<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHAPTER 1: INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>1.1 Purposes and Goals</td>
<td>2</td>
</tr>
<tr>
<td>1.2 Acknowledgements</td>
<td>2</td>
</tr>
<tr>
<td>CHAPTER 2: APPROACH USED AND ELEMENTS CONSIDERED</td>
<td>3</td>
</tr>
<tr>
<td>2.1 Approach to the Problem</td>
<td>4</td>
</tr>
<tr>
<td>2.2 Characteristics of the Shorelands Included</td>
<td>4</td>
</tr>
<tr>
<td>CHAPTER 3: PRESENT SHORELINE SITUATION OF LANCASTER COUNTY</td>
<td>9</td>
</tr>
<tr>
<td>3.1 The Shorelands of Lancaster County</td>
<td>10</td>
</tr>
<tr>
<td>3.2 Shoreline Erosion</td>
<td>10</td>
</tr>
<tr>
<td>3.3 Shore Use Limitations</td>
<td>11</td>
</tr>
<tr>
<td>CHAPTER 4: SUMMARIES, DESCRIPTIONS, AND SEGMENT MAPS</td>
<td>21</td>
</tr>
<tr>
<td>4.1 Segment and Subsegment Summaries</td>
<td>22</td>
</tr>
<tr>
<td>4.2 Segment and Subsegment Descriptions</td>
<td>26</td>
</tr>
<tr>
<td>Segment 1</td>
<td>26</td>
</tr>
<tr>
<td>Segment 2</td>
<td>29</td>
</tr>
<tr>
<td>Segment 3</td>
<td>31</td>
</tr>
<tr>
<td>Segment 4</td>
<td>33</td>
</tr>
<tr>
<td>Segment 5</td>
<td>36</td>
</tr>
<tr>
<td>Segment 6</td>
<td>38</td>
</tr>
<tr>
<td>Segment 7</td>
<td>40</td>
</tr>
<tr>
<td>4.3 Segment and Subsegment Maps</td>
<td>43</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LIST OF ILLUSTRATIONS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIGURE 1: Shorelands Components</td>
<td>5</td>
</tr>
<tr>
<td>FIGURE 2: Marsh Types</td>
<td>5</td>
</tr>
<tr>
<td>FIGURE 3: South of Oyster Creek</td>
<td>12</td>
</tr>
<tr>
<td>FIGURE 4: Windmill Point Marina</td>
<td>12</td>
</tr>
<tr>
<td>FIGURE 5: East of Crab Point</td>
<td>12</td>
</tr>
<tr>
<td>FIGURE 6: Crab Point</td>
<td>12</td>
</tr>
<tr>
<td>FIGURE 7: Mouth of West Branch Carter Creek</td>
<td>12</td>
</tr>
<tr>
<td>FIGURE 8: Groins North of Rogue Point</td>
<td>13</td>
</tr>
<tr>
<td>FIGURE 9: Belmont Creek</td>
<td>13</td>
</tr>
<tr>
<td>FIGURE 10: Horattico - Curletts Point</td>
<td>13</td>
</tr>
<tr>
<td>FIGURE 11: Concrete Groins - Curletts Point</td>
<td>13</td>
</tr>
<tr>
<td>FIGURE 12: Riprap at Curletts Point</td>
<td>13</td>
</tr>
</tbody>
</table>

| TABLE 1: Lancaster County Shorelands Physiography | 20 |
| TABLE 2: Lancaster County Subsegment Summaries | 22 |
| MAPS 1A-F: Lancaster County Summary Maps | 14 |
| MAPS 2A-C: Fleets Bay Area | 43 |
| MAPS 3A-C: Fleets Island | 46 |
| MAPS 4A-C: Cherry Point Area | 49 |
| MAPS 5A-C: Carter Creek | 52 |
| MAPS 6A-C: Eastern Branch Corrotoman River | 55 |
| MAPS 7A-C: Western Branch Corrotoman River | 58 |
| MAPS 8A-C: Towles Point | 61 |
| MAPS 9A-C: Rogue Point Area | 64 |
| MAPS 10A-C: Rocky Neck | 67 |
| MAPS 11A-C: Deep Creek | 70 |
| MAPS 12A-C: Lancaster County | 73 |
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 a discussion of those factors which might significantly limit development of the shorelines and, in some instances, a discussion of some of the potential or alternate uses of the shorelines, particularly with respect to recreational use, since such information could aid potential users in the perception of a segment of the shoreline.

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 21, 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 has been prepared and published with funds provided to the Commonwealth by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, grant number 04-7-158-64041. The Shoreline Situation Report series was originally developed in the Wetlands/Edges Program of the Chesapeake Research Consortium, Inc., as supported by the Research Applied to National Needs (RANN) program of the National Science Foundation. The completion of this report would have been impossible without the expert services of Beth Marshall, who typed several drafts of the manuscript, Bill Jenkins and Ken Thornberry, who prepared the photographs, and Sam White, who piloted the aircraft on the many photo acquisition and reconnaissance flights. Also we thank the numerous other persons who, through their direct aid, criticism, and suggestions, have assisted our work.
CHAPTER 2
Approach Used and Elements Considered
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, shoreline 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 unanswered. 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 groups 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 following 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) Limitations to shore use and potential or alternate 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 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.

For each subsegment there are two length measurements, the shore-nearshore interface or shoreline, and the fastland-shore interface. The two interface lengths differ most when the shore zone is embryoned or extensive marsh. On the subsegment maps, a dotted line represents the fastland-shore interface when it differs from the shoreline. The fastland-shore interface length is the base for the fastland statistics.

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 a contour line representing one and a half times the mean tide range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbol is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 2). 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 has extensive acreage projecting into an estuary or river. An embargoed marsh is a marsh 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 embargoed marsh. The central point of 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, 4 400 ft. (122 m) in width along shores

Extensive marsh

Embargoed marsh, occupying a drowned valley or reentrant

Artificially stabilized

Fastland Zone

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The
physiographic classification of the fastland is based upon the average slope of the land within 400 feet (122 m) of the fastland - shore boundary. The general classification is:

Low shore, 20 ft. (6 m) or less of relief; with or without cliff
Moderately low shore, 20-40 ft. (6-12 m) of relief; with or without cliff
Moderately high shore, 40-60 ft. (12-18 m) of relief; with or without cliff
High shore, 60 ft. (18 m) or more of relief; with or without cliff.

Two specially classified exceptions are sand dunes and areas of artificial fill.

Nearshore Zone

The nearshore zone extends from the shore zone to the 12-foot (MLLW 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 from shore

Subclasses: with or without bars
with or without tidal flats
with or without submerged vegetation

Figure 1
A profile of the three shorelands types.

Figure 2
A plan view of the three 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.

Governmental
Includes lands whose usage is specifically controlled, restricted, or regulated by governmental organizations: e.g., Camp Peary, Fort Story. Where applicable, the Governmental use category is modified to indicate the specific character of the use, e.g., residential, direct military, and so forth.

Recreational 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 wild-

fowl sanctuaries, fish and shellfish conservation

grounds, or other uses that would preclude develop-

ment.

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, wastelands;

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 se-
lection as to the primary or controlling type of usage.
For simplicity and convenience, managed
woodlands are classified as “unmanaged, wooded”
areas.

Shore Zone

Bathing

Boat launching

Bird watching

Waterfowl hunting

Nearshore Zone

Pound net fishing

Shellfishing

Sport fishing

Extraction of non-Living resources

Boating

Water sports

c) Shorelands Ownership Classification

The shorelands ownership classification used
has two main subdivisions, private and governmen-
tal, with the governmental further divided into

federal, state, county, and town or city. Applica-
tion 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.

Water Quality

The water quality sections of this report are

based upon data abstracted from Virginia State
Water Control Board’s publication Water Quality
Standards (November, 1974) and Water Quality
Inventory (105 (b) Report) (April 1978).

Additionally, where applicable, Virginia Bu-

reau of Shellfish Sanitation data is used to as-
sign ratings of satisfactory, intermediate, or

unsatisfactory. These ratings are defined pri-

marily 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 Bu-

reau’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 ac-
ceptable. In these cases an intermediate rating
can be assigned temporarily, and the area will be
permitted to remain open pending an improvement in
conditions.

Although the shellfish standards are somewhat

more stringent than most of the other water quality

standards, they are included because of the eco-

nomic and ecological impacts of shellfish ground

 closures. Special care should be taken not to en-

danger the water quality in existing “satisfactory”

areas.

e) Zoning

In cases where zoning regulations have been

established the existing information pertaining
to the shorelands has been included in the re-

port.

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

damaged.

The degree of erosion was determined by several

means. In most locations the long term trend was
determined using map comparisons of shoreline po-

sitions 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 inspec-

ions and interviews were held with local inhab-

itants.

The existing shoreline defenses were evaluated

as to their effectiveness. In some cases repeti-
tive visits were made to monitor the effective-

ness of recent installations. In instances where

existing structures are inadequate, we have given

recommendations for alternate approaches. Fur-

thermore, recommendations are given for defenses

in those areas where none currently exist. The

primary emphasis is placed on expected effective-

ness with secondary consideration to cost.

Limitations to Shore Use and Potential or

Alternate Shore Uses

In this section we point out specific factors

which may impose significant limits on the type

or extent of shoreline development. This may

result in a restatement of other factors from

elsewhere in the report, e.g., flood hazard or

erosion, or this may be a discussion of some

other factor pertaining to the particular area.

Also we have placed particular attention on the

recreational potential of the shore zone.

The possible development of artificial beach,

erosion protection, etc., influence the evalu-

ation of an area’s potential. Similarly, poten-

tial alternate shore uses are occasionally noted.
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. In Shoreline Situation Reports of counties that have had marsh inventories, the marsh number is indicated, thus allowing the user of the Shoreline Situation Report to key back to the formal marsh inventory for additional data. The independent material in this report is provided to indicate the physiographic type of marsh land and to serve as a rough guide to marsh distribution, pending a formal inventory. Additional information on wetland characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 2, by C.H. Silberhorn, G.H. Davies, and T.A. Barnard, Jr., SNAMSE No. 46, 1974, and in other VIMS publications.

i) Flood Hazard Levels

The assessment of tidal flooding hazard for the whole of the Virginia tidal shoreline 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 judgment based upon considerations such 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 Shoreline Situation of Lancaster County

3.1 The Shorelands of Lancaster County

Lancaster County is situated on the southern tip of Virginia’s Northern Neck at the mouth of the Rappahannock River. The county is bounded by Richmond and Northumberland Counties on the north, the Rappahannock River on the west and south, and the Chesapeake Bay on the east. In addition to the Rappahannock River and Chesapeake Bay, there are numerous smaller rivers, creeks, and bays, most notably the Corrotoman River and Fleets Bay, included within Lancaster’s 167 square miles. Kilmarnock, Irvington, and White Stone are the major population centers serving this predominately rural area. According to the Lancaster County Tidal Marsh Survey (G.M. Silberhorn, 1973, Special Report Number 45 in Applied Marine Science and Ocean Engineering, Virginia Institute of Marine Science), the county contains at least 212 marshes of ¼ acre or larger totaling 1,190 acres. The shoreline, as measured on U.S. Geological Survey 1:24,000 scale topographic maps, is 276.9 miles long. The fastland-shore zone boundary is slightly longer, 288.9 miles.

Geographically, the fastland of Lancaster County is typical of the Coastal Plain areas, the shorelands being basically flat along the bay with higher elevations along the Rappahannock River and its tributaries. Fifty-three percent of the fastland is low shore, thirty percent is moderately low shore, and less than five percent is moderately high shore. Twelve percent of the total is bluff. Although five percent of the shore zone is artificially stabilized, less than one percent of the fastland bordering on the shore is artificial fill. Most of the shore (86%) is marsh, including fringing, embayed, and extensive marshes. Only nine percent is beach. Three tenths of the nearshore zone are on narrow or shallow creeks and are unclassified. Of the classified nearshore areas, most are narrow.

Along the shoreline, all of the fastland is privately owned. Use is classified as 20% residential, 20% agricultural, 1% commercial, and less than 1% industrial. The remaining 51% is considered unmanaged, wooded (43%) or unwooded (8%), meaning that the land is not subjected to day to day human trespass. With a slight variation, the distribution of shorelands use appears to reflect the entire county’s land use. The variation is a greater residential use along the shore with a parallel decrease in the local percentage of agricultural and unmanaged land. The shore areas classified as commercial or industrial are generally marinas, boatyards, or other water oriented businesses.

Lancaster County is experiencing a rapid growth in the demand for waterfront land as sites for second or vacation homes. The county’s pleasant rural character, coupled with its outstanding water access, make it a highly desirable place for vacation or retirement retreats. This accelerated demand for waterfront land is in part responsible for the great interest in shoreline problems.

The area from Mosquito Point up the Rappahannock River to Towles Point, including the Towns of Irvington and Weems on Carter Creek and much of the shore of the Corrotoman River system, bears the bulk of the shoreline development. Generally, the more exposed portions of this shore are bluffs, thus protecting houses and such from damage due to high waters and affording outstanding views of the river. Much of the lower land is protected from attack by larger waves and provides excellent access to the water.

3.2 Shore Erosion Situation

Shoreline erosion is a problem of generally moderate concern to the citizens of Lancaster County. According to Byrne and Anderson (1977), Shoreline Erosion in Tidewater Virginia, Special Report Number 111 in Applied Marine Science and Ocean Engineering, Virginia Institute of Marine Science, 102 pages), the average historical erosion rate along the county’s shoreline is 0.7 feet per year. Byrne’s and Anderson’s report is for 188 miles of Lancaster’s shore and utilizes 86 to 97 years of data. As might be expected, there is a considerable difference between the erosion regimes along the Chesapeake and along the rivers. The average rate of shoreline retreat along the river was 1.7 feet per year whereas, along the rivers, the rate was 0.6 feet per year. Normalizing the data to a 100-year period, 792 acres were eroded from the 43 miles of Bay shore and 561 acres from the 125 miles of river shore. In terms of smaller shoreline reaches, the greatest average erosion rates were 7.9 feet per year between Windmill and North Points, and 6.6 feet per year between Cymers and Mosquito Creeks. Along the Corrotoman and Rappahannock Rivers, average erosion rates of individual reaches ranged down from 5.1 feet per year.

Although erosion and deposition are of major concern to the owners and users of shorefront property, they are problems which confront every taxpayer. Lands removed by erosion may be lost from the tax lists. Harbors and channels, which are filled by sediment, require dredging at public expense. Sediments also can cover productive oyster grounds.

Although shoreline erosion is a locally severe problem in the county, there are no unusually complex problems in shore protection. Whereas some individual structures are unsuccessful or are failing, most attempts at shoreline stabilization have been somewhat successful.

Because erosion of the bluffs is caused both by attack from waves and by upland runoff, measures to decrease runoff caused erosion should not be forgotten. Firmly rooted vegetation on the bluff crest and face can be highly effective at limiting erosion and trapping sediment. Leaving a “green zone” between plowed areas and the bluff crest and plowing parallel to the bluff are practices that
should be encouraged. Also, foot traffic along the bluff faces should be discouraged.

As always, the choice of particular shore protection methods depends upon local conditions. Expert advice should be sought before contracting for any shore protection. Inappropriate methods, as well as being unsuccessful, may accentuate problems either at or near their location. Improperly constructed structures, although cheaper in the initial construction, may require more maintenance or earlier replacement.

3.3 SHORE USE LIMITATIONS

There are few hidden limitations to the uses of Lancaster's shorelands. As noted in the Subsegment Descriptions, the very low-lying areas are subject to storm flooding so any necessary construction or development should be designed to be flood resistant. Anyone initiating new construction along the unstabilized, rapidly eroding areas should be aware of the erosion problem and either set the structure back from the shoreline or plan on the expense of shore protection. As there are valuable shellfishing grounds near Lancaster's shore, care should be taken to be sure that shoreline development does not result in unacceptable closures of the shellfish grounds.

Most other shore use limitations are social, in the form of zoning or subdivision ordinances.
FIGURE 8. Concrete bag groins north of Rogue Point, Subsegment 5B. These structures have been effective in trapping good buffer beaches.

FIGURE 9. Belmont Creek, Subsegment 6A. The area is protected by bulkhead and a groin system. Erosion due to downhill rain runoff is continuing along the bluffed portion.

FIGURE 10. Morattico - Curleltts Point, Subsegment 7B. The river-fronting shoreline is bulkhead, with several effective groins.

FIGURE 11. Curleltts Point area, Subsegment 7B. A closeup of concrete-filled culverts, placed to act like a groin. Notice the nice sand beach which has been captured by the structure.

FIGURE 12. Morattico - Curleltts Point, Subsegment 7B. The riprap appears to be effective. The concrete culverts have been placed parallel to the shoreline, like a bulkhead. The structure's distance from the fastland indicates that it is not very effective. Riprap has been placed underneath the pier to act like a groin.
<table>
<thead>
<tr>
<th>Subsegment</th>
<th>ARTIFICIAL</th>
<th>FILL</th>
<th>LOW SHORE</th>
<th>LOW SHORE WITH BLUFF</th>
<th>MODERATELY LOW SHORE</th>
<th>MODERATELY HIGH SHORE</th>
<th>MODERATELY HIGH SHORE WITH BLUFF</th>
<th>NEARSHORE</th>
<th>FASTLAND USE</th>
<th>OWNERSHIP</th>
<th>TOTAL MILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>0.1</td>
<td>10.8</td>
<td>0.2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1B</td>
<td>1.9</td>
<td>16.6</td>
<td>0.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1C</td>
<td>0.1</td>
<td>11.7</td>
<td>0.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1D</td>
<td>11.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2A</td>
<td>10.7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2B</td>
<td>18.9</td>
<td>17.4</td>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3A</td>
<td>16.1</td>
<td>17.6</td>
<td>2.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3C</td>
<td>19.6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4A</td>
<td>20.8</td>
<td>21.9</td>
<td>5.8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4B</td>
<td>20.3</td>
<td>19.6</td>
<td>5.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4C</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4D</td>
<td>20.0</td>
<td>19.4</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5B</td>
<td>20.0</td>
<td>19.4</td>
<td>1.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14A</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14B</td>
<td>20.0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>133</td>
<td>153.6</td>
<td>9.5</td>
<td>86.0</td>
<td>23.9</td>
<td>11.3</td>
<td>3.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

% of FASTLAND 0% 5% 3% 30% 8% 4% 1%
% of SHORELINE 5% 9% 69% 12% 4% 13% 10% 1%
CHAPTER  4

4.1 Table of Subsegment Summaries
4.2 Segment and Subsegment Descriptions
4.3 Segment and Subsegment Maps
### TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR LANCASTER COUNTY, VIRGINIA

<table>
<thead>
<tr>
<th>SUBSEGMENT</th>
<th>SHORELAND TYPE</th>
<th>FLOOR SAVAGE</th>
<th>WATER QUALITY</th>
<th>BEACH QUALITY</th>
<th>SHORE EROSION SITUATION</th>
<th>ALTERNATE SHORE USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A INDIAN CREEK (1.1 miles of eastland)</td>
<td>POSTLAND: Artificial fill 1%, low shore 97%, and low shore with bluff 2%; SHORE: Artificially stabilized 2%, brush 4%, fringe marsh 91%, and submerged 7%; HEARSE: Narrow 24% and intermediate 35%</td>
<td>POSTLAND: Agricultural 48%, industrial 21%, residential 21%, unmanaged, wooded 4%, and unmanaged, wooded 3%; SHORE: Brush 4%, fringe marsh 31%, and submerged 9%</td>
<td>Good, Most of the beaches are fairly wide and clean in this subsegment.</td>
<td>High, noncritical. Most of the shoreline has elevations of 5 feet or less one would be flooded during periods of abnormally high water.</td>
<td>Slight or no change for the Indian Creek portion. High, noncritical for the section of land between Indian and Dymer Creeks.</td>
<td>Low. Due to the rural nature of the area, there seems to be little demand for public recreational facilities.</td>
</tr>
<tr>
<td>1B DUNES CREEK AND CRAB ISLAND (3.0 miles of eastland)</td>
<td>POSTLAND: Artificial fill 1%, low shore 99%, and low shore with bluff 2%; SHORE: Artificially stabilized 4%, brush 4%, fringe marsh 91%, and submerged 7%; HEARSE: Narrow 24% and intermediate 35%</td>
<td>POSTLAND: Industrial 67%, industrial 21%, residential 21%, unmanaged, wooded 11%, and unmanaged, wooded 9%; HEARSE: Some private recreational use, but mostly unused; HEARSE: Sport hunting, fishing, and some shellfishing</td>
<td>Good, Most of the beaches are fairly wide and clean in this subsegment.</td>
<td>High, critical. The majority of the shoreline has elevations of 5 feet or less, with many structures located along it. There is a possibility of the shoreline being inundated during periods of abnormally high water.</td>
<td>Slight or no change for the portion of the subsegment which has narrow, strip beaches.</td>
<td>Low. The county zoning ordinances prohibit commercial or industrial use of the shore. This area is still basically rural and there seems little demand for public recreational facilities in the near future.</td>
</tr>
<tr>
<td>1C TAHOE CREEK (12.0 miles of eastland)</td>
<td>POSTLAND: Artificial fill 4%, low shore 97%, and low shore with bluff 2%; SHORE: Artificially stabilized 4%, brush 48%, fringe marsh 77%, and submerged 13%; HEARSE: Narrow 24% and intermediate 35%</td>
<td>POSTLAND: Agricultural 43%, residential 21%, and unmanaged, wooded 20%; HEARSE: Some private recreational use, but mostly unused</td>
<td>Slight or no change for sevical, noncritical. The major average historical erosion rate for the low-fronting shoreline is 5 to 6 feet per year.</td>
<td>High, noncritical for most of the subsegment. High, critical for some structures built below the 5-foot contour along the low-fronting shoreline.</td>
<td>Slight or no change for the entire subsegment. There are approximately 1,000 feet of artificially stabilized shoreline in the subsegment. Most structures appear to be for cosmetic purposes rather than for erosion control.</td>
<td>Low. There seems little demand for further or alternate development of this subsegment.</td>
</tr>
<tr>
<td>1D ARTIFICIAL ISLAND (11.7 miles of eastland)</td>
<td>POSTLAND: Entirely low shore; SHORE: Artificially stabilized 35%, brush 35%, and submerged 30%; HEARSE: Fishing, shellfishing, hunting, and other water sports.</td>
<td>POSTLAND: Commercial 8%, residential 21%, and unmanaged, wooded 31%, and unmanaged, wooded 4%; HEARSE: Private recreational and commercial use.</td>
<td>Slight or no change for noncritical. The average historical rate of erosion from South Point to the Kinhikiki Point Marine is 2.5 to 7 feet per year. There are numerous shore protection structures, most of which are effective.</td>
<td>High, critical. There are two elevations below 5-foot elevations and would be inundated during periods of abnormally high water.</td>
<td>Slight or no change for sevical, noncritical. The average historical rate of erosion from South Point to the Kinhikiki Point Marine is 2.5 to 7 feet per year. There are numerous shore protection structures, most of which are effective.</td>
<td>Low. The rural-agricultural nature of the subsegment seems best suited for the area, and any residential development would be at the expense of the agricultural lands. There seems little demand for public recreational facilities at the present time.</td>
</tr>
<tr>
<td>1E PLENTY ISLAND (26.6 miles of eastland)</td>
<td>POSTLAND: Entirely low shore; SHORE: Artificially stabilized 17%, brush 10%, fringe marsh 33%, and submerged 43%; HEARSE: Narrow 45% and intermediate 35%;</td>
<td>POSTLAND: Agricultural 45%, industrial 21%, residential 21%, unmanaged, wooded 4%, and unmanaged, wooded 3%; SHORE: Brush 4%, fringe marsh 31%, and submerged 9%</td>
<td>Slight or no change for sensitive, noncritical. The average historical rate of retreat has been 0.07 feet per year. There are several areas of effective artificial stabilization in this subsegment, except for one grade field at the south of Kinhikiki Point, which is being filled.</td>
<td>High, critical. Several structures in the subsegment, especially along Windmill Point and Little Dymer Creeks, would be flooded during periods of abnormally high water.</td>
<td>Slight or no change for moderate, noncritical. The average historical rate of retreat has been 0.07 feet per year.</td>
<td>Low. Although several areas of this subsegment have the potential of becoming public recreational areas, there seems little pressure for such facilities at the present.</td>
</tr>
<tr>
<td>1F WEISWILL POINT CREEK (2.5 miles of eastland)</td>
<td>POSTLAND: Artificial fill 4%, low shore 97%, and moderately low shore 2%; SHORE: Artificially stabilized 4%, brush 4%, fringe marsh 35%, and submerged 9%; HEARSE: Narrow 24% and intermediate 35%; HEARSE: Commercial and sport fishing, hunting, and other water related activities.</td>
<td>POSTLAND: Agricultural 15%, residential 37%, unmanaged, wooded 17%, and unmanaged, wooded 16%; SHORE: Commercial use covers less than 1% of the shoreline use. HEARSE: Private recreational use.</td>
<td>Slight or no change for sevical, noncritical. The average historical rate of retreat has been 0.07 feet per year. There are several areas of effective artificial stabilization in this subsegment, except for one grade field at the south of Kinhikiki Point, which is being filled.</td>
<td>High, critical and noncritical. Several structures in the subsegment, especially along Windmill Point and Little Dymer Creeks, would be flooded during periods of abnormally high water.</td>
<td>Slight or no change for sevical, noncritical. The average historical rate of retreat has been 0.07 feet per year. There are several areas of effective artificial stabilization in this subsegment, except for one grade field at the south of Kinhikiki Point, which is being filled.</td>
<td>Low. This area is mostly used for hunting, fishing, and farms. Little alternate shore use seems probable for the near future.</td>
</tr>
<tr>
<td>TABLE 2. (Cont’d.)</td>
<td>SHORELAND USE</td>
<td>FLOOD ZONE</td>
<td>WATER QUALITY</td>
<td>BEACH QUALITY</td>
<td>SHORE EROSION SITUATION</td>
<td>ALTERNATE SHORE USE</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------</td>
<td>--------------------------------------</td>
<td>------------</td>
<td>---------------</td>
<td>---------------</td>
<td>-------------------------</td>
<td>---------------------</td>
</tr>
</tbody>
</table>
| 35 MUSKOKA POINT                                                                       | Low, noncritical for most of the    | Low, critical at White Pine Beach, some structures have been built very close to the shoreline. | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Good. Almost the entire shoreline is fronted by a wide, clean beach. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 6.2 miles (5.7 miles of fastland)                                                       | of the shoreline. High, critical at High, critical at White Pine Beach, some structures have been built very close to the shoreline. | Low, noncritical for most of the    | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Good. Almost the entire shoreline is fronted by a wide, clean beach. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 36 CARTER CREEK                                                                         | Low, noncritical for most of the    | Low, noncritical for most of the    | Satisfactory. Carter Creek has been degraded by several point and non-point pollution sources. It is currently closed to the taking of shellfish. | Poor. There are only narrow, strip beaches at the mouth of Carter Creek. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 23.2 miles (23.3 miles of fastland)                                                      | of the shoreline. High, critical at High, critical at White Pine Beach, some structures have been built very close to the shoreline. | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Poor. There are only narrow, strip beaches at Carter Point. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 36 NORTH OF CORINNA VENUS RIVER 1.1 miles (1.4 miles of fastland)                       | Low, noncritical for most of the    | Low, noncritical for most of the    | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Poor. There are only narrow, strip beaches at Corinna Venus Point. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 21.1 miles (21.4 miles of fastland)                                                      | of the shoreline. High, critical at High, critical at White Pine Beach, some structures have been built very close to the shoreline. | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Poor. There are only narrow, strip beaches at Corinna Venus Point. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 6A CORINNA VENUS RIVER 14.2 miles (17.4 miles of fastland)                              | Low, noncritical for most of the    | Low, noncritical for most of the    | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Poor. There are only narrow, strip beaches at Corinna Venus Point. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
| 35.7 miles (31.7 miles of fastland)                                                      | of the shoreline. High, critical at High, critical at White Pine Beach, some structures have been built very close to the shoreline. | Satisfactory. The entire shoreline meets the State Water Control Board’s 305(b)(1)(i)(I) criteria and the Bureau of Shellfish Sanitation standards. | Poor. There are only narrow, strip beaches at Corinna Venus Point. | Slight or no change to moderate, noncritical. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.

Note: Some private residential areas are probable for some sections of the shoreline. These areas little demand for public recreational facilities at the present time.

Low. Most of the area is already intensively used. There is a section of wooded land at the head of Church Point which could be used for public recreational facilities. However, this portion of the creek is very shallow, limiting water related activities.

Low. This is a public recreational area for public facilities at the present time. The shoreline is not privately maintained and the area is essentially abandoned.

Low. The shoreline is not privately maintained and the area is essentially abandoned. The average historical erosion rate for most of the shoreline has been 1.5 to 2.7 feet per year. This shoreline has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being replaced.
<table>
<thead>
<tr>
<th>TABLE 2. (Cont'd)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SHORELANDS TYPE</strong></td>
</tr>
<tr>
<td>60</td>
</tr>
<tr>
<td>5A</td>
</tr>
<tr>
<td>5B</td>
</tr>
<tr>
<td>6A</td>
</tr>
<tr>
<td>6B</td>
</tr>
<tr>
<td>7A</td>
</tr>
</tbody>
</table>
# TABLE 2 (cont'd)

<table>
<thead>
<tr>
<th>SHORELINE</th>
<th>SHORELANDS TYPE</th>
<th>FLOOD HAZARD</th>
<th>WATER QUALITY</th>
<th>BEACH QUALITY</th>
<th>SHORE EROSION SITUATION</th>
<th>ALTERNATE SHORE USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>7B Lancaster Creek (1.4 miles of fastland)</td>
<td>FASTLAND: Low shore 48% and moderately low shore 52%.&lt;br&gt;SHORE: Artificially stabilized 62%, beach 38%.&lt;br&gt;SHORE: Some private recreational use, but mostly unused.&lt;br&gt;BEACHES: Intermediate 52% and wide 48%. The remainder of the nearshore zone is too narrow and shallow for classification.</td>
<td>Low, noncritical for the entire shoreline except for the Narratic area, which has high flood potential.</td>
<td>The entire shoreline meets the State Water Quality Control Board's 305(b)(2) criteria, and all but the upper portion of Lancaster Creek meets the Bureau of Shellfish Sanitation standards.</td>
<td>Poor to fair. There are several strip beaches around the mouth of Millbury Creek.</td>
<td>Slight or no change to severe, noncritical. The Narratic area has experienced an average historical erosion rate of 3.1 to 4.4 feet per year, however, most of this area has now been artificially stabilized.</td>
<td>Low. Due to the rural nature of the area there seems to be little demand for public recreational facilities.</td>
</tr>
</tbody>
</table>
INDIAN CREEK
Map 2

EXTENT: 58,700 feet (11.1 mi.) of shoreline from the head of Indian Creek to the mouth of Dymer Creek, including Pitman's Cove and Long Creek. The subsegment also contains 58,700 feet (11.1 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Artificial fill 1% (0.1 mi.), low shore 97% (10.8 mi.), and low shore with bluff 2% (0.2 mi.).
SHORE: Artificially stabilized 2% (0.3 mi.), beach 6% (0.7 mi.), fringe marsh 91% (10.1 mi.), and embayed marsh 1% (0.1 mi.).
NEARSHORE: Narrow 24% and intermediate 5%. The remainder of the shoreline is located along the creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 48% (5.4 mi.), industrial 3% (0.4 mi.), residential 25% (2.5 mi.), unmanaged, wooded 24% (2.6 mi.), and unmanaged, unwooded 2% (0.2 mi.).
SHORE: Some commercial use at Kilmarnock Wharf, but mostly unused.
NEARSHORE: Some commercial shipping, sport boating and fishing.

WIND AND SEA EXPOSURE: This subsegment trends basically NW - SE. The fetch at the mouth of the creek is unlimited across the Chesapeake Bay.

OWNERSHIP: Private.

ZONING: The entire subsegment is zoned residential except for Kilmarnock Wharf at the head of the creek, which is zoned industrial.

FLOOD HAZARD: High, noncritical. The majority of the shoreline has elevations of 5 feet or less and would be flooded during periods of abnormally high water. No structures are endangered.

WATER QUALITY: The upper portion of Indian Creek does not meet the 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards. This has been due to discharges of domestic sewage from the Town of Kilmarnock. However, these raw discharges were eliminated when a Sewage Treatment Plant was placed in operation in April of 1975. The Sewage Treatment Plant discharges into Indian Creek and is not meeting permit limitations. Removal of these discharges should allow a decrease in the size of the condemnation area. The rest of the creek presently meets both the 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Good. Most of the beaches are fairly wide in this subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the Indian Creek shoreline. High, noncritical (5.6 feet per year) for the part of the shoreline between Indian and Dymer Creeks that borders on the Chesapeake Bay.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are several areas with protective structures. Near the head of Indian Creek there are two sites of bulkhead and a section each of bulkhead and rubble riprap at Kilmarnock Wharf. Near the mouth of the creek there are several areas of bulkhead and groins. All the structures appear to be effective.

OTHER SHORE STRUCTURES: There are several piers, some with boat houses.

SHORE USE LIMITATIONS: Except for the industrial area at Kilmarnock Wharf, the entire subsegment has been zoned residential excluding all uses other than agricultural or recreational.

ALTERNATE SHORE USE: Low. The county zoning ordinance eliminates any usage more intense than residential. Due to the rural nature of the area, there seems to be little demand for public recreational facilities.

MAPS: USGS, 7.5 Min. Ser. (Topo.), FLEETS BAY Quad., 1968.
NOS 1235 (536), 1:40,000 scale, RAPPARANNACK RIVER ENTRANCE, VA, 16th ed., 1975.

DYMER CREEK
Map 2

EXTENT: 106,700 feet (20.2 mi.) of shoreline along Dymer Creek. The subsegment also contains 104,200 feet (19.7 mi.) of fastland. Included in these measurements is Crog Island which comprises a shoreline measurement of 4,100 feet (0.8 mi.) and a fastland measurement of 2,600 feet (0.5 mi.).

SHORELANDS TYPE
FASTLAND: Low shore 99% (19.6 mi.) and low shore with bluff 1% (0.1 mi.).
SHORE: Artificially stabilized 4% (0.8 mi.), beach 4% (0.8 mi.), fringe marsh 91% (18.6 mi.), and embayed marsh 1% (0.1 mi.).
NEARSHORE: Narrow 17% and wide 1%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 67% (13.2 mi.), industrial 2% (0.4 mi.), residential 15% (2.9 mi.), unmanaged, wooded 11% (2.2 mi.), and unmanaged, unwooded 5% (1.0 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Sport boating, fishing, and some shellfishing.

WIND AND SEA EXPOSURE: The subsegment trends basically NW - SE. The fetch at the mouth of the creek is unlimited across the Bay.

OWNERSHIP: Private.

ZONING: Industrial at the mouth of Georges Cove, agricultural and residential for the rest of the subsegment.

FLOOD HAZARD: High, critical. The majority of the shoreline has elevations of 5 feet or less. Many structures are located below the 5-foot contour line and would be inundated during periods of high water.

WATER QUALITY: In the past, the upper portion of Dymer Creek did not meet 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards.
This was due to the discharge of domestic waste from the Town of Kilnbrook. The Sewage Treatment Plant, installed in April 1975, has eliminated most of these problems. Although this upper region is still closed to the taking of shellfish, it, along with the rest of the creek, does meet 305(b)(1)(B) criteria.

BEACH QUALITY: Poor to fair. The majority of the subsegment has narrow, strip beaches. Grogs Island has an area of fine, white sand.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Severe, noncritical. Dymer Creek to Indian Creek, including Grogs Island, has an average erosion rate of 6.6 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are numerous areas of artificially stabilized shoreline in the subsegment. All of these structures appear to be effective.

OTHER SHORE STRUCTURES: There are several piers and boat ramps in the subsegment.

SHORE USE LIMITATIONS: With the exception of the mouth of Georges Cove, the entire subsegment is zoned for agricultural and residential usage. This precludes any other type of development.

ALTERNATE SHORE USE: Low. The county zoning ordinance limits the use of the shoreline to anything more intense than residential use. Due to the rural nature of the area, there seems to be little demand for public recreational facilities.

MAPS: USGS, 7.5 Min.Ser. (Topo.), FLEETS BAY Quadr., 1968.
NOGA 1223S (334), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 10th ed., 1975.
PHOTOS: Aerial-VIMS 1Feb77 LN-18/896-1008.

SUBSEGMENT 1C
TABBS CREEK
Maps 2 and 3

EXTENT: 63,300 feet (12.0 mi.) of shoreline from the mouth of Dymer Creek to the mouth of Antipoison Creek, including Tabbs Creek. The subsegment also contains 64,800 feet (12.3 mi.) of fastland.

SHORELINES TYPE
FASTLAND: Artificial fill b1% (0.1 mi.), low shore 9% (11.7 mi.), and low shore with bluff 3% (0.5 mi.).
SHORE: Artificially stabilized 6% (0.7 mi.), beach 20% (2.5 mi.), fring marsh 72% (8.6 mi.), and embayed marsh 2% (0.2 mi.).
BEACH: Narrow 9% and intermediate 20%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELINES USE
FASTLAND: Agricultural 43% (5.3 mi.), residential 27% (3.3 mi.), and unmanaged, wooded 30% (3.7 mi.).
SHORE: Some private recreational use, but mostly unused.
BEACH: Sport boating, fishing, and some shellfishing.

WIND AND SEA EXPOSURE: Tabbs Creek trends W-E, and the Bay-facing shoreline trends basically N-S. The fetch along this shoreline is unlimited across the Bay.

OWNERSHIP: Private.
ZONING: Residential.
FLOOD HAZARD: High, noncritical for most of the subsegment. High, critical for structures built below the 5-foot contour, especially the ones on the Bay-facing shoreline.

WATER QUALITY: The headwaters of Tabbs Creek do not meet the Bureau of Shellfish Sanitation standards and is closed to the taking of shellfish. The water quality for the rest of the subsegment is satisfactory as it meets both the State Water Control Board 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Fair. The majority of the shoreline has narrow, strip beaches. Most of the groin fields in the subsegment have trapped nice, wide fillets of sand.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. The average historical rate of erosion for the Bay-facing portions has been 5.6 to 6.0 feet per year. In Tabbs Creek, there has been no noticeable retreat. An area north of the mouth of Tabbs Creek has been accreting at the rate of 1.6 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are several areas of artificially stabilized shoreline in the subsegment. In some areas, groins have been used in conjunction with bulkhead and have done a good job in trapping fillets of sand. All of the protective structures appear to be effective.

OTHER SHORE STRUCTURES: There are numerous piers in the subsegment.

SHORE USE LIMITATIONS: The entire subsegment is zoned for residential use, which limits commercial or industrial activities along the shoreline.

ALTERNATE SHORE USE: Low. This area is basically rural in nature. There seems to be no pressure to develop this section of the county for a more intense use.

MAPS: USGS, 7.5 Min.Ser. (Topo.), FLEETS BAY Quadr., 1968.
NOGA 1223S (334), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.
PHOTOS: Aerial-VIMS 1Feb77 LN-1C/805; 824-887; 27Apr76 LN-1C/806-823; 886-894.
SUBSEGMENT ID: 1D
ANTIPOISON CREEK
Map 3

EXTENT: 61,700 feet (11.7 mi.) of shoreline along Antipoison Creek, including Harpers Creek. The subsegment also contains 61,700 feet (11.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Artificially stabilized 3% (0.6 mi.), beach 3% (0.3 mi.), and fringe marsh 94% (11.0 mi.).
NEARSHORE: Antipoison Creek has average depths of 6 to 8 feet.

SHORELANDS USE
FASTLAND: Agricultural 56% (6.6 mi.), commercial 12% (0.3 mi.), residential 21% (2.4 mi.), and unmanaged, wooded 20% (2.4 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Fishing, shellfishing, boating, and other water sports.

WIND AND SEA EXPOSURE: Antipoison Creek trends basically NW - SE. Patches at the mouth are insignificant due to the protection of Fleets Island.

OWNERSHIP: Private.

ZONING: Residential and commercial.

FLOOD HAZARD: High, critical. Many dwellings are located below 5-foot elevations and would be inundated during periods of abnormally high water.

WATER QUALITY: Satisfactory. The water quality of Antipoison Creek meets both the State Water Control Board 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor. There are only thin, strip beaches along the north bank of the creek mouth.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the entire subsegment.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 2,000 feet of bulkhead in the subsegment mainly used for cosmetic purposes rather than for erosion control.

OTHER SHORE STRUCTURES: There are several piers and boat houses located along the creek.

SHORE USE LIMITATIONS: The shorelands of Antipoison Creek are very susceptible to flooding. Present zoning codes restrict commercial development of the area.

ALTERNATE SHORE USE: Low. The rural-agricultural nature of this subsegment seems best suited for the area. Some residential development is possible, though any development would be at the expense of the agriculture. Given the rural nature of this section of Lancaster County, there is no significant need for public shoreline facilities.

MAPS: USGS, 7.5 Min. Ser. (Topo.), FLEETS BAY Quad., 1968.
NOS # 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.

PHOTOS: Aerial-VIMS 1Feb77 LN-1D/720-804.
SUBSEGMENT 2A
FLEETS ISLAND
Map 3

EXTENT: 87,100 feet (16.5 mi.) of shoreline from the mouth of Antipoison Creek to the mouth of Windmill Point Creek, including Oyster Creek. The subsegment has a fast land measurement of 56,500 feet (10.7 mi.).

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Artificially stabilized 11% (1.8 mi.), beach 18% (2.9 mi.), fringe marsh 39% (6.5 mi.), and embayed marsh 32% (5.3 mi.).
NEARSHORE: Narrow 4% and intermediate 43%. The remainder of the nearshore zone is located along Oyster Creek which is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Commercial 6% (0.7 mi.), residential 21% (2.2 mi.), unmanaged, wooded 31% (3.3 mi.), and unmanaged, unwooded 42% (4.6 mi.).
SHORE: Private recreational and commercial use (marina). Some waterfront hunting in the marshes.
NEARSHORE: Sport boating, fishing and shell-fishing.

WIND AND SEA EXPOSURE: Fleets Island trends basically NW - SE. Fetches along the Bay-fronting portion of Fleets Island are unlimited. The fetch at the mouth of Windmill Point Creek is SW - 6 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: High, critical. Numerous structures have been built along the shoreline where elevations are five feet or less. Much of Fleets Island and the surrounding areas would be inundated during the 100-year flood.

WATER QUALITY: Satisfactory for all the subsegment except in and around the Windmill Point Marina area, which does not meet either the State Water Control Board 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards. The current problem stems from the boating activity at the marina. The new State Water Control Board regulations, which are to be put into effect in 1977, and the implementation of a sewage treatment plant at Windmill Point should help reduce the pollution problems.

BEACH QUALITY: Poor to good. Between North Point and Windmill Point there are areas of nice sand beach intermixed with areas of no beach. Around Windmill Point and from here to Windmill Point Creek there is an excellent sand beach.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. From North Point to the Windmill Point Marina, the shoreline has experienced an average historical erosion rate of 2.9 to 7.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Between North Point and Windmill Point there is one section of wooden bulkhead which is protecting a house, and two areas of riprap. Numerous attempts have been made to protect this area with groins. However, most of the groins have been flanked. Windmill Point Marina is almost totally bulk-headed and has a jetty on either side of its entrance channel. From the marina to the end of the subsegment there are numerous wooden and riprap groins, most of which are doing an effective job of trapping sand.

OTHER SHORE STRUCTURES: There are several piers in the subsegment. The Windmill Point Marina has approximately 115 wet berths, both open and closed.

SHORE USE LIMITATIONS: The Fleets Island area is very susceptible to flooding due to its low elevation and the direct proximity of the Chesapeake Bay. Few areas on the Island would be safe from flooding during the 100-year storm. Also, the severe historical erosion rates for the Bay-fronting shoreline would also limit shoreline development.

ALTERNATE SHORE USE: Several areas along the Bay shore have the potential to become nice public picnic areas and beaches. Non-structural development is best in such a flood prone area. The subsegment should be left in its natural state.

MAPS: USGS, 7.5 Min. Ser. (Topo.), DELTAVILLE Quadr., 1964; NOS# 12235 (334), 1:40,000 scale, RAPPANNOCK RIVER ENTRANCE, VA, 16th ed., 1975;
EXTENT: 107,900 feet (20.4 mi.) of shoreline from the mouth of Windmill Point Creek to Mosquito Point, including Windmill Point Creek, Little Oyster Creek and Mosquito Creek. Also included in this shoreline measurement are the Mosquito Islands which comprise 25,000 feet (4.5 mi.) of shoreline. This subsegment also contains 85,100 feet (16.1 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Artificial fill 1% (0.1 mi.), low shore 98% (15.9 mi.), and moderately low shore 1% (0.2 mi.).

SHORE: Artificially stabilized 4% (0.8 mi.), beach 15% (3.1 mi.), fringe marsh 53% (10.7 mi.), embayed marsh 9% (1.9 mi.), and extensive marsh 19% (3.9 mi.).

NEARSHORE: Intermediate 14% and wide 2%. The rest of the nearshore zone is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Agricultural 15% (2.3 mi.), residential 35% (5.5 mi.), unmanaged, wooded 35% (5.7 mi.), and unmanaged, unwooded 16% (2.6 mi.). Commercial use comprises less than 1% of the shorelands use.

SHORE: Private recreational use, especially sunbathing and strolling along the beaches and waterfowl hunting in the marshes.

NEARSHORE: Commercial and sport fishing, boating, and other water related activities.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends basically E - W. The fetch from the southeast is unlimited across the Bay.

OWNERSHIP: Private.

ZONING: Residential and agricultural.

FLOOD HAZARD: High, critical and noncritical. Most structures along Windmill Point Creek and Little Oyster Creek as well as several other structures in the subsegment would be endangered by flooding during the 100-year storm. Mosquito Island and other shorelands would also be inundated during the flood.

WATER QUALITY: Satisfactory. The entire subsegment meets the State Water Control Board 305(b) (1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor to good. There are several good beaches in the subsegment, notable being the sand spit at Deep Hole Point, and several areas around Mosquito Point. These beaches are wide with clean sand.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, noncritical. The only area of erosion has been between Mosquito Point and Mosquito Creek, where the average historical rate of retreat has been 2.7 feet per year. Much of the shoreline between Mosquito and Windmill Point Creeks is accreting at a rate of approximately 1.5 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 5,000 feet of artificially stabilized shoreline in this subsegment. Groins, bulkhead, or a combination of the two have been used between Mosquito Point and Mosquito Creek to stabilize the shoreline. These structures seem to be effective. An ineffective groin field is located at the mouth of Mosquito Creek. Elsewhere in the subsegment, bulkhead and riprap have been used to retain fill in several areas.

OTHER SHORE STRUCTURES: There are several piers in the subsegment.

SHORE USE LIMITATIONS: Many areas of this subsegment have a high flood hazard. No structures should be built in the flood zone. Also, this is primarily rural in nature. The county zoning ordinance prohibits any construction in this area other than for residences.

ALTERNATE SHORE USE: This area is mostly used for isolated residences and farms. Little alternate shore use seems probable for the near future.

SUBSEGMENT 3A
 MOSQUITO POINT TO CRAB POINT
 Maps 3, 4, and 5

EXTENT: 32,600 feet (6.2 mi.) of shoreline along the Rappahannock River from Mosquito Point to Crab Point. The subsegment includes 51,200 feet (9.7 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 12% (1.6 mi.), low shore with bluff 11% (1.0 mi.), moderately low shore 17% (1.7 mi.), moderately low shore with bluff 16% (1.6 mi.), moderately high shore 26% (2.5 mi.), and moderately high shore with bluff 14% (1.3 mi.).
SHORE: Artificially stabilized 12% (0.8 mi.), beach 77% (4.8 mi.), and embayed marsh 10% (0.7 mi.).
NEARSHORE: Narrow 68% and intermediate 32%.

SHORELANDS USE

FASTLAND: Agricultural 21% (2.0 mi.), commercial 1% (0.1 mi.), residential 14% (1.6 mi.), unmanaged, wooded 4% (0.4 mi.), and unmanaged, unwooded 60% (5.8 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Commercial and sport boating, fishing, shellfishing, and other water related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically SE - NW. Fitches at Cherry Point are SE - 4½ nautical miles and W - 6½ nautical miles.

OWNERSHIP: Private.

ZONING: Residential and commercial.

FLOOD HAZARD: Low, noncritical for most of the subsegment. High, critical at White Stone Beach, where structures have been built very close to the shore.

WATER QUALITY: Satisfactory. The entire subsegment meets the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Good. Almost the entire length of the subsegment is fronted by a nice sand beach.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, noncritical. The average historical erosion rate has been 1.5 to 1.7 feet per year along White Stone Beach and Cherry Point, and southeast of Crab Point.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approximately 4,000 feet of protective structures along the shoreline in this subsegment. Between Mosquito Point and White Stone Beach, there is a groin field that has done an excellent job of trapping sand. The groins at White Stone Beach are of moderate effectiveness. Between Cherry Point and the bridge, another groin field is doing a very good job of catching sand. A concrete bulkhead at the base of the bridge is retaining fill. There are many groins in the rest of the subsegment. The first section to the north of the bridge is trapping sand, though the rest are relatively ineffective. There is a jetty at Crab Point.

OTHER SHORE STRUCTURES: There are a few piers along the subsegment.

SHORE USE LIMITATIONS: Forty-one percent of the shoreline has bluffs, making access to the shore difficult. There is already scattered development along the subsegment and any further build-up would spoil the rural nature of the area.

ALTERNATE SHORE USE: Low. No major public recreational facility seems necessary for such a rural section. Public landings along the shoreline would be the only facilities needed in the subsegment. Some residential development is probable for several shoreline areas.


PHOTOS: Aerial-VIMS 23Jan76 LN-3A/591-631.

SUBSEGMENT 3B
 CARTER CREEK
 Map 5

EXTENT: 117,100 feet (22.2 mi.) of shoreline along Carter Creek, including all of its tributaries. The subsegment contains a fastland measurement of 123,100 feet (23.5 mi.).

SHORELANDS TYPE

FASTLAND: Artificial fill 2% (0.4 mi.), low shore 20% (4.7 mi.), low shore with bluff 8% (1.9 mi.), moderately low shore 24% (3.6 mi.), and moderately low shore with bluff 46% (10.7 mi.).
SHORE: Artificially stabilized 9% (1.9 mi.), beach 3% (0.6 mi.), fringe marsh 83% (18.4 mi.), and embayed marsh 5% (1.2 mi.).
NEARSHORE: Narrow 9%. The rest of the shoreline in this subsegment is located along the many tributaries to Carter Creek, which are too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Commercial 9% (2.2 mi.), residential 78% (18.2 mi.), and unmanaged, wooded 13% (2.9 mi.).
SHORE: Some private recreational use, such as waterfowl hunting in the marshes, and commercial use.
NEARSHORE: Commercial and sport boating, fishing, and other water related activities.

WIND AND SEA EXPOSURE: Carter Creek trends basically NE - SW. The fetch at Veems is SE - 5.2 nautical miles.

OWNERSHIP: Private.

ZONING: Residential and commercial.

FLOOD HAZARD: Low, noncritical for most of the shoreline. High, critical for numerous structures near the mouth of the creek that have been built directly on the shoreline below the 5-foot contour.

WATER QUALITY: Unsatisfactory. Carter Creek does not meet either the State Water Control Board's 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards. The creek has been
degraded by numerous sources including marinas and heavy boating activity, individual dwellings with faulty septic tank drain fields, two privately owned sewage treatment plants discharging into the creek, and many oyster shucking houses.

**BEACH QUALITY:** Poor. There are only narrow, strip beaches at the mouth of Carter Creek.

**PRESENT SHORE EROSION SITUATION**

**EROSION RATE:** Moderate, noncritical (1.1 feet per year) around Weems. Slight or no change for the rest of the subsegment.

**ENDANGERED STRUCTURES:** None.

**SHORE PROTECTIVE STRUCTURES:** There are many sections of bulkhead along the creek mainly for retaining fill or for cosmetic purposes.

**OTHER SHORE STRUCTURES:** There are numerous piers, many with boat houses, in the creek.

**SHORE USE LIMITATIONS:** Carter Creek is zoned residential and commercial. The shoreline is already densely populated, and is rapidly growing.

**ALTERNATE SHORE USE:** Low. The area is already intensely used. There is a section of wooded land at the head of Church Prong which could be used for public recreational facilities. However, this portion of the creek is very shallow, limiting water related use.

**MAPS:** USGS, 7.5 Min. Ser. (Topo.), IRVINGTON Quadr., 1968.

**NOS** 12235 (354), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975;

**NOS** 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

**PHOTOS:** Aerial-VIMS 5Aug76 LN-38/484-485;

502-527; 1Feb77 LN-38/486-501; 598-570;

17Feb77 LN-38/571-590,

**SUBSEGMENT 3C**

**MOUTH OF CORROTOMAN RIVER**

**Map 5**

**EXTENT:** 16,400 feet (3.1 mi.) of shoreline along the Rappahannock River from Weems to Corrotoman Point.

**SHORELINES TYPE**

**FASTLAND:** Low shore 56% (1.9 mi.) and low shore with bluff 44% (1.5 mi.).

**SHORE:** Artificially stabilized 13% (0.4 mi.), beach 14% (0.4 mi.), fringe marsh 70% (2.2 mi.), and embayed marsh 3% (0.1 mi.).

**NEARSHORE:** Narrow 50% and intermediate 28%.

The rest of the shoreline is located along the creeks north of Wharton Grove Camp, which are too narrow and shallow for classification.

**SHORELINES USE**

**FASTLAND:** Agricultural 18% (0.6 mi.), residential 49% (1.7 mi.), and unmanaged, wooded 33% (1.1 mi.).

**SHORE:** Mostly private recreational and agricultural use.

**NEARSHORE:** Sport boating, fishing, shell fishing, and other water sports.

**WIND AND SEA EXPOSURE:** The shoreline of this subsegment trends SE - NW. Fetches at Orchard Point are SE - 6.6 nautical miles and SW - 5.1 nautical miles.

**OWNERSHIP:** Private.

**ZONING:** Residential and agricultural.

**FLOOD HAZARD:** Low, noncritical. The majority of the subsegment has elevations of at least 10 feet and is not subject to flooding.

**WATER QUALITY:** Satisfactory, meeting both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

**BEACH QUALITY:** Poor. There is a narrow, strip beach at Corrotoman Point.

**PRESENT SHORE EROSION SITUATION**

**EROSION RATE:** Slight or no change for the small creeks in the subsegment. Moderate, noncritical for the rest of the subsegment, with an average historical erosion rate of 1.2 to 1.6 feet per year.

**ENDANGERED STRUCTURES:** None.

**SHORE PROTECTIVE STRUCTURES:** There are approximately 2,000 feet of artificial stabilization in this subsegment, the sections of riprap and bulkhead are doing an effective job of stabilizing the shoreline. However, the section of bulkhead at Orchard Point is being flanked. There are also three ineffective groin fields in the subsegment.

**OTHER SHORE STRUCTURES:** Piers, some with boat houses.

**SHORE USE LIMITATIONS:** The county zoning ordinance prohibits a more intense use other than residential or agricultural in this subsegment. The area from Weems to Wharton Grove Camp is already developed for residences. The remainder of the subsegment is predominately agricultural and any development there would be at the sacrifice of these farm lands.

**ALTERNATE SHORE USE:** Low. The subsegment is Basically rural in nature. Public recreational facilities seem unnecessary at this time.

**MAPS:** USGS, 7.5 Min. Ser. (Topo.), IRVINGTON Quadr., 1968.

**NOS** 12235 (354), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975;

**NOS** 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

**PHOTOS:** Aerial-VIMS 5Aug76 LN-30/462-483.
SUBSEGMENT 4A
COROTOMAN RIVER
Maps 5 and 6

EXTENT: 75,700 feet (14.3 ml.) of shoreline along the Corotoman River, from Corotoman Point to Black Stump Point, including Taylor and Moran Creeks. The subsegment also contains 82,900 feet (15.7 ml.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 4% (7.8 ml.), low shore with bluff 14% (2.1 ml.), and moderately low shore 37% (5.8 ml.).
SHORE: Artificially stabilized 3% (0.4 ml.), beach 2% (0.3 ml.), fringe marsh 83% (11.9 ml.), and embayed marsh 12% (1.7 ml.).
NEARSHORE: Narrow 10% and intermediate 11%.
The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 9% (1.5 ml.), residential 32% (5.0 ml.), and unmanaged, wooded 59% (9.2 ml.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Sport boating and fishing, shellfishing, bathing, and other water sports.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends basically S - N. Patches at Corotoman Point are SW - SSW - 1/2 nautical miles and NE - NE - 3/4 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural from Corotoman Point to and including the southern bank of Taylor Creek. Residential for the rest of the subsegment.

FLOOD HAZARD: Low, noncritical for those areas fronted by bluffs. Moderate, noncritical for Taylor Creek. High, critical for the road on the northern side of the mouth of Taylor Creek.

WATER QUALITY: Satisfactory, meeting both the State Water Control Board’s 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor. There are only narrow, strip beaches in the subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. The area experiencing the greatest erosion has been the shoreline between Taylor and Moran Creeks, which has an average historical retreat of 5.1 feet per year. However, most of this area has now been stabilized. Slight or no change for the shoreline of Taylor and Moran Creeks. The rest of the subsegment has a moderate, noncritical historical erosion rate ranging from 1.1 to 2.7 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 2,000 feet of artificially stabilized shoreline in the subsegment. Most of this is rubble riprap located between Taylor and Moran Creeks. All structures appear to be effective.
OTHER SHORE STRUCTURES: There are several piers in the subsegment, some with boat houses built on them.

SHORE USE LIMITATIONS: The entire subsegment is zoned for agricultural and residential use, limiting any commercial or industrial activities along the shoreline.

ALTERNATE SHORE USE: Low. Due to the rural nature of the subsegment, public recreational facilities seem unnecessary at this time. Some residential build-up will probably continue along the shoreline, though care should be taken to maintain the good water quality standards of this area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), INNVINCION Quad., 1968.
NOSF 12235 (534), 1:40,000 scale, RAPPANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.
NOSF 12237 (605-SC), 1:40,000 scale, RAPPANNOCK RIVER, Corotoman River to Fredericksburg, VA, 12th ed., 1975.

SUBSEGMENT 4B
COROTOMAN RIVER
Maps 6 and 7

EXTENT: 130,400 feet (24.7 ml.) of shoreline along the Eastern Branch of the Corotoman River, including the tributaries. The subsegment also contains 147,700 feet (28.0 ml.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 2% (0.6 ml.), moderately low shore 59% (16.6 ml.), moderately low shore with bluff 11% (3.0 ml.), moderately high shore 25% (6.8 ml.), and moderately high shore with bluff 2% (1.0 ml.).
SHORE: Artificially stabilized 1% (0.3 ml.), beach 3% (0.7 ml.), fringe marsh 73% (18.0 ml.), and embayed marsh 23% (5.7 ml.).
NEARSHORE: Narrow 11%. The rest of the subsegment is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 10% (2.7 ml.), commercial 1% (0.1 ml.), residential 19% (5.4 ml.), and unmanaged, wooded 70% (19.7 ml.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Sport boating, fishing, shellfishing, and other water related activities.

WIND AND SEA EXPOSURE: The shoreline of the Eastern Branch trends basically SW - NE. The fetch at Black Stump Point is SSW - 5% nautical miles.

OWNERSHIP: Private.

ZONING: The area from Punches Cove to Browns Creek is zoned for agricultural use, the remainder of the subsegment is residential.

FLOOD HAZARD: Low, noncritical. The majority of the shoreline has elevations of at least 10 feet. There are a few isolated structures which could be flooded during the 100-year storm.

WATER QUALITY: Satisfactory, meeting both the State Water Control Board’s 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation

33
standards for most of the subsegment. The headwaters of the Eastern Branch are now recovering from years of degradation caused by raw sewage discharge from the Town of Kilmarock. The construction of the Kilmarock Sewage Treatment Plant, which discharges into another river basin, has eliminated the major source of pollution.

**BEACH QUALITY:** Poor. There are only isolated patches of sand beach in this subsegment.

**PRESENT SHORE EROSION SITUATION**

**EROSION RATE:** Slight or no change for the entire subsegment except around Black Stump Point which is moderate, noncritical (1.7 feet per year).

**ENDANGERED STRUCTURES:** None.

**SHORE PROTECTIVE STRUCTURES:** There are approximately 1,500 feet of artificially stabilized shoreline in the subsegment. This consists mainly of wooden bulkhead used for cosmetic purposes. There are also two jetties at West Point.

**OTHER SHORE STRUCTURES:** There are numerous piers, many with boat houses along the subsegment.

**SHORE USE LIMITATIONS:** The county zoning ordinance limits this area to residential and agricultural use only. Access to the shoreline would be difficult and costly as large portions of the land are wooded.

**ALTERNATE SHORE USE:** Low. Because this area is still very rural, public recreational facilities seem unnecessary at this time. Some residential growth may continue, but care should be taken to maintain the good water quality of the creek.

**MAPS:** USGS, 7.5 Min. Ser. (Topo.), IRVINGTON Quadr., 1968; NOB# 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975; NOB# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

**PHOTOS:** Aerial-VIMS 17Feb77 LN-48/321-415; 5Aug76 LN-48/416-438.

**SUBSEGMENT 4C**

**CORROTOMAN RIVER**

**Map 7**

**EXTENT:** 171,900 feet (32.6 mi.) of shoreline along the Western Branch of the Corrotoman River, including the tributaries, from West Point to Bar Point. This subsegment includes 188,200 feet (35.7 mi.) of fastland.

**SHORELANDS TYPE**

- **FASTLAND:** Low shore 4% (1.6 mi.), low shore with bluff 3% (1.0 mi.), moderately low shore 6% (24.2 mi.), moderately low shore with bluff 16% (5.7 mi.), moderately high shore 6% (2.0 mi.), and moderately high shore with bluff 3% (1.1 mi.).
- **SHORE:** Artificially stabilized 1% (0.1 mi.), beach 7% (2.2 mi.), fringe marsh 67% (21.7 mi.), and embayed marsh 26% (8.5 mi.).
- **NEARSHORE:** Narrow 32%. The remainder of the creek is too narrow and shallow for classification.

**SHORELANDS USE**

- **FASTLAND:** Agricultural 11% (3.9 mi.), residential 9% (3.3 mi.), and unmanaged, wooded 80% (28.4 mi.).
- **SHORE:** Some bathing on the beaches and waterfowl hunting in the marshes, but mostly unused.
- **NEARSHORE:** Sport boating, fishing, and swimming.

**WIND AND SEA EXPOSURE:** The shoreline of the Western Branch trends basically SE - NW. The fetch at Bar Point is 3 - 5 nautical miles.

**OWNERSHIP:** Private.

**ZONING:** Agricultural and residential.

**FLOOD HAZARD:** Low, noncritical for most of the subsegment. Moderate, noncritical for the upper creek portions and the marsh areas.

**WATER QUALITY:** Satisfactory, meeting both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards for all the subsegment except at the headwaters, which is closed to the taking of shellfish.

**BEACH QUALITY:** Fair to poor. Most of the beaches in this subsegment are narrow and often interspaced with marsh vegetation. However, the shoreline near Bar Point has several fairly wide and clean beaches.

**PRESENT SHORE EROSION SITUATION**

**EROSION RATE:** Slight or no change for all the subsegment except moderate, noncritical from Ottoman Wharf to Bar Point which has an average historical erosion rate of 1.0 feet per year.

**ENDANGERED STRUCTURES:** None.

**SHORE PROTECTIVE STRUCTURES:** There is approximately 700 feet of effective bulkhead along the shoreline in this subsegment.

**OTHER SHORE STRUCTURES:** There are several piers and boat houses and the Harry Point Ferry slips in this subsegment.

**SHORE USE LIMITATIONS:** This subsegment is zoned for residential and agricultural purposes, limiting any commercial or industrial activities along the shore. As with Subsegment 4B, any major residential development would be a costly proposition as there are few existing access roads to most sections of the shoreline.

**ALTERNATE SHORE USE:** Low. Some private residential growth may continue along the shoreline, but it seems that the area will remain basically rural. There appears to be little demand for public recreational facilities, although some public launching ramps would be of benefit to the boating community.

**MAPS:** USGS, 7.5 Min. Ser. (Topo.), IRVINGTON Quadr., 1968; USGS, 7.5 Min. Ser. (Topo.), LANCASER Quadr., 1968; USGS, 7.5 Min. Ser. (Topo.), LIVELY Quadr., 1968; USGS, 7.5 Min. Ser. (Topo.), URBANIA Quadr., 1968; NOB# 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975; NOB# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

**PHOTOS:** Aerial-VIMS 5Aug76 LN-4C/180-278; 17Feb77 LN-4C/279-320.
SUBSEGMENT 4D
CORROTOMAN RIVER
Maps 7 and 8

EXTENT: 75,100 feet (14.2 mi.) of shoreline along
the Corrotoman River from Bar Point to the mouth
of Whitehouse Creek, including Nyer and Town
Creeks. This subsegment also contains 76,300
feet (14.5 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Artificial fill < 1% (0.1 mi.), low
shore 45% (8.5 mi.), low shore with bluff 17
(0.2 mi.), moderately low shore 50% (7.3 mi.),
and moderately low shore with bluff 3% (0.4
mi.).
SHORE: Artificially stabilized 5% (0.7 mi.),
beach 17% (2.4 mi.), fringe marsh 77% (10.8
mi.), and embayed marsh 2% (0.3 mi.).
NEARSHORE: Narrow 18% and intermediate 6%.
The rest of the shoreline is located in creeks
which are too narrow and shallow for classifi-
cation.

SHORELANDS USE
FASTLAND: Agricultural 3% (0.4 mi.), residen-
tial 62% (9.0 mi.), and unmanaged, wooded 35
(5.0 mi.).
SHORE: Some private recreational use.
NEARSHORE: Sport boating, fishing, and swim-
ing.

WIND AND SEA EXPOSURE: The shoreline of this sub-
segment trends basically N - S. Feces at Bar
Point are SSE - 4½ nautical miles and S - 4½
nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: Low, noncritical. The majority of
the shoreline has elevations of at least 10
feet and is not subject to flooding.

WATER QUALITY: Satisfactory, meeting both the
State Water Control Board's 305(b)(1)(B) cri-
teria and the Bureau of Shellfish Sanitation
standards.

BEACH QUALITY: Poor. Most of the subsegment has
narrow, strip beaches. The few areas of rela-
tively good beach are littered with fallen trees.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the shore-
line from Ball Point to just south of Town Creek.
Moderate, noncritical for the rest of the subseg-
ment. The average historical erosion rate has
been 1.7 to 1.9 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are approxi-
mately 4,000 feet of wooden bulkhead in the sub-
segment, most of which appears to be effective.
One groin at the marsh south of Millenbeck is
doing a fairly effective job of catching sand.

OTHER SHORE STRUCTURES: There are a few piers in
the subsegment.

SHORE USE LIMITATIONS: Sixty-five percent of the
shoreline is already used for residential and
agricultural purposes. The remaining thirty-
five percent would be costly to develop as there
are no access roads to these areas. The county
zoning ordinance prohibits any commercial or in-
dustrial activities along the shoreline.

ALTERNATE SHORE USE: Low. Although this area is
fairly heavily populated, it is still basically
rural in nature, eliminating the need for public
recreational facilities. Any further develop-
ment should take care to maintain the good water
quality standards of this portion of the river.

MAPS: USGS, 7.5 Min.Ser. (Topo.), IRVINGTON
Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), URBANNA
Quadr., 1968.
NOA# 12235 (334), 1:40,000 scale,
RAPPAHANNOCK RIVER ENTRANCE, VA,
16th ed., 1975;
NOA# 12237 (605-SC), 1:40,000 scale,
RAPPAHANNOCK RIVER, Corrotoman River to

PHOTOS: Aerial-VIMS 5Aug76 LN-AD/165-179.
SUBSEGMENT 5A
WHITEHOUSE CREEK
Map 8

EXTENT: 60,100 feet (11.4 mi.) of shoreline from the mouth of Whitehouse Creek to Towles Point, including Millenbeck and Ewells Prongs, and Whitehouse Creek. The subsegment contains 62,000 feet (11.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 91% (10.7 mi.) and moderately low shore 9% (1.1 mi.).
SHORE: Artificially stabilized 6% (0.4 mi.), beach 2% (0.3 mi.), fringe marsh 77% (8.8 mi.), and embayed marsh 17% (1.9 mi.).
BEACH: Narrow 11%. The rest of the shoreline is located in Whitehouse Creek which is too narrow and shallow for classification.

SHORELINES USE
FASTLAND: Agricultural 6% (0.8 mi.), residential 21% (2.4 mi.), unmanaged, wooded 53% (6.2 mi.), and unmanaged, unwooded 20% (2.3 mi.).
SHORE: Private recreation including bathing and waterfowl hunting.
BEACH: Between Towles Point and Whitehouse Creek, the nearshore is used for commercial and sport boating, fishing, shellfishing, and water sports. In Whitehouse Creek the nearshore is used for sport boating and fishing.

WIND AND SEA EXPOSURE: The shoreline along Whitehouse Creek trends basically E - W. The shoreline between Whitehouse Creek and Towles Point trends NE - SW. Fetches at Towles Point are SE - 2% nautical miles, SW - 3 nautical miles, and S - 1½ nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: High, noncritical. Most of the shore is below the 5-foot contour making it highly susceptible to flooding. There is a house built on stilts on Ewells Prong that is endangered by flooding.

WATER QUALITY: Satisfactory, meeting both the criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor. There are only a few pocket beaches in the subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical (1.5 feet per year) for the area from the mouth of Whitehouse Creek to Towles Point. Slight or no change for the rest of the subsegment.
ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are six groins to the south of the mouth of Whitehouse Creek. These are made of culverts, and have caught a little sand but are now being flanked. In Whitehouse Creek there are several sections of bulkhead mostly used for retaining fill.

OTHER SHORE STRUCTURES: There are several piers and a boat house on Millenbeck Prong and a private boat ramp on Whitehouse Creek.

SHORE USE LIMITATIONS: The entire subsegment is zoned for residential and agricultural purposes, precluding any commercial or industrial use. The high flood hazard of the area should limit any residential development, although private construction will probably continue.

ALTERNATE SHORE USE: Low. There seems to be little demand for a public park in this area as it is still rural and undeveloped.


PHOTOS: Aerial-VIMS 23Jan76 LN-5A/122-134; 5Aug76 LN-5A/135-144.

SUBSEGMENT 5B
TOWLES POINT TO BELMONT CREEK
Maps 8, 9, and 10

EXTENT: 71,800 feet (13.6 mi.) of shoreline along the Rappahannock River from Towles Point to the mouth of Belmont Creek, including all the tributaries. The subsegment also contains 81,300 feet (15.4 mi.) of fastland.

SHORELINES TYPE
FASTLAND: Low shore 43% (6.7 mi.), low shore with bluff 4% (0.6 mi.), moderately low shore 42% (6.5 mi.), and moderately low shore with bluff 11% (1.6 mi.).
SHORE: Artificially stabilised 9% (1.2 mi.), beach 9% (1.2 mi.), fringe marsh 69% (9.4 mi.), and embayed marsh 13% (1.8 mi.).
BEACH: Narrow 6% and intermediate 36%. The rest of the shoreline is located on creeks which are too narrow and shallow for classification.

SHORELINES USE
FASTLAND: Agricultural 11% (1.8 mi.), residential 23% (3.5 mi.), unmanaged, wooded 53% (8.4 mi.), and unmanaged, unwooded 11% (1.7 mi.).
SHORE: Private recreation including bathing along the beaches and waterfowl hunting in the marshes.
BEACH: Commercial and sport boating, fishing, shellfishing, and other water related activities.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends first SE - NW, and then S - N. Fetches at Rogue Point are 5 - 10 nautical miles, W - 1½ nautical miles, and NW - 10 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: High, noncritical for the shoreline from Towles Point to Beach Creek and for the marsh areas. High, critical for around Beach Creek. Low, noncritical for the rest of the subsegment as most of it is fronted by at least 5 to 10-foot bluffs.
WATER QUALITY: Satisfactory, meeting both the State Water Control Board's 305(b)(1) criteria and the Bureau of Shellfish Sanitation standards except for Wyatt Creek which is closed to the taking of shellfish.

BEACH QUALITY: Good to poor. There is a clean, wide section of beach along Beach Creek, and between Payne's and Belmont Creeks.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical (1.9 to 2.8 feet per year) except critical for houses at Beach Creek.
ENDANGERED STRUCTURES: Several houses along Beach Creek.
SHORE PROTECTIVE STRUCTURES: There are approximately 3,000 feet of artificially stabilized shoreline and numerous groins along the subsegment. The groins along Beach Creek and near the mouth of Belmont Creek are doing a good job of building a beach. Most others are only of marginal effectiveness.

OTHER SHORE STRUCTURES: There are a few piers and a boat house on Beach Creek.

SHORE USE LIMITATIONS: The county zoning ordinance prohibits any commercial or industrial use of this subsegment. Forty-three percent of the subsegment has low shore, making it very susceptible to flooding during periods of abnormally high water. Eighty-two percent of the shoreline is either embayed or fringe marsh, which should be left in its natural state as a habitat for various fishes, shellfish and wildlife.

ALTERNATE SHORE USE: Low. The shorelands along this portion of the Rappahannock River are very rural. There seems to be little demand for any major public recreational facilities. There will probably be some residential development in this area, but care should be taken to maintain the water quality and rural atmosphere.

MAPS: USGS, 7.5 Min. Ser. (Topo.), URBANNA Quad., 1968.
USGS 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975;
USGS 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.
EXTENT: 47,800 feet (9.0 mi.) of shoreline along the Rappahannock River from Belmont Creek to Midway Creek, including Belmont, Greenvale and Midway Creeks. This subsegment also contains 65,600 feet (12.4 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Artificial fill 4% (0.5 mi.), low shore 24% (3.0 mi.), low shore with bluff 3% (0.4 mi.), moderately low shore 62% (7.7 mi.), and moderately low shore with bluff 7% (0.9 mi.).
SHORE: Artificially stabilized 11% (0.9 mi.), beach 17% (1.5 mi.), fringe marsh 64% (5.8 mi.), and embayed marsh 9% (0.7 mi.).
NEARSHORE: Narrow 21% and intermediate 18%. The remainder of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 15% (1.9 mi.), commercial 2% (0.2 mi.), residential 35% (4.4 mi.), unmanaged, wooded 64% (5.4 mi.), and unmanaged, unwooded 3% (0.4 mi.).
SHORE: Private recreation including bathing along the beaches and waterfowl hunting in the marshes.
NEARSHORE: Commercial and sport fishing, boating, and shellfishing.

WIND AND SEA EXPOSURE: The shoreline trends SE - NW. Patches at the end of Route 681 are S - 7 3/4 nautical miles, W - 1 1/2 nautical miles, and UNV - 6 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: Low, noncritical. The majority of the shoreline has elevations of at least 5 to 10 feet and is not subject to flooding.

WATER QUALITY: Satisfactory. Most sections meet both the State Water Control Board’s 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards. Greenvale and Belmont Creeks do not meet the Bureau of Shellfish Sanitation standards and are closed to the taking of shellfish.

BEACH QUALITY: Good to poor. Between Belmont and Greenvale Creeks a marsh has been artificially filled from creek dredging operations creating a very large sand beach. Several other areas of the subsegment have wide, clean beaches.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the shoreline of Belmont, Greenvale, and Midway Creeks. Moderate, noncritical (1.4 to 1.7 feet per year) for the shoreline along the Rappahannock with the exception of the two sandpits which are accreting at a rate of 0.8 to 1.4 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 3,000 feet of wooden bulkhead in this subsegment, most of which is doing an effective job of stabilizing the shoreline. There are numerous groins throughout the subsegment. Those at the mouth of Greenvale Creek and to the southeast of Midway Creek are doing an effective job of maintaining a beach.

OTHER SHORE STRUCTURES: There are numerous piers in the subsegment.

SHORE USE LIMITATIONS: The entire subsegment is zoned agricultural and residential, precluding any use other than recreational. Most of the unused, wooded areas of land have elevations of at least 20 feet along the shoreline, making access to the water difficult.

ALTERNATE SHORE USE: Low. Fifty percent of the subsegment is already used for residential or agricultural purposes. The remainder of the subsegment is basically rural, decreasing the need for public recreational facilities.


PHOTOS: Aerial-VIMS 23Jan76 LN-6A/52-79.

EXTENT: 26,300 feet (5.0 mi.) of shoreline along the Rappahannock River from Midway Creek to Deep Creek. The subsegment includes a fastland measurement of 28,100 feet (5.3 mi.).

SHORELANDS TYPE
FASTLAND: Low shore 79% (4.2 mi.) and moderately low shore 21% (1.1 mi.).
SHORE: Artificially stabilized 28% (1.4 mi.), beach 12% (0.6 mi.), fringe marsh 37% (1.9 mi.), and embayed marsh 24% (1.2 mi.).
NEARSHORE: Narrow 16% and intermediate 32%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 17% (0.9 mi.), residential 41% (2.2 mi.), and unmanaged, wooded 42% (2.4 mi.).
SHORE: Private recreation including bathing along the beaches and waterfowl hunting in the marshes.
NEARSHORE: Sport and commercial boating, fishing, and shellfishing.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends basically SSE - NNE. Patches at Boer are 5 - 5 nautical miles and W - 4 3/4 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: Moderate, critical. Several structures are built right on the shoreline and could be inundated during periods of abnormally high water.

WATER QUALITY: Satisfactory. The entire subsegment meets both the State Water Control Board’s 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Fair. Most of the shoreline is fronted by thin, strip beaches. At the mouth
of the creek to the southeast of Deep Creek, there is a relatively wide, clean sand beach.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Historically the average erosion rate has been slight or no change to moderate, noncritical (1.3 to 2.9 feet per year). However, only the unprotected areas now seem to be experiencing erosion. There are also three areas experiencing accretion. These are the sandspit at the mouth of Deep Creek (0.9 feet per year), the mouth of the creek southeast of Deep Creek (2.1 feet per year), and around Midway Creek (1.6 feet per year).

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There are numerous protective structures in this subsegment, most of which are doing a good job of stabilizing the shore. Wooden bulkhead and riprap, often used in conjunction with groins, are the most common structures.

OTHER SHORE STRUCTURES: There are several piers in the subsegment.

SHORE USE LIMITATIONS: The county zoning ordinance prohibits any commercial or industrial use along this portion of the river. Fifty-eight percent of the shorelands are already used for residential and agricultural purposes and any build-up of the remaining portion would spoil the rural character of the area.

ALTERNATE SHORE USE: Low. Commercial or industrial development is not permitted along this portion of the Rappahannock River, and there seems little demand for public recreational facilities.


PHOTOS: Aerial-VIMS 23Jan76 LN-6b/36-51.
SUBSEGMENT 7A
BELLE ISLE
Map 11

EXTENT: 91,400 feet (17.3 mi.) of shoreline along the Rappahannock River from Deep Creek to Mulberry Creek, including Deep and Mulberry Creeks. This subsegment contains a fastland measurement of 99,900 (18.9 mi.). Included in this measurement is Belle Isle, which has a fastland measurement of 16,600 feet (3.1 mi.).

SHORELANDS TYPE
FASTLAND: Low shore 93% (17.6 mi.) and moderately low shore 7% (1.3 mi.).
SHORE: Artificially stabilized 2% (0.4 mi.), beach 1% (0.1 mi.), fringe marsh 72% (12.5 mi.), embayed marsh 10% (1.7 mi.), and extensive marsh 15% (2.5 mi.).
NEARSHORE: Intermediate 13% and wide 3%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 33% (6.3 mi.), commercial <1% (0.1 mi.), residential 6% (1.2 mi.), unmanaged, wooded 38% (7.1 mi.), and unmanaged, unwooded 22% (4.2 mi.).
SHORE: Some private recreation, but mostly unused.
NEARSHORE: Sport and commercial boating, fishing and shellfishing.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends SE - NW. Fetches at Belle Isle are SE - 12 nautical miles, W - 3 nautical miles, and WNW - 64 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: High, noncritical for most of the subsegment. High, critical for one house on Mulberry Creek and one house on Belle Isle.

WATER QUALITY: Satisfactory. The entire subsegment meets both the State Water Control Board’s 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor. There is only a small section of beach on Belle Isle. The rest of the shoreline of this subsegment is fronted by marsh.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for Mulberry and Deep Creeks. Moderate, noncritical (2.5 feet per year) for the river-fronting portion of Belle Isle.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are two areas of wooden bulkhead in Mulberry Creek and two areas of wooden bulkhead in Deep Creek. On the southeast end of Belle Isle, there is a groin field which is doing a relatively good job of trapping sand. Also, just southeast of the groins there is one small section of riprap.
OTHER SHORE STRUCTURES: There are a few piers along Deep Creek and Mulberry Creek.

SHORE USE LIMITATIONS: This subsegment has low fastland elevations and is subject to flooding fairly often. Twenty-five percent of the shoreline are either embayed or extensive marshes which should be left in their natural condition as wildlife and fish habitats.

ALTERNATE SHORE USE: Low. The county zoning ordinance prohibits commercial or industrial use of this subsegment. Some residential construction may continue on the higher ground, but care should be taken to maintain the good water quality and the marsh lands.

NOS® 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.
PHOTOS: Aerial-VIMS 23Jan76 LN-7A/12-35.

SUBSEGMENT 7B
LANCASTER CREEK
Maps 11 and 12

EXTENT: 60,000 feet (11.4 mi.) of shoreline from Mulberry Creek along the Rappahannock to the headwaters of Lancaster Creek. This subsegment includes 70,000 feet (13.5 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 48% (6.3 mi.) and moderately low shore 52% (6.9 mi.).
SHORE: Artificially stabilized 6% (0.7 mi.), beach 5% (0.4 mi.), fringe marsh 38% (4.3 mi.), embayed marsh 51% (5.8 mi.), and extensive marsh 2% (0.2 mi.).
NEARSHORE: Intermediate 2% and wide 7%. The rest of the shoreline is located in Lancaster Creek which is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 20% (2.6 mi.), residential 30% (4.1 mi.), and unmanaged, wooded 50% (6.6 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Commercial and sport boating, fishing and shellfishing.

WIND AND SEA EXPOSURE: The shoreline of Lancaster Creek trends basically W - E.

OWNERSHIP: Private.

ZONING: Residential and agricultural.

FLOOD HAZARD: Low, noncritical for most of the subsegment. High, noncritical for the Moratillo area.

WATER QUALITY: Satisfactory. The entire subsegment meets the State Water Control Board’s 305(b)(1)(B) criteria and all except the upper portions of Lancaster Creek meet the Bureau of Shellfish Sanitation standards.

BEACH QUALITY: Poor to fair. There are no beaches of any significant size in this subsegment. There are several small strip beaches to the northwest of the mouth of Mulberry Creek.
PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to severe, noncritical. The Morattico area has experienced an average historical erosion rate of 3.1 to 4.8 feet per year. However, most of this area has now been artificially stabilized.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Almost the entire Morattico area shoreline has been artificially stabilized. These structures consist mainly of wooden bulkhead, groins, and riprap of tides, concrete conduits, and oyster shells. While the riprap is mostly effective, large sections of bulkhead have deteriorated and are being flanked. Several groins are ineffective.

OTHER SHORE STRUCTURES: There are numerous piers in the subsegment.

SHORE USE LIMITATIONS: Fifty percent of the shoreline is already used for agricultural or residential purposes. A large portion of Lancaster Creek is embayed marsh, which should be left in its natural condition as a wildlife and fish habitat.

ALTERNATE SHORE USE: Low. The county zoning ordinance prohibits any commercial or industrial use of the shoreline. Due to the rural nature of the area, there would seem to be little demand for public recreational facilities.

MAPS: USGS, 7.5 Min.Ser. (Topo.), LIVELY Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), MORATTICO Quadr., 1968.
NOS# 12237 (605-SC), 1:40,000 scale,

PHOTOS: Aerial-VIMS 23Jan76 LN-7B/1-11.
MAP 4A
CHERRY POINT AREA
TOPOGRAPHY AND CULTURE
Subsegment 3A
" = Segment Boundary
/ = Subsegment Boundary
MAP 4C
CHERRY POINT AREA
FASTLAND USE, OWNERSHIP, EROSION
Subsegment 3A

USE
Agricultural  A
Industrial     I
Residential   RS

OWNERSHIP
Private       1

EROSION
Moderate
Slight or No Change  No Symbol
5B

MAP 8C
TOWLES POINT
FASTLAND USE, OWNERSHIP, EROSION
Subsegments 4D, 5A, and 5B

USE
Agricultural A
Residential RS
Unmanaged
Wooded W

OWNERSHIP
Private 1

EROSION
Moderate
Slight or No Change No Symbol

LANCASTER CO
MIDDLESEX CO
MAP 9C
ROGUE POINT AREA
FASTLAND USE, OWNERSHIP, EROSION
Subsegment 5B

USE
Agricultural A
Residential RS
Unmanaged W
Wooded W

OWNERSHIP
Private 1

EROSION
Moderate IIIII
Slight or No Change No Symbol
MAP 11A
DEEP CREEK
TOPOGRAPHY AND CULTURE
Segments 6B, 7A, and 7B
/ = Segment Boundary
\ = Subsegment Boundary