Shoreline Situation Report York County Virginia

Gary F. Anderson  
*Virginia Institute of Marine Science*

Gaynor B. Williams  
*Virginia Institute of Marine Science*

Margaret H. Peoples  
*Virginia Institute of Marine Science*

Peter Rosen  
*Virginia Institute of Marine Science*

Carl H. Hobbs III  
*Virginia Institute of Marine Science*

See next page for additional authors

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Authors
Gary F. Anderson, Gaynor B. Williams, Margaret H. Peoples, Peter Rosen, Carl H. Hobbs III, Robert J. Byrne, and John M. Zeigler

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Shoreline Situation Report
YORK COUNTY, VIRGINIA

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William J. Hargis Jr., Director
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CHAPTER 1

Introduction
CHAPTER 1
INTRODUCTION

1.1 PURPOSES AND GOALS

It is the objective of this report to supply an assessment, and at least a partial integration, of those important shoreland parameters and characteristics which will aid the planners and the managers of the shorelands in making the best decisions for the utilization of this limited and very valuable resource. The report gives particular attention to the problem of shore erosion and to recommendations concerning the alleviation of the impact of this problem. In addition we have tried to include in our assessment some of the potential uses of the shoreline particularly with respect to recreational use, since such information could be of considerable value in the way a particular segment of coast is perceived by potential users.

The basic advocacy of the authors in the preparation of the report is that the use of shorelands should be planned rather than haphazardly developed in response to the short term pressures and interests. Careful planning could reduce the conflicts which may be expected to arise between competing interests. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in a manner such that the very elements which attracted people to the shore have been destroyed by the lack of planning and forethought.

The major man-induced uses of the shorelands are:

-- Residential, commercial, or industrial development.
-- Recreation
-- Transportation
-- Waste disposal
-- Extraction of living and non-living resources.

Aside from the above uses, the shorelands serve various ecological functions.

The role of planners and managers is to optimize the utilization of the shorelands and to minimize the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the allotted space to fulfill the design most efficiently. We hope that the results of our work are useful to the planner in designing the beach by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone. Alternately, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indicating defenses likely to succeed in containing the erosion. In summary our objective is to provide a useful tool for enlightened utilization of a limited resource, the shorelands of the Commonwealth.

Shorelands planning occurs, either formally or informally, at all levels, from the private owner of shoreland property to county governments, to planning districts and to the state and federal agency level. We feel our results will be useful at all these levels. Since the most basic level of comprehensive planning and zoning is at the county or city level, we have executed our report on that level, although we realize some of the information may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example, provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with, and to support, the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

1.2 ACKNOWLEDGEMENTS

This report was prepared with funds provided by the Research Applied to National Needs program (RANN) of the National Science Foundation administered through the Chesapeake Research Consortium (CRC), Inc. George Dawes and Gene Silberhorn of the VIMS Wetlands Section contributed many useful ideas and criticisms. Dennis Owen assisted with the data reduction. Beth Marshall typed the manuscript. Peter Rosen, Peggy Peoples, Joe Gilley, Russell Bradley, Ken Thornberry, and Bill Jenkins prepared the graphics. We also thank the numerous other persons in Maryland and Virginia who have criticized and commented upon our ideas and methods.
CHAPTER 2
Approach Used and Elements Considered
2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, shoreland types, and use was not available, so we performed the field work and developed classification schemes. In order to analyze successfully the shoreline behavior we placed heavy reliance on low altitude, oblique, color, 35 mm photography. We photographed the entire shoreline of each county and cataloged the slides for easy access at VIMS, where they remain available for use. We then analyzed these photographic materials, along with existing conventional aerial photography and topographic and hydrographic maps, for the desired elements. We conducted field inspection over much of the shoreline, particularly at those locations where office analysis left questions unresolved. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

The basic shoreline unit considered is called a subsegment, which may range from a few hundred feet to several thousand feet in length. The end points of the subsegments were generally chosen on physiographic consideration such as changes in the character of erosion or deposition. In those cases where a radical change in land use occurred, the point of change was taken as a boundary point of the subsegment. Segments are a grouping of subsegments. The boundaries for segments also were selected on physiographic units such as necks or peninsulas between major tidal creeks. Finally, the county itself is considered as a sum of shoreline segments.

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use of the report since some users' needs will adequately be met with the summary overview of the county while others will require the detailed discussion of particular subsegments.

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

The characteristics which are included in this report are listed below followed by a discussion of our treatment of each.

a) Shorelands physiographic classification
b) Shorelands use classification
c) Shorelands ownership classification
d) Zoning
e) Water quality
f) Shore erosion and shoreline defenses
g) Potential shore uses
h) Distribution of marshes
i) Flood hazard levels
j) Shellfish leases and public shellfish grounds
k) Beach quality

a) Shorelands Physiographic Classification:

The shorelands of the Chesapeake Bay System may be considered as being composed of three interacting physiographic elements: the fastlands, the shore, and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shore zone.

Definitions:

Shore Zone

This is the zone of beaches and marshes. It is a buffer zone between the water body and the fastland. The seaward limit of the shore zone is the break in slope between the relatively steeper shoreface and the less steep nearshore zone. The approximate landward limit is the contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1A). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 1B). Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which occupies a reentrant or drowned creek valley. The purpose in delineating these marsh types is that the effectiveness of the various functions of the marsh will, in part, be determined by type of exposure to the estuarine system. A fringe marsh
may, for example, have maximum value as a buffer to wave erosion of the fastland. An extensive marsh, on the other hand, is likely a more efficient transporter of detritus and other food chain materials due to its greater drainage density than an embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where the various types exist.

The classification used is:

- Beach Marsh
  - Fringe marsh, < 400 ft. (122 m) in width along shores
  - Extensive marsh
  - Embayed marsh, occupying a drowned valley or reentrant
- Artificially stabilized

**Fastland Zone**

The zone extending from the landward limit of the shore zone to the 12-foot (MLW datum) contour. In the smaller tidal rivers the 6-foot depth is taken as the reference depth. The 12-foot depth is probably the maximum depth of significant sand transport by waves in the Chesapeake Bay area. Also, the distinct drop-off into the river channels begins roughly at the 12-foot depth. The nearshore zone includes any tidal flats.

The class limits for the nearshore zone classifications were chosen following a simple statistical study. The distance to the 12-foot underwater contour (isobath) was measured on the appropriate charts at one-mile intervals along the shorelines of Chesapeake Bay and the James, York, Rappahannock, and Potomac Rivers. Means and standard deviations for each of the separate regions and for the entire combined system were calculated and compared. Although the distributions were non-normal, they were generally comparable, allowing the data for the entire combined system to determine the class limits.

The calculated mean was 919 yards with a standard deviation of 1,003 yards. As our aim was to determine general, serviceable class limits, these calculated numbers were rounded to 900 and 1,000 yards respectively. The class limits were set at half the standard deviation (500 yards) each side of the mean. Using this procedure a narrow nearshore zone is one 0-400 yards in width, intermediate 400-1,400, and wide greater than 1,400.

The following definitions have no legal significance and were constructed for our classification purposes:

- Narrow, 12-ft. (3.7 m) isobath located < 400 yards from shore
- Intermediate, 12-ft. (3.7 m) isobath 400-1,400 yards from shore
- Wide, 12-ft. (3.7 m) isobath > 1,400 yards

**Figure 1A**

An illustration of the definition of the three components of the shorelands.

**Figure 1B**

A generalized illustration of the three different marsh types.
b) Shorelands Use Classification:

**Fastland Zone**

**Residential**
Includes all forms of residential use with the exception of farms and other isolated dwellings. In general, a residential area consists of four or more residential buildings adjacent to one another. Schools, churches, and isolated businesses may be included in a residential area.

**Commercial**
Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas within the general commercial context. Marinas are considered commercial shore use.

**Industrial**
Includes all industrial and associated areas. Examples: warehouses, refineries, shipyards, power plants, railyards.

**Government**
Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story.

**Recreation and Other Public Open Spaces**
Includes designated outdoor recreation lands and miscellaneous open spaces. Examples: golf courses, tennis clubs, amusement parks, public beaches, race tracks, cemeteries, parks.

**Preserved**
Includes lands preserved or regulated for environmental reasons, such as wildlife or wildlife sanctuaries, fish and shellfish conservation grounds, or other uses that would preclude development.

**Agricultural**
Includes fields, pastures, croplands, and other agricultural areas.

**Unmanaged**
Includes all open or wooded lands not included in other classifications:

a) Open: brush land, dune areas, waste lands; less than 40% tree cover.

b) Wooded: more than 40% tree cover.

The shoreland use classification applies to the general usage of the fastland area to an arbitrary distance of half mile from the shore or beach zone or to some less distant, logical barrier. In multi-usage areas one must make a subjective selection as to the primary or controlling type of usage.

---

c) Shorelands Ownership Classification

The shorelands ownership classification used has two main subdivisions, private and governmental, with the governmental further divided into federal, state, county, and town or city. Application of the classification is restricted to fastlands alone since the Virginia fastlands ownership extends to mean low water. All bottoms below mean low water are in State ownership.

---

d) Water Quality

The ratings of satisfactory, intermediate or unsatisfactory assigned to the various subsegments are taken from a listing at the Virginia Bureau of Shellfish Sanitation, based on information from water samples collected in the various tidewater shellfishing areas. The Bureau attempts to visit each area at least once a month.

The ratings are defined primarily in regard to number of coliform bacteria. For a rating of satisfactory the maximum limit is an MPN (Most Probable Number) of 70 per 100 ml. The upper limit for fecal coliforms is an MPN of 23. Usually any count above these limits results in an unsatisfactory rating, and, from the Bureau's standpoint, results in restricting the waters from the taking of shellfish for direct sale to the consumer.

There are instances, however, when the total coliform MPN may exceed 70, although the fecal MPN does not exceed 23, and other conditions are acceptable. In these cases an intermediate rating may be assigned temporarily, and the area will be permitted to remain open pending an improvement in conditions.

Although these limits are somewhat more stringent than those used in rating recreational waters
(see Virginia State Water Control Board, Water Quality Standards 1946, amended 1970), they are used here because the Bureau of Shellfish Sanitation provides the best areawide coverage available at this time. In general, any waters fitting the satisfactory or intermediate categories would be acceptable for water recreation.

e) Zoning

In cases where zoning regulations have been established the existing information pertaining to the shorelands has been included in the report.

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore erosion:
- slight or none - less than 1 foot per year
- moderate - 1 to 3 feet per year
- severe - greater than 3 feet per year

The locations with moderate and severe ratings are further specified as being critical or non-critical. The erosion is considered critical if buildings, roads, or other such structures are endangered.

The degree of erosion was determined by several means. In most locations the long term trend was determined using map comparisons of shoreline positions between the 1850's and the 1940's. In addition, aerial photographs of the late 1930's and recent years were utilized for an assessment of more recent conditions. Finally, in those areas experiencing severe erosion field inspections and interviews were held with local inhabitants.

The existing shoreline defenses were evaluated as to their effectiveness. In some cases competitive visits were made to monitor the effectiveness of recent installations. In instances where existing structures are inadequate, we have made recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

g) Potential Shore Uses

We placed particular attention in our study on evaluating the recreational potential of the shore zone. We included this factor in the consideration of shoreline defenses for areas of high recreational potential. Furthermore, we gave consideration to the development of artificial beaches if this method were technically feasible at a particular site.

All the existing shoreline defenses were evaluated as to their effectiveness. In some cases competitive visits were made to monitor the effectiveness of recent installations. In instances where existing structures are inadequate, we have suggested recommendations for alternate approaches. Furthermore, recommendations are given for defenses in those areas where none currently exist. The primary emphasis is placed on expected effectiveness with secondary consideration to cost.

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subsegment is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. The material in this report is provided to indicate the physiographic types of marshes and to serve as a rough guide on acreages until detailed surveys are completed. Additional information of the wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report by Marvin L. Wais and Thomas D. Wright, SHMOS Report No. 10, Virginia Institute of Marine Science, 1969, and in other Virginia Institute of Marine Science publications.

i) Flood Hazard Levels

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreland is still incomplete. However, the United States Army Corps of Engineers has prepared reports for a number of localities which were used in this report. Two tidal flood levels are customarily used to portray the hazard. The Intermediate Regional Flood is that flood with an average recurrence time of about 100 years. An analysis of past tidal floods indicates it to have an elevation of approximately 8 feet above mean water level in the Chesapeake Bay area. The Standard Project Flood level is established for land planning purposes which is placed at the highest probable flood level.

j) Shellfish Leases and Public Grounds

The data in this report show the leased and public shellfish grounds as portrayed in the Virginia State Water Control Board publication "Shellfish growing areas in the Commonwealth of Virginia: Public, leased and condemned," November 1971, and as periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.
k) Beach Quality

Beach quality is a subjective judgement based on such considerations as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.
CHAPTER 3
Present Shorelands Situation
CHAPTER 3
PRESENT SHORELANDS SITUATION

3.1 NATURE OF THE SHORELANDS; PHYSIOGRAPHY, LAND USE, AND OWNERSHIP

York County, as a part of the James - York Peninsula, has shorelands which border on the York River and the Chesapeake Bay. Since regional planning will consider the county as a whole it is important to compare the physiographic differences of the shorelands of these two sections of York County.

The shorelands bordering the Chesapeake Bay are primarily marshes separated by tidal rivers and creeks which in turn form sub-peninsulas or "necks". The low-lying fastland of the Chesapeake Bay shorelands is fronted primarily by extensive or fringe marshes. The York River portion is a relatively straight flank of the Peninsula occasionally incised by small tidal creeks. This portion of the county's shoreline is marked by high cliffs with a variety of shore zone types. The three main shore zone types along the York River are fringe marsh, beach, and artificially stabilized. Excluding tidal creek shoreline the majority of the shoreline is artificially stabilized.

Although York County does not contain extensive stretches of natural beach shoreline, it does have 6,991 acres of relatively unpolluted marshes. In addition to constituting a vital link in the marine food chain, the marshes serve as a habitat for waterfowl, a natural erosion prevention mechanism, and a water cleansing system. In recognition of their vital importance as a marine resource, the Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia) was passed to establish a mechanism to preserve this resource.

The distribution of shorelands physiography and of fastland use and ownership is shown in Table 1 and graphically displayed in Maps 1A through 1D. Approximately eighty-two percent of York County's shoreline is low shore, eleven percent is moderately low shore, and the remaining seven percent is moderately high to high shore, usually with bluffs. Approximately ten percent of the shore zone is beach.

Fifty-five percent of the one hundred twenty-nine square miles which York County covers is controlled by the military. This is reflected directly in the significant amount of shoreline, thirty percent, which the federal government controls. The largest percentage of the shoreline, sixty-two percent, is used for private residential purposes. The remaining eight percent is divided between commercial, industrial, recreational, preserved, and unmanaged. Only one percent of the county's shoreline is set aside for public recreational use, the majority of which is encompassed in the public beach at Yorktown. The Plum Tree Island Wildlife Refuge is the only preserved area.

Table 2 and Maps 2 through 8 are a segment by segment condensation of present subsegment descriptions and are presented in Chapter 4.

3.2 SHORE EROSION PROCESSES AND PATTERNS: SHORE DEFENSES

The magnitude of shore erosion in York County must be classed moderate. Where buildings and other structures are endangered, the situation is critical. Map 13 is a summary of the erosion situation in York County. As the erosional characteristics of the Chesapeake Bay and the York River shores differ, they will be discussed separately.

3.21 The Chesapeake Bay Shore. The erosion of the Goodwin Islands, and along the faces of Crab Neck and the Big Salt Marsh has continued virtually unchecked. The only exception is York Point, where landowners have implemented bulkheading behind the natural marsh grass fringe. The outer Bay faces of these marshes display many similarities in mechanics and features to the barrier islands of the Eastern Shore of Virginia.

For the greater part, the outer marshes are simple low-lying segments with small backshore dunes and a bayside veneer of sand. As the littoral drift is relatively small, the situation is one of significant erosion. It is particularly important to consider what happens during coastal storms.

Processes. Along the Chesapeake Bay coastline the most damaging storms are the "northeasters" and the occasional hurricanes. Aside from the intense wave action there is generally a one to three-foot storm surge. The surge has two important effects. The erosive power of the waves is translated further up onto the marsh beach allowing the high waves to wash backshore dune sand into the Bay and to smear sand over the marsh surface. The sand washed over the marsh
raises the ground elevation. In time, the highly productive marsh grass is replaced by other species, and the sand in the washovers is temporarily lost from the active beach littoral transport system. The washovers can also affect the circulation within the marshes and bays by filling some of the tidal channels and forcing a redistribution of flow.

These processes are natural responses of the marsh beaches. As the shoreface retreats, former marsh deposits are excavated, and the washover deposits and wind-shaped dunes supply sand to the beach. The physiographic components, beach, dunes, and washovers, found on the marsh beaches today existed a century ago even though the entire ensemble is retreating. The erosion rates and areal loss on an area by area basis are:

Goodwin and Tue Islands - 104 acres in the last 100 years
Crab Neck Marsh - 2.2 feet per year
Big Salt Marsh - 3.5 feet per year

These rates and areal retreats were determined by comparison of the shoreline positions in 1854 and 1944. The magnitude of erosion in any given year, of course, is controlled by the frequencies and characteristics of the storms during that year. Two overriding facts must be borne in mind when considering the marsh beach erosion problems:

1. Mean Sea Level is rising.
2. The marsh beaches are not receiving a large enough supply of sand from fastland erosion to feed the littoral drift system.

The consequence of these facts is an eroding shoreline.

Aside from their other properties, marshes act as an excellent deterrent to erosion. Although the extensive marshes of the Goodwin Islands, Crab Neck, and Plumtree Island have suffered severe erosion, they continue to function as an effective buffer to upland developments. Within the tidal creeks of York County the fringes and embayed marshes do an excellent job of protecting the fastland from minor erosion due to boat wakes and small wind-generated waves. The exceptions are those cases where the natural fringe marsh has been jeopardized by the emplacement of riprapping or bulkheading. In many instances those shore protection devices are in reality cosmetic, where the landowner's desire was to increase the size of his property or to increase the aesthetic value rather than in response to a serious erosion problem.

3.22 The York River Shore.

Processes. Waves generated by local winds are the dominant agent of erosion within the Chesapeake Bay and its tributary estuaries (e.g., the York River). The growth and height of the waves is controlled by four factors: the over water distance across which the wind blows, known as the fetch; the speed of the wind; the duration of the wind; and the depth of the water.

Due to the weather patterns affecting the Chesapeake Bay area and York River area, peak winds occur during frontal passages and storms. The winds of northeast storms during the fall, winter, and early spring generate waves which attack the western shore of the Bay and particularly lower sections of the York River. To a lesser extent, summer regional winds (southeast and south) also generate wave activity but the destructive wave action is greater with the northerly winds. The winds and the low barometric pressure along the ocean coastline have an additional, indirect effect on the Bay System erosional patterns during the storms, by forcing additional water into the Bay. Frequently this local "wind tide" or storm surge may be two or three feet above the normal tide level. For example, the severe northeast storm of March 1962 caused water elevations in Norfolk Harbor to reach an elevation of 7.4 feet above mean sea level. This elevation is approximately 6 feet higher than the average spring tide. When this occurs the wave driven erosional action is concentrated higher on the fastland, above the beach or marsh which normally acts as a buffer.

After a storm passes, the winds frequently shift to the northwest and north. In this case the south shore of the York River is exposed to intense wave action. In some cases this occurs before the extra water in the Bay has had sufficient time to drain out, resulting again in the wave activity being concentrated above the usual beach level. These effects of storms are, of course, further enhanced if they occur in conjunction with the higher spring tides during the lunar month.

In addition to the height of the waves, the direction at which they impinge upon the shore controls the magnitude of transport along the shoreline (littoral drift), a factor which is central to the question of shoreline stability. In theory, the transport of material along the beach is greatest when the waves break on the shoreline at an angle of forty-five degrees. Consider a hypothetical case of a shoreline several miles in length, where the fastland is a bluff composed of a mixture of stratified gravel, sand,
silt, and clay, a situation which is typical of much of the York River shoreline. Under wave attack, particularly if the water level is high due to the tide or storm surge, the cliff itself may be undercut causing face material to slump to the base. Continued wave action on the slumped material would winnow away the silts and clays leaving the sand and gravel to form a beach. Some of the sand and gravel will be transported along the beach. The beach itself acts as a buffer to wave energy as the waves break and run up and back down the sloping foreshore. If there is sufficient sand drifting along the shore zone from the up-drift segment of the coast, the beach at any given site may remain full enough to cushion the effects of a particular storm. However, if the sand supply up-drift is stopped, for one reason or another, the buffer effect is reduced and erosion will ensue.

Much of the sand drifted along the Virginia coastline is ultimately deposited as spits or bars in front of lesser tributary creeks, where it may contribute to the choking off of the entrance channel.

The erosional behavior of any particular segment of shoreline may be expected to vary from year to year depending upon the frequency and the intensity of storms. Furthermore, similar variability may arise from differences in average sea level elevations. The long-term (decades) trend is for a relative rise in sea level. In the lower Chesapeake Bay the trend is about 0.01 feet per year. However, yearly variations of 0.15 feet per year are not uncommon. Although these differences are small they can be significant in terms of horizontal distances across a gently sloping shore. The long-term trend has dramatic consequences.

The role played by beaches in the physical processes of the coastline merits reiteration: beaches are natural land forms which serve to absorb incidental wave energy thereby inhibiting erosion of the fastland. The details of the configuration of any given beach may change, hour by hour or day by day, as the accumulation of sand adjusts to changing conditions. By and large, the natural maintenance of beach along Virginia's shoreline systems is attained at the expense of erosion of the fastlands. For any particular segment of shoreline, the beach sand is derived from erosion of the fastland at the site or from erosion at an up-drift site.

Erosion and Shore Defenses in York County. Historically, the necks directly exposed to the Bay and the lower portions of the York River have undergone the most severe erosion. Specifically, the Goodwin Islands, the Crab Neck marshes, the Plumtree Island marshes, and the high cliffs along the Colonial National Historical Park and Parkway were the sites of the most extensive erosion. Of particular national concern were the Revolutionary War fortifications along the cliff edge at Yorktown. Park Service surveys and the VIMS Erosion Report revealed a linear cliff retreat of 125 to 150 feet prior to the Army Corps of Engineers cliff stabilization program in that area. The well-placed, large stone riprap, implemented by the Corps, has halted the erosion, although some cliff slumping due to rain runoff is still witnessed.

Another area of concern is the picnic area at the east end of Water Street in Yorktown. As shown in Figure 2, recent storms have removed large sections of the dredge spoil fastland, including several trees and a concrete picnic table. Although working against a lower cliff, several private erosion control measures along the York River portion of Goodwin Neck (Fig. 3) graphically display the result of using improper bulkhead construction materials. These bulkheads probably would have been successful had they been constructed of solid concrete with tiebacks and groins instead of poorly lain cinder blocks. Aside from the destruction due to wave action, the saline waters of the York deteriorated the mortar allowing wave action to complete the destruction.

Although properly implemented riprap and bulkheads offer the greatest protection against bluff retreat, it is generally impossible to maintain any beach above the high tide line due to the wave reflection from the face of these structures during high water. Groins should be used in conjunction with riprap or bulkhead if the maintenance of a beach is desired along with bluff protection. If the groins are successful in trapping sand, the beach, thus formed, protects the rip-rapped or bulkheaded face.

Although the planning of shore erosion defenses for any particular segment of the Bay and River shoreline of York County requires detailed evaluation, it is possible to recommend certain generalized guidelines:

a) In those areas experiencing rapid bluff recession and where there is limited up-drift sand supply, the application of groins alone should be discouraged.

b) If bluff stabilization is the main objective, properly designed bulkheading or stone riprap should be used. If possible these installations should be augmented
with a groin system to establish a beach for frontal protection.

c) If possible the individual groins in a groin system should be placed in a time sequential manner with the most down-drift groins being first installed. In those cases where groins alone are being utilized, this procedure will reduce the likelihood of flanking. Furthermore, the observed trapping characteristics will assist in the determination of the spacing between groins.

d) Where possible, groin systems should be artificially filled with sand in order to establish sand by-passing to the down-drift shoreline as soon as possible.

e) If there is a need for shore protection in an area with fringe marsh bordering the shore, the riprapping or bulkheading should be installed between the fastland and the marsh.

Finally, it must be emphasized that installation of shore defenses in one location generally has an impact on the adjacent down-drift shoreline. The impact can be both direct and indirect. In the case of bluff stabilization by bulkheads or riprap, the act of stabilization removes a source of sand which normally would pass to down-drift beaches. The installation of groin fields is a more aggressive action with a correspondingly greater impact on the down-drift beaches, as it prevents by-passing of sand until the system is filled.

In all cases shore erosion defenses should be planned under guidance of persons trained or experienced in coastal processes.

3.3 SHORE USE POTENTIAL AND UNIQUE FEATURES

Several factors come to bear when considering potential uses for the shorelands of York County. Present use and the physiographic nature of the shoreline in most areas prevent developing or enhancing the use of the shorelands. This is particularly so along the York River where extensive sections are managed by the federal government. The extensive marshes of the Chesapeake Bay shore, with few exceptions, also preclude use other than as preserved areas.

3.3.1 The Chesapeake Bay Shore. The Black Walnut Ridge section of the Big Salt Marsh is an outstanding area for developing as an unusual and unique public recreational facility. Contained within a relatively small area are several types of coastal marsh environments. Through this facility the many valuable functions of Virginia's wetlands could be emphasized. As Tidewater is an established tourist area, the facility would offer yet another facet to the recreational attractions of the Peninsula. Although a comprehensive plan would be necessary prior to implementation, possible features could include: a visitors' center, open pile walkways across the marsh, observation towers, film and lectures on wetlands, guided tours, and other associated features. The facility would not only serve as a tourist attraction but could provide a living classroom for the various schools in the area.

The Goodwin Islands are another unique shorelands area within York County. Developmental pressures have been exerted to use these low-lying islands for industrial expansion in the lower York or for residential purposes. Particularly due to the high flood hazard, this area is not suitable for this type of development. The Goodwin Islands represent the same variety of shorelands environments seen at the Black Walnut Ridge area. This area could also be considered a candidate for this type of development, where the emphasis is on preservation through education rather than sacrificing a relatively unspoiled area. As with the Black Walnut Ridge area, a comprehensive plan would be necessary before implementation.

Elsewhere in York County, the zoning ordinance and existing installations, in many cases, have determined the course of shorelands use. It can only be reemphasized that care should be taken to limit additional alterations to natural marsh conditions which exist throughout most of the portion of York County's shorelands.

3.3.2 The York River Shore. Due to the physiographic nature and the extensive shore protective measures along this portion of York County's shoreline, only one area has potential for further or alternate use development. The area is the Yorktown beach area, which could be further developed for recreational use.

Yorktown beach is the only public beach in York County. It receives heavy use during the summer months from local residents as well as tourists. This pressure can be expected to increase, particularly during the Bicentennial celebration. Visitors and residents will expect to find an adequate, safe, and accessible public beach. The beach at Yorktown is adequate and relatively accessible but certain sections are not safe. As detailed in the Segment 5 description a restricted and guarded swimming area needs to be established. Consideration should also be given to an overall plan for maximizing the use of downtown Yorktown.

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FIGURE 2: Large stone riprap which protects much of the nonmarsh York River shoreline. However, there is no beach along these sections at high tide.

FIGURE 3: Yorktown Beach, the only public beach in York County.

FIGURE 4: Wave erosion at the Park Service picnic grounds in Yorktown.

FIGURE 5: One example of the many poorly designed and constructed bulkheads in York County.
FIGURE 6: The Plumtree Island Wildlife Refuge marsh with its small barrier beach.

FIGURE 7: One of the many dead end canals in York County.

FIGURE 8: Another example of a dead end canal and spoiled marsh. Such practices are environmentally unsound in addition to placing homes in high flood hazard areas.
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<th>Physiography-use-ownership classification</th>
<th>Subsegment</th>
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<th>FASTLANDS USE</th>
<th>OWNERSHIP</th>
<th>TOTAL MILES</th>
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CHAPTER 4

4.1 Table of Subsegment Summaries
4.2 Segment and Subsegment Descriptions
4.3 Segment and Subsegment Maps
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<tr>
<th>SUBSEGMENT</th>
<th>SHORELINE TYPE</th>
<th>SHORELINE USE</th>
<th>NEARSHORE</th>
<th>FASTLAND</th>
<th>NATURE</th>
<th>ARMS</th>
<th>SHORE AREA</th>
<th>DATE</th>
<th>ENHANCED STRUCTURE</th>
<th>PRIVATE SECURITY ENCOURAGE ACTION</th>
<th>POTENTIAL USE IMPLICATIONS</th>
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<td>BENNETT CREEK to YORK POINT</td>
<td>Low shore.</td>
<td>Residential.</td>
<td>High, critical.</td>
<td>Natural.</td>
<td>None.</td>
<td>None.</td>
<td>Effective 150-foot bulkhead.</td>
<td>None.</td>
<td>Low, Marsh areas should be left in their natural state.</td>
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<td>THE THOROFARE to YORK POINT</td>
<td>Low shore.</td>
<td>Commercial, Governmental.</td>
<td>High, critical.</td>
<td>Natural barrier.</td>
<td>None.</td>
<td>None.</td>
<td>Well maintained bulkhead; effective breakwater.</td>
<td>None.</td>
<td>Low, Area should not be developed any further, marsh lands should be left as they are. Nature walk across Back Creek Ridge could be valuable to public recreation.</td>
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<td>None.</td>
<td>Effective breakwater, riprap.</td>
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<td>Low, Marsh should be left as it is due to its natural marsh growth and marine recreation potential.</td>
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<td>POLEY POINT</td>
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<td>None.</td>
<td>None.</td>
<td>None.</td>
<td>Effective breakwater, riprap.</td>
<td>None.</td>
<td>Low, Beavy attempt should be made to preserve the natural state of the marsh.</td>
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<td>None.</td>
<td>Effective riprap cover, about 95% of shoreline; 150-foot assembly not totally effective.</td>
<td>None.</td>
<td>Low, Recreational development should be required or redeveloped to officially designated marsh areas. Highlands should be left as they are.</td>
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<td>Low shore and moderately low shore.</td>
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<td>None.</td>
<td>None.</td>
<td>Effective breakwater, riprap.</td>
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<td>Low, Present use precludes any changes in that use.</td>
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<td>Effective breakwater, riprap.</td>
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<td>Low, Present use precludes any changes in that use.</td>
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<tr>
<td>2 TIP SHELL POINT to BENNETT CREEK</td>
<td>Low shore.</td>
<td>Commercial, Governmental,</td>
<td>High, critical.</td>
<td>Natural.</td>
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<td>None.</td>
<td>Effective breakwater, riprap.</td>
<td>None.</td>
<td>Low, Present use precludes any changes in that use.</td>
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<tr>
<td>3 BENNETT CREEK to TOWN POINT</td>
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<td>Commercial, Governmental.</td>
<td>High, critical.</td>
<td>Natural.</td>
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<td>None.</td>
<td>Effective breakwater, riprap.</td>
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<td>Low, Present use precludes any changes in that use.</td>
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<td>8 YORKSHORE to YORK POINT</td>
<td>Low shore and moderately low shore.</td>
<td>Commercial, Residential.</td>
<td>High, critical.</td>
<td>None.</td>
<td>None.</td>
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<td>Effective breakwater, riprap.</td>
<td>None.</td>
<td>Low, Present use precludes any changes in that use.</td>
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**TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR YORK COUNTY, VIRGINIA**
4.2 Segment and Subsegment Descriptions

BRICK KILN CREEK TO TIN SHELL POINT,
YORK COUNTY, VIRGINIA
SEGMENT 1 (Maps 1A, 1B, 1C)

EXTENT: 24,500 feet (4.6 mi.) from Brick Kiln Creek to Tin Shell Point.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Extensive marsh, except for dredge spoil piles at Cedar Landing and Tin Shell Point.
NEARSHORE: The Back River in this section is broad and shallow (4 ft.).

SHORELANDS USE
FASTLAND: Primarily used for residential purposes.
SHORE: Except for encroaching developments, the marsh has been left in its natural state.
NEARSHORE: The Back River is used primarily by water sport enthusiasts and for some commercial fishing.

WIND AND SEA EXPOSURE: The Back River runs basically E - W. The fetch throughout the segment is ½ mile or less.

OWNERSHIP: Private.

ZONING: Residential.

FLOOD HAZARD: High, critical. According to the Corps of Engineers Flood Hazard Report for the Town of Poquoson, this segment is subject to flooding from each of the projected flood levels covered in that report.

WATER QUALITY: Satisfactory.

BEACH QUALITY: There are no beaches in this segment.

PRESENT SHORE EROSION SITUATION
EROSION RATES: Slight to none, noncritical.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: At Cedar Landing, there is a 200-foot, wooden, tongue and groove bulkhead. This well emplaced structure appears effective in retaining fill.

Suggested Action: None.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: As the predominant shore type is extensive marsh, every effort should be made to preserve this valuable resource. These marshes provide numerous necessary biological functions in addition to the natural erosion protection properties.

C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1971.

PHOTOS: Aerial-VIMS 30Apr73 YK-1 1-29.
TIN SHELL POINT TO BENNETT CREEK, YORK COUNTY, VIRGINIA
SEGMENT 2 (Maps 1A, 1B, 1C and 2A, 2B, 2C)

EXTENT: Approximately 98,800 feet (8.7 mi.) from Tin Shell Point to Bennett Creek. The center­line of Bennett Creek is the dividing line between segments 2 and 3.

SHORELANDS TYPE
FAstLAND: Low shore.
SHORE: Extensive marsh with occasional fringe beaches.
NARROWSTREngth: The first third borders the Back River Channel whose depths range from 12 to 15 feet. From Flat Gut to Cow Island there are the extensive shallow Drum Island Flats and the Plumtree Bar. These flats have a varied shallow bathymetry with a soft muddy bottom.

SHORELANDS USE
FASTLAND: Commercial, governmental, and un­managed, open.
SHORE: Recreational and the Plumtree Island Wildlife Refuge.
NARROWSTRENGTH: Boating, sport fishing, and extensive commercial fishing.

OFFSHORE: The channel entrance to the York River is bounded by the Poquoson Flats and the York Spit. Dredged channel depth is 40 feet.

ZONING: Commercial, Residential, and Federal.

WIND AND SEA EXPOSURE: There are three basic shore orientations in this segment. Tin Shell Point to Plumtree Island trends SW - NE, fetches are NE - 16 miles, E - 16 miles, and SE - unlimited through the bay mouth. Plumtree Island to Marsh Point trends SE - NW, fetches are SE - unlimited, S - 16 miles, and NE - 16 miles. The shoreline trend from Marsh Point to Cow Island is E - W, fetches are N - 12 miles, NE - 30 miles, and E - 16 miles.

OWNERSHIP: Private and Federal.

FLOOD HAZARD: High, critical. According to the Corps of Engineers Flood Hazard report for Poquoson, this area is susceptible to flooding from all predicted flood levels. This is due
to the extreme lowness of the fastland area. Past storms (1933, 1962) have given graphic evidence to this very real hazard.

WATER QUALITY: Intermediate.

BEACH QUALITY: Poor. Thin, narrow, sand beaches exist at the outboard fringes of the Big Salt Marsh. These beaches are too small to support anything but limited recreational use.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is well maintained bulkheading at Amory's Wharf and Messick Point for protection of commercial ventures. One quarter mile south of Plumtree Island there is an effective, large stone, rip­rap breakwater.

Suggested Action: None.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: The major portion of this segment is the Plumtree Island Wildlife Refuge, which precludes any other present day use. In other areas of the segment, encroachment by housing developments has covered and threatened to expand to use the marsh lands as building land in order to abate the growing housing pressure in York County and the Town of Poquoson. Every attempt should be made to keep these marshes as they are, for their natural water cleansing function in addition to their natural erosion control.

The marshes around Blackwalnut Ridge provide an excellent opportunity for observing the various types of marsh environments. With this valuable resource in close proximity to a growing urban and suburban population, the need arises to protect and preserve the area and use it for the education and recreation of the populace. Thus, consideration should be given to establishing a marsh nature walk through the Blackwalnut Ridge area. This would necessitate a planning study which would further outline environmental impact and design considerations. The result could be an unusual and valuable addition to the public recreational facilities of the area, as well as preserving one of Virginia's most valuable resources.

C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1972.
PHOTOS: Aerial-VIMS 30Apr73 YK-2 30-51; VIMS 27Oct73 YK-2 52-72.
BENNETT CREEK TO YORK POINT, YORK COUNTY, VIRGINIA

SECTOR 3

(Maps 2A, 2B, 2C, 3A, 3B, 3C, 4A, 4B, 4C)

EXPOSED: There is a 750-foot wide channel which runs from the mouth of the Poquoson River to Buoy "2" where it joins the York River Channel. Depths range from 16 feet near the Poquoson River to 30 feet near the York River Channel.

WIND AND SHE EXPOSURE: There is no one shore orientation for the segment. Chisman Creek basically lies S - W, the Poquoson River lies SW - NE, and Ship Point trends W - S. The shore zone is narrow. From off of Calthrop Neck to the mouth of the Poquoson River there is a 500-yard wide, 10-foot deep, channel.

WATER QUALITY: Intermediate.

PRESENT SHORE EROSION SITUATION: There are a few sites where concrete rubble riprap has been employed. In most cases the structures are used for cosmetic purposes or to abate boat wake erosion, the latter being particularly so in housing development canals. Again, between Griffins Beach and Hunts Point and between Hodges Cove and Ship Point the structures are in response to definite erosion problems. Most of the bulkheading and riprapping is doing an effective job in retaining backfill or reducing boat wake erosion. Those structures in the areas of definite erosion problems are moderately effective. Extreme exposure and limited sand supply will continue to make them marginally effective.

Suggested Action: Except in the previously defined areas of erosion, installation of structures should be discouraged unless a definite need is established. Rather, the encouragement of natural marsh grasses through transplanting and fertilizing should be implemented. Even in relatively high energy areas such as between Hodges Cove and Ship Point, existing stands of marsh grass have done an excellent job of preventing erosion. In those areas such as some of the narrower housing development canals where grasses might prove impractical, placed riprap stone and filter cloth is recommended. In most cases this variegated face is more effective in reducing wave energy than bulkheading. Also, it provides numerous shelters for crabs, small fishes, and other marine organisms, and has the ability to relieve ground water pressure more readily than bulkheading. Even within these canals a natural stand of supratidal marsh grasses will tend to grow along the fastland near the canal. Rather than being considered an eyesore, the root systems of these grasses and trees act to hold the soil in place.

OTHER SHORE STRUCTURES: There are numerous piers along the shore of this segment. The predominant type of structure is wooden bulkheading. There are a few sites where concrete rubble riprap has been employed. In most cases the structures are used for cosmetic purposes or to abate boat wake erosion, the latter being particularly so in housing development canals. Again, between Griffins Beach and Hunts Point and between Hodges Cove and Ship Point the structures are in response to definite erosion problems. Most of the bulkheading and riprapping is doing an effective job in retaining backfill or reducing boat wake erosion. Those structures in the areas of definite erosion problems are moderately effective. Extreme exposure and limited sand supply will continue to make them marginally effective.

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PHOTOS: Aerial-VIMS 30Apr73 YK-3 73-185.
Ground - VIMS 4Feb74 YK-3 156-164.
EXTENT: 116,640 feet (22.1 mi.) from York Point to the western shore of the Thoroughfare. It includes Back Creek, the Goodwin Islands, Cleatson Creek, Bay Tree Creek, and the intervening shore.

SHORELANDS TYPE
FASTLAND: Entirely low shore.

SHORE: The shore zone consists mainly of two types of marsh, fringing and extensive. The major portions of extensive marsh occur at the Goodwin Islands, 206 acres, and Bay Tree Marsh, 252 acres. With the exception of a few small pocket beaches and those portions artificially stabilized, the rest of the shore is fringe marsh. The small pocket beaches occur along the western side of the Thoroughfare near Goodwin Neck Estates and in front of Bay Tree Marsh from York Point to Green Point.

BEACH: For the most part, the nearshore zone is intermediate except off the southeast side of Tue Point where the nearshore zone is wide and in excess of 2,600 yards. Between the Goodwin Islands and Goodwin Neck, through the Thoroughfare, there is a 1,700-yard wide, 60-foot wide, and 4-foot deep, dredged channel. This connects to a deeper natural channel which enters Poquoson Bay to the York River. A branch of this natural channel extends approximately one-half mile up into Back Creek.

Fastland: The primary use of this segment is residential (95%) with a small section of Back Creek being used for commercial (3%) and industrial (2%) purposes. The Goodwin Islands are not used at the present.

Present shore erosion situation:

PRESENT SHORE EROSION SITUATION
EROSION RATE: Portions of the shore within this segment have undergone severe erosion. Overall the segment has lost approximately 360 acres of land in the last 100 years. That being most severely eroded (3.9 ft/yr.) is the portion between York Point and Green Point. Here the overall shoreline retreat ranges from 200 feet to almost 350 feet. In this same 100-year span the Goodwin Islands have lost approximately 110 acres.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Of this segment, 5,670 feet of the shoreline is protected. Of this, 5,600 feet is bulkheaded, with the remainder being riprapped. Except for the structures along the Thoroughfare and at York Point, the purpose of the structures is cosmetic and in and around marinas to prevent boat wake erosion. All structures are working well.

Suggested Action: Except in those areas which display a definite erosion problem, cosmetic bulkheading should be discouraged. The natural fringe provides good erosion protection in addition to providing natural water cleansing.

OTHER SHORE STRUCTURES: None.

Potential use enhancement: Low. Every attempt should be made to preserve the natural state of the marshes. Upland areas should be used to meet the growing demand for suburban housing.


Photos: Aerial-VIMS 30Apr73 YK-4 153-233; VIMS 10Sep73 YK-4 454-465.

SHORELANDS TYPE
EXTENT: 61,240 feet (11.6 mi.) from the Thorofare to Yorktown Creek. Includes the tidal creek shoreline of Wonnley Creek (4.9 mi.).

SHORELANDS USE
FASTLAND: One mile of the York River portion of Goodwin Neck is low shore. The rest of the shoreline ranges from moderately low shore to high shore, characterized by a cliff immediately behind the shore zone. These cliffs range from 10 feet, near the American Oil Pier, to 60 feet, near the Yorktown Battlefield shore.
SHORE: The dominant feature of this zone is the high shore, characterized by a cliff immediately behind the shore zone. These cliffs range from moderate low shore to high shore, characterized by a cliff immediately behind the shore zone. These cliffs range from 10 feet, near the American Oil Pier, to 60 feet, near the Yorktown Battlefield shore.
NEABSHORE: The nearshore ranges from narrow, sandy bottom, except near the Thorofare where there is a fringemarsh. The other portion is protected by bulkheading. Except at Wonnley Creek marina, this bulkheading is cosmetic.
WASHSHORE: Near the residence at the end of Yorktown, the shore is a sandy bottom, except near the Thorofare where the bottom is soft sandy-mud.

PRESENT SHORE EROSION SITUATION
BEACH QUALITY: The beach of Yorktown is good. Sand is clean, the beach is wide and it is relatively long. The beaches on Goodwin Neck are small and thin but generally clean. At present they are used primarily for private recreational purposes, but with enhancement they could be expanded to support higher density recreational use.
FLOOD HAZARD: Low, noncritical, for most of the segment, as structures are above the maximum range of the projected 100-year storm. High, critical, for the outer sections of Goodwin Neck and the business section of Yorktown, which are threatened by the projected 25 and 100-year flood levels.
WATER QUALITY: Satisfactory.
BEACH QUALITY: The beach of Yorktown is good. Sand is clean, the beach is wide and it is relatively long. The beaches on Goodwin Neck are small and thin but generally clean. At present they are used primarily for private recreational purposes, but with enhancement they could be expanded to support higher density recreational use.

PRESENT SHORE PROTECTION STRUCTURES
OFFSHORE: The offshore zone is also used extensively for commercial shellfishing. There is also extensive recreational boating and sport fishing during the appropriate seasons. Recreational boating during the summer months is particularly heavy. In the deep portions of the York River Channel, again according to the season, there is heavy oysterfishing. Throughout the year numerous Navy ships and oil tankers use the York River Channel to supply and re-supply the Naval Weapons Station and the Goodwin Neck Tank Farm.
WIND AND SEA EXPOSURE: The shore is basically oriented E - W. Patches are NW - 2 miles, N - 2 miles, NE - 6 miles, and E - 20 miles.

OWNERSHIP: Private - 62%; Federal - 30%, City - 8%.
ZONING: Commercial, Residential, Industrial, Federal, and City.
30 bulkhead installations. The 660 feet of stone bulkhead in front of Cornwallis' Cave is being undercut. Between Wormley Creek and the Thoroughfare there are 20 bulkheads in various states of disrepair. Within Wormley Creek there are eight well-constructed bulkheads used primarily for cosmetic purposes.

Suggested Action: To avert additional damage, the York River bulkheads should be either replaced or repaired. Those individuals whose bulkheads are destroyed or in disrepair might consider the use of properly placed, adequate size riprap, if they are only concerned with stopping erosion. However, the enhancement of a beach in this area would require groins. Due to the extensive amount of shoreline protection in this segment and that a significant amount of the beach sand is supplied by local sources of erosion, only properly designed and constructed groins would be of any value.

OTHER SHORE STRUCTURES: There are two large piers, one at the Coast Guard Reserve Training Center and the other services the large tankers at AMOCO Tank Farm. The VECPO Power Station has two large sheet pile jetties, used as an intake duct. The concrete piling and platform, in Yorktown, support the Wharf Restaurant and the Yorktown Post Office. The George P. Coleman Bridge, world's largest double-swing, single-span bridge, is found in this segment. There are several old piers and unused pilings near a boat ramp in Yorktown.

POTENTIAL USE ENHANCEMENT: The section of this segment with the most potential for full and increased use of its shoreline is the Yorktown area. At present it is one of only two public recreational beaches on the Peninsula. The ever-increasing suburban population of York County and the Peninsula will demand adequate, safe and accessible public beaches. Two of these criteria, however, are not being fully met. Certain portions of the Yorktown beach are not safe for average swimmers, in particular, the area near the Yorktown Post Office. Here the bottom drops off to deep water quickly and quite close to the shore. Besides this hazard, during the high velocity portions of the tidal cycle strong offshore currents are present. A restricted and guarded swimming area should be established starting 400 feet east of the post office. This roped off area should extend to approximately the 8-foot contour. This would also alleviate the hazard of boaters straying close to a heavily used swimming area.

The other problem is not as easily remedied. It represents a problem throughout Yorktown, access and parking, the latter being the most serious. No easy solution is apparent without a redesign of the downtown portion of Yorktown. Due to the present limited parking, people in their desire to use the beach and commercial facilities are forced to park anywhere they can. Many times these are not the safest areas. Two possible, although expensive, solutions would be to build a multilevel parking ramp against the bluff, and/or to tunnel into the bluff and provide underground parking. The solution to the access problem is directly tied to the solution of the parking problem.

Other increased use facilities which might be considered are a fishing pier, a service marina, a boardwalk, a nature walk on Yorktown Creek, bicycle facilities, etc. The employment of a professional coastal zone development planner is recommended, not only to use the area more efficiently under present demands but also to meet the extreme demands that will be placed upon Yorktown during the Bicentennial Celebration. If properly prepared the Yorktown area could serve as a model of a well thought out tourist and recreational facility. This would not only meet the increased demands of the tourists but more adequately serve the resident population.


Ground - VIMS 1Jun73 YK-5 81-127; VIMS 28Aug73 YK-5 128-151.
SHORELANDS TYPE

FASTLAND: Moderately low shore 36% (1.9 mi.), low shore 34% (1.7 mi.), and moderately high shore 30% (1.4 mi.). The fastland is characterized at the shore by a 10 to 20-foot bluff, except at and near the entrances to the small tidal creeks.

SHORE: At those points along the Colonial National Historical Park section of the subsegment are protected by the entrance to Ballard Creek. There are also several cracks through the seawall which would have to be repaired before backfilling could be held within the structure. To prevent the associated problems of nailing dissimilar types of structures and materials, consideration should be given to replacing the jeopardized seawall by Yorktown Creek with riprap and filter cloth. A system of shoreline defense structures possibly incorporating riprap should be designed for the beach adjacent to Yorktown Creek.

OTHER SHORE STRUCTURES: The only other shore structures present are the two large piers at the Naval Weapons Station pier. The large closed pier encompasses a section of the York River approximately 2200 feet by 1500 feet and the second singular pier extends approximately 1500 feet out into the York.

POSSIBLE USE ENHANCEMENT: Low. Restricted access as well as the extensive amount of ripraping do not allow increased use of the shore zone. The Colonial National Historical Parkway has maximized the use of the unrestricted portions of the subsegment.

These sections of riprap are all large, placed stone. The next section of riprap, about 200 feet of small stone, starts approximately 200 yards down river from the Naval Weapons Station pier. The entrance to Ballard Creek is protected by approximately 500 feet of large stone riprap. Beginning at the south flank of Ballard Creek entrance, along the York River Cliffs and to the previously mentioned seawall, there is approximately 2200 feet of heavy stone riprap.

Suggested Action: The seawalled section of this subsegment is the only portion which could be strengthened. The center portion of it has been breached and recently replaced with concrete bags. The bags appear to be working but because they are not secured to each other by any other means than weight and cohesion by the set cement, large wind generated waves during high water storm conditions could breach the structure again. The entire length of seawall has not been backfilled and has allowed some flanking on its southern end. There are also several cracks through the seawall which would have to be repaired before backfilling could be held within the structure. To prevent the associated problems of nailing dissimilar types of structures and materials, consideration should be given to replacing the jeopardized seawall by Yorktown Creek with riprap and filter cloth. A system of shoreline defense structures possibly incorporating riprap should be designed for the beach adjacent to Yorktown Creek.

OTHER SHORE STRUCTURES: The only other shore structures present are the two large piers at the Naval Weapons Station pier. The large closed pier encompasses a section of the York River approximately 2200 feet by 1500 feet and the second singular pier extends approximately 1500 feet out into the York.

POSSIBLE USE ENHANCEMENT: Low. Restricted access as well as the extensive amount of ripraping do not allow increased use of the shore zone. The Colonial National Historical Parkway has maximized the use of the unrestricted portions of the subsegment.

These sections of riprap are all large, placed stone. The next section of riprap, about 200 feet of small stone, starts approximately 200 yards down river from the Naval Weapons Station pier. The entrance to Ballard Creek is protected by approximately 500 feet of large stone riprap. Beginning at the south flank of Ballard Creek entrance, along the York River Cliffs and to the previously mentioned seawall, there is approximately 2200 feet of heavy stone riprap.

Suggested Action: The seawalled section of this subsegment is the only portion which could be strengthened. The center portion of it has been breached and recently replaced with concrete bags. The bags appear to be working but because they are not secured to each other by any other means than weight and cohesion by the set cement, large wind generated waves during high water storm conditions could breach the structure again. The entire length of seawall has not been backfilled and has allowed some flanking on its southern end. There are also several cracks through the seawall which would have to be repaired before backfilling could be held within the structure. To prevent the associated problems of nailing dissimilar types of structures and materials, consideration should be given to replacing the jeopardized seawall by Yorktown Creek with riprap and filter cloth. A system of shoreline defense structures possibly incorporating riprap should be designed for the beach adjacent to Yorktown Creek.

OTHER SHORE STRUCTURES: The only other shore structures present are the two large piers at the Naval Weapons Station pier. The large closed pier encompasses a section of the York River approximately 2200 feet by 1500 feet and the second singular pier extends approximately 1500 feet out into the York.

POSSIBLE USE ENHANCEMENT: Low. Restricted access as well as the extensive amount of ripraping do not allow increased use of the shore zone. The Colonial National Historical Parkway has maximized the use of the unrestricted portions of the subsegment.

These sections of riprap are all large, placed stone. The next section of riprap, about 200 feet of small stone, starts approximately 200 yards down river from the Naval Weapons Station pier. The entrance to Ballard Creek is protected by approximately 500 feet of large stone riprap. Beginning at the south flank of Ballard Creek entrance, along the York River Cliffs and to the previously mentioned seawall, there is approximately 2200 feet of heavy stone riprap.

Suggested Action: The seawalled section of this subsegment is the only portion which could be strengthened. The center portion of it has been breached and recently replaced with concrete bags. The bags appear to be working but because they are not secured to each other by any other means than weight and cohesion by the set cement, large wind generated waves during high water storm conditions could breach the structure again. The entire length of seawall has not been backfilled and has allowed some flanking on its southern end. There are also several cracks through the seawall which would have to be repaired before backfilling could be held within the structure. To prevent the associated problems of nailing dissimilar types of structures and materials, consideration should be given to replacing the jeopardized seawall by Yorktown Creek with riprap and filter cloth. A system of shoreline defense structures possibly incorporating riprap should be designed for the beach adjacent to Yorktown Creek.

OTHER SHORE STRUCTURES: The only other shore structures present are the two large piers at the Naval Weapons Station pier. The large closed pier encompasses a section of the York River approximately 2200 feet by 1500 feet and the second singular pier extends approximately 1500 feet out into the York.

POSSIBLE USE ENHANCEMENT: Low. Restricted access as well as the extensive amount of ripraping do not allow increased use of the shore zone. The Colonial National Historical Parkway has maximized the use of the unrestricted portions of the subsegment.
KING CREEK AND FELGATES CREEK,
YORK COUNTY, VIRGINIA
SUBSEGMENT 6B (Maps 6A, 6B, 6C and 7A, 7B, 7C)

EXTENT: 51,200 feet (9.6 mi.), tidal creek shoreline of King Creek and Felgates Creek.

SHORELANDS TYPE
PASTLAND: Moderately low shore.
SHORE: Embayed marsh (80%), fringe marsh (15%), and beach (5%).
CREEK: Shallow, shifting shoals at entrance.

SHORELANDS USE
PASTLAND: The north shore of King Creek is used by the Naval Supply Depot (Cheatham Annex).
The south shore and Felgates Creek are used by Yorktown Naval Weapons Station.
SHORE: Used entirely by Cheatham Annex and the Naval Weapons Station.
CREEK: Crabbing and some fishing.

WIND AND SEA EXPOSURE: The shoreline of King Creek trends SW – NE. Felgates Creek trends S – N.

OWNERSHIP: Federal.
ZONING: Federal.

FLOOD HAZARD: Low, non-critical. Buildings and presently used land are situated well above projected flood levels.

WATER QUALITY: Unsatisfactory.

BEACH QUALITY: There are no beaches in this subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight to none, non-critical.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: Present use by Cheatham Annex and the Naval Weapons Station precludes any changes or suggestions for change.
CAMP PEARLY AND CHEATHAM ANNEX,
YORK COUNTY, VIRGINIA
SUBSEGMENT 60 (Maps 7A, 7B, 7C and 8A, 8B, 8C)

EXTENT: Approximately 137,280 feet (26 mi.) from
SHORELANDS TYPE
King Creek to Skimino Creek. Includes tidal creek
EXTENDING: There is one large bar offshore. It
shoreline of Skimino Creek and Carter
begins 2,200 yards offshore of the mouth
Creek, but not Queen Creek.

SHORELANDS TYPE
FASTLAND: Mostly low shore (23 mi.), and some
EXTENT: Approximately 137,280 feet (26 mi.) from
moderately high shore (2.5 mi.). The moderately
King Creek to Skimino Creek. Includes tidal creek
high shore forms a 20-foot cliff at the shore­
SHORE: Entirely controlled by Camp Peary Naval
line.
Reservation and Cheatham Annex. Occasional
SHORE: Fringe marsh (7 mi.) and embayed marsh
military residences occupy the fastland but
(2.4 mi.) make up the majority of the shore
there are also several small pocket
type. There is also 1.2 miles of shoreline
beaches (0.5 mi.) and some artificially stabi­
fronting Ferry Point, which is an extensive
lized shoreline (0.8 mi.).
marsh. There are also several small pocket
WEARHOUSE: Intermediate width. Ranging from
beaches (0.5 mi.) and some artificially stabi­
600 yards off Penniman Spit to more than 1,500
lized shoreline (0.8 mi.).
yards off Carter Creek. It is generally char­
OWNSHIP: Federal.
acterized by a gradually sloping, shallow shelf
ZONING: Federal.
with depths ranging from 27 to 53 feet.
FLOOD HAZARD: Low. All structures within the
BREACH QUALITY: Only two beaches of lengths more
subsegment are above predicted flood levels.
than one hundred feet exist within this subseg­
WATER QUALITY: Unsatisfactory.
ment. These are located at the entrance to
FLOOD HAZARD: Low. All structures within the
Skimino Creek and at Penniman Spit at the en­
subsegment are above predicted flood levels.
trance to King Creek. The Skimino Creek beach
SHORE PROTECTIVE STRUCTURES: Four percent
is a narrow, thin, eroding beach fronting the
is 500 yards wide with an average depth of
Perry Point Marsh. It is used by Camp Peary
35 feet. At Queen Creek it is 1,500 yards off­
personnel for recreation. The beach on Penniman
shore and widens to approximately 1,000 yards,
Spit is a clean, narrow beach. The backshore is
with depths ranging from 27 to 53 feet.
thickly vegetated. The extreme end and back­
WIND AND SEA EXPOSURE: The York River portion
side of Penniman Spit is bounded by a small
of this subsegment trends NW - SE, fetches are N -
fringing marsh.
3 miles, NE - 2 miles, E - 3 miles, and SE -
PRESENT SHORE DEGRADATION SITUATION
6 miles. The tidal creeks generally trend E -
EROSION RATE: Slight to moderate, noncritical.
W
The historical rate of erosion for this subseg­
ENDANGERED STRUCTURES: None.
ment is 0.9 to 2.6 feet per year. There are
POTENTIAL USE ENHANCEMENT: Present day use of the
evidences of minor erosion at the mouth of
fastland precludes suggesting any changes in
Skimino Creek and several small sections of
that use.
Camp Pearly and Cheatham Annex shore. These
MAPS: USGS, 7.5 Min.Ser. (Topo.), WILLIAMSBURG
small sections are usually directly behind a
breach in the fringe marsh which bounds the
FOOTNOTE: #445, 1140.000 scale, YORK RIVER,
York River shore of these two installations.
Yorktown to West Point, 1971.
INDENTIFIED STRUCTURES: None.
PHOTOS: Aerial-VIMS 1000ct72 VK-60 370-371, 374,
SHORE PROTECTIVE STRUCTURES: Four percent
376, 380, 384;
(5,500 ft.) of the shoreline is artificially
VIMS 2700ct72 VK-60 369, 372, 375,
stabilized. There is one, 75-foot long, con­
375, 377-379, 381-384, 386, 387;
cy concrete rubble groin, flanking the south side
VIMS 1039ct73 VK-60 394-421, 426-
of the entrance to Carter Creek. There are two
435.
bulldoos, one protecting a small building on
GROUND - VIMS 24May73 VK-60 1-11, 28-32, 38-48, 54;
the north side of the entrance to Carter Creek
VIMS 17Jun73 VK-60 12-27.
and the other, of approximately 200 feet, pro­
tects the bluff on the south side of the en­
trance to Queen Creek. Another 1,200 feet
of riprap joins the previously mentioned bulkhead
at Queen Creek. Its construction is concrete
rubble, concrete cylinders, and stone. From
Cheatham Annex pier north, approximately 1,500
feet consists of concrete rubble and large
stones.
All structures except one are working well.
The bulkheading on the south bank of the entrance
to Queen Creek has several boards missing, is not
backfilled, and is not properly tied to the rip­
rap or the bluff.
Suggested Action: The few instances of un­
checked erosion which exist behind breaches in
the fringe marsh do not at this time present a
serious problem. If action was taken, planting
of marsh grass in the breaches would be the
cheapest and easiest solution. If conventional
techniques were used, large stone riprap
probably would be the most effective. It also
appears that much of the erosion is caused by land run­
off rather than being entirely due to wave action
at high water.
OTHER SHORE STRUCTURES: There are two open pile
piers (2,800 ft. and 2,600 ft.) extending from
the Cheatham Annex section of the subsegment,
and several small fish traps along the Camp
Peary section of the shore.

YEARNOURSH: The nearshore zone is used exten­
sively for commercial fishing. Heavy crabbing,
gill netting, and pound netting are employed
along the entire extent of this subsegment.
Sport fishing is also popular along this sub­
segment.
OPENHOUR: There is one large bar offshore. It
begins 2,200 yards offshore of the mouth
of Skimino Creek and extends to approximately 200
yards off of Beaver Dam Swamp. The York River
Channel varies from 2,200 yards off the mouth
of Skimino Creek to 900 yards off Penniman Spit.
From Skimino Creek to off Queen Creek the chan­
el is 500 yards wide with an average depth of
35 feet. At Queen Creek it is 1,500 yards off­
shore and widens to approximately 1,000 yards,
with depths ranging from 27 to 53 feet.

VIMS 17Jun73 VK-60 12-27.
W

SHORELANDS USE
FASTLAND: The entire extent of this subsegment
is taken up by the Camp Pearly Naval
Reservation and the U.S. Naval Supply Center, Cheatham
Annex.
OWNERSHIP: Entirely controlled by Camp Pearly Naval
Reservation and Cheatham Annex. Occasional
military residences occupy the fastland but
there are no accesses to the shore fronting the York
River. The southern shore, at the mouth
of Skimino Creek, is utilized as a picnic area
and recreational beach for Camp Pearly military
personnel. Also at Cheatham Annex there are
two large piers used as loading structures.
YEARNOURSH: The nearshore zone is used exten­
sively for commercial fishing. Heavy crabbing,
gill netting, and pound netting are employed
along the entire extent of this subsegment.
Sport fishing is also popular along this sub­
segment.
OPENHOUR: There is one large bar offshore. It
begins 2,200 yards offshore of the mouth
of Skimino Creek and extends to approximately 200
QUEEN CREEK, YORK COUNTY, VIRGINIA
SURVEYMENT 6D (Maps 7A, 7B, 70)

EXTENT: Queen Creek is a tidal creek with approximately 11 miles of shoreline. It is bounded on its north bank by Camp Peary and its south bank by Cheatham Annex.

SHORELANDS TYPE
FASTLAND: The north shore is approximately 5 miles of low shore. The south shore is approximately 4 miles of moderately high shore and 1½ miles of moderately low shore.
SHORE: Queen Creek is an embayed marsh of 580 acres.
CREEK: Long, narrow, tidal creek. The upper portion is shallow, the lower portion supports a maintained small boat channel and provides access to Queen Creek Marina. The channel is marked with day markers.

SHORELANDS USE
FASTLAND: The north shore is entirely government, used by Camp Peary. The south shore fastland is split between Cheatham Annex (3 mi.) and Queens Lake Development (2 mi.).
SHORE: The only section presently used is the Queen Creek Marina (40 slips).
CREEK: The creek is used for crabbing and as an access to Queen Creek Marina.

WIND AND SEA EXPOSURE: Queen Creek trends E - W with the south being the only portion affected by wind waves. Patches are N - 4 miles, NE - 2½ miles, E - 3 miles, and SE - 6½ miles.

OWNERSHIP: Federal - 75%; Private - 25%.

ZONING: Federal - 75%; Residential - 25%, from the county line to the small gut which borders the east side of the Queen Lake development.

FLOOD HAZARD: Medium, critical. The Queen Creek Marina is highly susceptible to flooding by severe storms.

WATER QUALITY: Intermediate.

BEACH QUALITY: There are no beaches within Queen Creek.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or none, noncritical.
No areas of significant erosion were noted, although there were evidences of minor marsh bank erosion, probably due to boat wakes. Historically the channel has changed its course but no data can be given on net loss or gain to the creek areas.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: The only presently maintained shore structures are the bulkheads, piers, and slips at the Queen Creek Marina.
Several old decayed boat slips and piers exist on the Camp Peary shore of Queen Creek. These are in great disrepair and offer only marginal protection to the shore. On the south shore, near the mouth, there is an unexplained pile of concrete rubble which has been dumped on the marsh.

Suggested Action: The increase in demand for shorefront property has and will continue to make Queen Creek a desirable place to live. With this will come an increase in boating activity which leads to increased erosion of the marsh banks by boat wakes. Besides the loss of valuable marsh this erosion accelerates the filling of the creek making it less accessible to boats. Posted and enforced speed limits within the creek should be established.

OTHER SHORE STRUCTURES: Piers.

POSSIBLE USE ENHANCEMENT: Low. The increased number of housing developments should be restricted to upland areas. Every attempt should be made to maintain the marshes in their natural state. Boating facilities should be restricted to one central area, such as Queen Creek Marina. Although this concentrates a potential pollution hazard to a point source, it allows for a managed and guided use of the area. In this way destruction of the marsh areas by the construction of individual dredged canals can be prevented.

PHOTOS: Aerial-VIMS 100ct72 YK-6D 389-393;
4.3 Segment and Subsegment Maps

MAP 2A
BRICK KILN CREEK TO TIN SHELL POINT
TOPOGRAPHY AND CULTURE

Squares 1 and 2
= Segment Boundary
= Subsegment Boundary

LANGLEY AIR FORCE BASE
(Research Center)
MAP 5C
GOODWIN ISLAND TO HUNTS NECK
TOPOGRAPHY AND CULTURE
Segments 4 and 3

USE

Agricultural A
Commercial C
Residential RS
Unmanaged
Unwooded U
Wooded W

OWNERHIP

Private 1

EROSION

Moderate

Slight or No Change No Symbol

Legend:

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

Legend:

Moderate
MAP 6A
YORKTOWN TO GOODWIN NECK
SHORELANDS TYPES
Segment 5

/ = Segment Boundary
| = Subsegment Boundary