the future, to reevaluate this conclusion.

WATER SUPPLY PROTECTION RECOMMENDATIONS

The issue of providing and maintaining an adequate supply of potable water for the citizens of Hampton Roads is critical to each of the region's local governments. Several of the Hampton Roads tributaries to the A/P Watershed are presently used as key elements of the region's potable water supply system. Protection of those

resources was identified at the outset of this planning effort as a basic premise of the Environmental Management Program for the Hampton Roads portion of the A/P Watershed. The Environmental Management Program has not addressed the question of providing additional water supply to the region. However, it does recognize that protection of the quality of existing sources is crucial to maintaining an adequate supply of potable water for the region. A number of the Program's recommendations, discussed previously, are directed at achieving a high level of protection for this critical resource. Specific recommendations for water supply protection include:

- **The watersheds upstream of the water supply intakes should be designated as the "Water Supply Watershed" element of the "Critical Management Area."**

- *Local governments should adopt Water Supply Protection Policies and Development Regulations governing land use activities in these watersheds. These should provide for mandatory nonpoint source controls with high performance standards. Specific levels must be established on a watershed-specific basis and should reflect recommended BMP effectiveness evaluations.*

- Local governments should continue to implement current water conservation policies and strengthen those policies as technology permits.

GROUNDWATER MANAGEMENT RECOMMENDATIONS

As is true of the surface waters of the A/P Watershed, the groundwater resource of the Coastal Plain is a shared resource that benefits the citizens of both Virginia and North Carolina. This resource is vital to maintenance of ecosystem health as well as for individual, municipal and industrial water supply. The localities of the Hampton Roads portion of the A/P Watershed are currently conducting a comprehensive program directed at improved management of this resource. This effort is coordinated by the HRPDC and involves active participation by the SWCB and the U.S. Geological Survey. To date, this regional program has focused on quantity issues. The SWCB has begun the process of developing regulations to implement the Virginia Groundwater Act of 1992. Efforts to address groundwater quality issues involve the Virginia Groundwater Protection Steering Committee and local and regional studies of groundwater quality. In addition, through the Department of Agriculture and Consumer Services, the Commonwealth of Virginia is developing a Generic Pesticide Management Plan to protect groundwater. Pesticide Specific Management Plans may be prepared if required by EPA.

- The SWCB should finalize and implement its Groundwater Management Permit regulations for all potential sources of groundwater withdrawal in the Coastal Plain (Eastern Virginia Groundwater Management Area).

- The Virginia Groundwater Protection Steering Committee should continue its efforts to develop groundwater protection programs throughout the state.

- **Because of the role of local government in implementing groundwater protection programs, local government participation on the Virginia Groundwater Protection Steering Committee should be provided.**

- HRPDC should continue to work with the region's localities to implement the recommendations and practices contained in the Groundwater Protection Handbook for Southeastern Virginia, as well as other recommendations contained in evolving state programs.

- The effort to address the issue of potential pesticide contamination of groundwater should continue through the Department of Agriculture and Consumer Services.

- *A comprehensive groundwater quality monitoring program should be established to ensure effective implementation of the pesticide/groundwater plans as well as of other groundwater protection programs.*

- *Efforts by the local governments of the Hampton Roads region to address groundwater management issues should be continued on a cooperative basis through the HRPDC. They should be expanded to include groundwater quality as well as groundwater quantity.*

SOLID AND HAZARDOUS WASTE RECOMMENDATIONS

All local governments in the Hampton Roads portion of the A/P Watershed, either directly through the Superfund Amendments and Reauthorization Act (SARA) Title III program, or indirectly through the waste management programs of the Southeastern Public Service Authority of Virginia (SPSA), are actively involved in hazardous materials and waste management. They are also actively involved in solid waste management activities. However, current activities do not address the legacy of past disposal practices except in limited cases.

- Local governments should continue operation of or participation in existing programs to plan for and manage solid and hazardous wastes and hazardous materials.

- *Conditional use permits should be required for all activities involving the storage or use of hazardous materials or wastes. Conditions should include buffering, distance from sensitive receptors and mandatory implementation of specific best management practices, such as use of dikes, covering and impervious pads for outdoor materials storage areas.*

Similar requirements could be imposed through the Site Plan Review Process for sites that do not require a rezoning or conditional use permit.

- o Local governments should continue to support the Solid Waste Management and Household Hazardous Waste Programs of the SPSA.

- o *The Virginia Department of Agriculture and Consumer Services, in cooperation with the Virginia Cooperative Extension Service and the Virginia Farm Bureau, should continue their program to provide special pesticide collection days for farmers. As resources permit, these programs should be expanded. Where feasible, these programs should be coordinated across state lines. Within the Hampton Roads region, it appears that coordination between the agricultural collection days program and the SPSA Household Hazardous Waste Program may be appropriate.*

- o Local governments should continue their litter control programs in cooperation with the DWM and the private sector. It would also be appropriate to incorporate litter control more directly into the local solid waste management system.

The Chesapeake Bay Watershed Development Policies and Guidelines also address the question of introduction of toxic substances to the Bay and its tributaries.

- o *Specific guidelines, which are equally applicable to the Hampton Roads portion of the A/P Watershed, should be incorporated into the local regulatory process. They include:*

  -Reduce, where feasible, the use of toxic compounds in the construction, operation and maintenance of new development. While the Guidelines apply specifically to new development, this recommendation is equally appropriate to existing land use activities.

  -Site new activities that use, store, or manufacture significant quantities of toxic substances away from proximity to surface waters.

  -Trap spills before they reach surface waters.

HABITAT MANAGEMENT RECOMMENDATIONS

Both the CCMP and the Chesapeake Bay Program address the issue of vital/critical environmental areas and protection of habitat for living resources. To date, mandatory local government programs for the expressed purpose of habitat management have not been established. However, a number of initiatives in habitat management have been undertaken by all levels of government and the private sector. They include resource inventories, land acquisition and management planning studies.

- *Natural resource areas, including wetlands and critical habitat, are recognized as one element of the recommended "Critical Management Area." Local governments should delineate those areas based on available scientific studies and develop programs to protect and manage them.*

- *Local governments should continue to work with the DCR-DNH and The Nature Conservancy to inventory important natural heritage resources and to develop appropriate programs to manage those resources.*

- Local governments and HRPDC should continue to participate in and cooperate with the efforts of the Back Bay/North Landing River Focal Area Committee to achieve the goals of the North American Waterfowl Management Plan.

- Local governments and HRPDC should continue to participate with public and private sector entities in the proposed EPA Habitat Management Demonstration Project for the Back Bay and North Landing River portions of the A/P Watershed.

- *State fisheries agencies should continue their efforts to develop fishery-specific management plans and to remove obstructions to anadromous fish passage.*

AIR POLLUTION RECOMMENDATIONS

Because of the symbiotic relationship between air and water pollution control:

- *The DAPC and the SWCB should work with the Virginia Department of Transportation to develop BMPs applicable to "blasting" and painting activities on highway bridges and related structures.*

- *The DAPC and the SWCB should coordinate their activities to control the introduction of toxic materials to surface waters through both air emissions and point and nonpoint source discharges.*

- *Vehicle owners, especially those operating vehicle fleets, should be required to institute maintenance programs to ensure proper operation of emissions controls.*

INFORMATION SYSTEM RECOMMENDATIONS

To facilitate long-term management of environmental quality in the Watershed, increased coordination of Geographic Information System (GIS) development and operation is needed. The CCMP recommends that the North Carolina GIS, developed and operated by the North Carolina Center for Geographic Information and Analysis (CGIA), continue to serve as the GIS for the APES Program. The Virginia Commission

on Population Growth and Development is addressing GIS needs and coordination on a statewide basis as one element of its examination of statewide planning and development management needs. Recommendations on GIS implementation can be expected from this effort late in 1993.

- To ensure that the GIS meets the long-term watershed management needs, Virginia EcoMAPS, North Carolina CGIA and HRPDC should continue coordination efforts, which began through the Bi-State Coordination Forum.

- HRPDC should continue to develop its Comprehensive GIS, using the ARC/INFO system. This program should be structured to support local government management efforts.

- Efforts to develop similar systems at the local level should be coordinated with the HRPDC system to ensure compatibility and to ensure the widest availability of data for the region.

- The Virginia Council on the Environment, through the EcoMAPS system, should continue to make natural resource data available in computerized and hard copy format to local governments and regional agencies.

- *The Commission on Population Growth and Development should consider the North CArolina GIS System as one model for the developing Virginia system. Recommendations should address long-term coordination and compatibility between the GIS systems of the two States.*

PUBLIC EDUCATION RECOMMENDATIONS

A key component in the success of this environmental management program is the development of an educated and concerned citizenry. Both the public at large and special interest groups must be involved. Recommended activities include::

- *Public education and information programs conducted by state, regional and local agencies should be continued and augmented. These programs should focus on the need for stewardship and good housekeeping practices that can be implemented by homeowners and other residents. Opportunities to "piggyback" these programs with similar programs on Coastal Resources, Hazardous Waste and so forth should be explored and used to the maximum extent possible.*

- *Useful "good-housekeeping" programs that should be encouraged include:*

  -Litter control.
  -Proper disposal of toxic home chemicals.
  -Proper timing and application rates for fertilizers and pesticides.

-Use of native plant materials in landscaping.
-Proper vehicle maintenance.
-Proper disposal of wastes produced in boating activities.
-Proper maintenance of recreational and commercial boats.

A number of these items are being addressed in two HRPDC projects. They are "A Citizen's Guide to Nonpoint Source Pollution" and the Vegetative Practices Guide for Nonpoint Source Pollution Management.

- **Information about groundwater conditions in the A/P Watershed should be developed and provided to homeowners, other well users and well contractors. This information should focus on proper well construction techniques that reflect groundwater conditions and on measures that can be implemented to protect both the quality and quantity of groundwater available.**

- *Regular information about environmental issues and programs in the two states should be provided to the citizens of the two states. This can be accomplished through the HRPDC public information program, APES Public Involvement Program and through the various environmental information programs operated by the VCOE.*

- The public information and education programs, operated by public/private coalitions and private organizations, should be supported to ensure that special interest groups are aware of management program activities and related issues.

MONITORING AND FUTURE STUDIES

To determine progress in achieving the recommendations of this Environmental Management Program, to identify needed modifications in this Program and related regulatory programs and to fill gaps in the information base for management decisions, a number of studies need to be completed.

- *The SWCB should expedite preparation of the update to the Chowan River and Dismal Swamp Basins Water Quality Management (303(e)) Plan. This is currently scheduled for completion in 1995.*

- **The various activities and studies of the Currituck Sound Watershed recommended in the "Proposal for a Southern Watershed Special Area Management Plan," prepared by the HRPDC, are still needed. Especially important is the need to establish a formal process to coordinate ongoing activities in the watershed to ensure that they are meeting resource management and local land use and environmental management needs.**

- *Local governments should implement a comprehensive stormwater impact monitoring program in conformance with the requirements of the*

EPA Stormwater Permitting Program. This program should be conducted on a cooperative regional basis. In addressing water quality impacts, the impacts of stormwater runoff on aquatic resources should be determined. (The Cities of Chesapeake and Virginia Beach are already undertaking such a program. Efforts to develop a regional monitoring program are underway through the HRPDC Regional Stormwater Management Program, in cooperation with the Hampton Roads Sanitation District and the SWCB.)

- *Water quality monitoring programs, being conducted by state and local government agencies and private organizations should be closely coordinated to ensure that the results are mutually supportive.*

- *State resource management agencies should complete inventories identifying the location of critical habitat for aquatic resources, including shellfish beds, fish nursery areas, prime submerged aquatic vegetation beds and others, in all waters of the A/P Watershed. These inventories should not only identify the locations of such areas, but also the quality of the areas and their potential value.*

- *Inventories of nontidal wetlands should be completed for the entire A/P Watershed. These should include the necessary "ground-truthing". A key element to future management activities is an evaluation of the function and value of these wetlands. It should be noted that the SWCB is conducting a study through the Coastal Zone Enhancements (309) Program under the Virginia Coastal Resources Management Program to develop a water-quality standard for such areas. A similar program addressing other wetland values should be undertaken.*

- **A comprehensive study of the role of agricultural drainage in water quality conditions in the Hampton Roads portion of the A/P Watershed should be undertaken in a cooperative fashion by local governments, the SWCB, the DCR-DSWC and the HRPDC. Agricultural drainage ditches have been identified as a probable source of suspended solids and nutrients to these waters. Studies should address the relative contribution of individual ditch systems, original source of the pollutants and appropriate control measures. This issue has potential applicability throughout the eastern or lower Coastal Plain portion of the A/P Watershed in both North Carolina and Virginia.**

- *Continued analyses of the effectiveness of BMPs should be conducted. This should address urban, agricultural and silvicultural practices. It should include both structural and nonstructural practices in all areas.*

- *Two additional research efforts related to on-lot disposal of sanitary wastes should be undertaken on a cooperative basis by the Department of Health and local governments. They are:*

-Quantify the impacts of on-lot wastewater disposal.

-Quantify the impacts of alternative septic-tank pumpout schedules.

-Determine the effectiveness of alternative on-lot wastewater disposal systems.

- **Comprehensive evaluations of appropriate widths of vegetated buffers are necessary. These studies should address buffers in agricultural and urban settings as well as in a variety of topographical and soils conditions. They should examine effectiveness for water quality as well as for other resource values. Buffer width recommendations should be reevaluated on the basis of those studies.**

- *The U.S. Geological Survey, in cooperation with the SWCB, HRPDC and local governments, should expand its groundwater model for Eastern Virginia (the Coastal Plain) to account for the water table and other shallow aquifers and the relationship between them and surface waters. (Efforts to develop components of the necessary studies are underway at present.)*

- *Appropriate state, federal and local agencies should establish a comprehensive groundwater quality monitoring program to determine the need for a groundwater protection program and to serve as the basis for a program, if one is determined to be necessary.*

This ongoing monitoring program is ambitious and will not be inexpensive. However, conducting such a program will be crucial to the long-term success of the Environmental Management Program for the Hampton Roads Virginia Portion of the A/P Watershed. In all cases, the results of the monitoring efforts and other studies should be published on a regular basis. To be most effective in conducting this program, the published results need to be distributed widely.

CONCLUSION

The Environmental Management Program for the Hampton Roads Portion of the A/P Watershed has been developed from the perspective of the region's local governments. It has been developed in cooperation with local government staff representatives on the APES Advisory Committee of the HRPDC and represents a general consensus of that group. Recommended actions are believed to be generally applicable in the Hampton Roads region. As noted previously, a number of these recommended actions require additional legislative authority and financial support for implementation. The Environmental Management Program builds on the region's experience with the Chesapeake Bay Program and various issue-specific programs. Additional education and refinement of the recommendations will be required as the program moves toward implementation at the state and local levels. The

Environmental Management Program is structured to respond to the unique institutional experience and characteristics as well as the unique environmental setting of the Hampton Roads region. Concurrently, many of the recommendations would seem to be applicable to the balance of the Virginia portion of the A/P Watershed and may be applicable to the North Carolina portion as well. A close and cooperative working relationship must be maintained among state, regional and local institutions in both states if the CCMP and the Environmental Management Program for the Hampton Roads Portion of the A/P Watershed are to be successfully implemented.

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