Shoreline Situation Report Essex County, Virginia

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Shoreline Situation Report
ESSEX COUNTY, VIRGINIA

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# TABLE OF CONTENTS

**CHAPTER 1: INTRODUCTION**

- 1.1 Purposes and Goals  
- 1.2 Acknowledgements  

**CHAPTER 2: APPROACH USED AND ELEMENTS CONSIDERED**

- 2.1 Approach to the Problem  
- 2.2 Characteristics of the Shorelands Included  

**CHAPTER 3: PRESENT SHORELINE SITUATION OF ESSEX**

- 3.1 The Shorelands of Essex  
- 3.2 Shore Erosion Situation  
- 3.3 Shore Use Limitations  

**CHAPTER 4: SUMMARIES AND MAPS OF ESSEX**

- 4.1 Segment and Subsegment Summaries  
- 4.2 Segment and Subsegment Descriptions  
  - Segment 1  
  - Segment 2  
  - Segment 3  
  - Segment 4  
  - Segment 5  
  - Segment 6  
  - Segment 7  
  - Segment 8  
- 4.3 Segment and Subsegment Maps  

---

**LIST OF ILLUSTRATIONS**

<table>
<thead>
<tr>
<th>FIGURE</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1: Shoreland Components</td>
<td>5</td>
</tr>
<tr>
<td>2: Marsh Types</td>
<td>5</td>
</tr>
<tr>
<td>3: Typical River Meander</td>
<td>11</td>
</tr>
<tr>
<td>4: Mark Haven Beach</td>
<td>12</td>
</tr>
<tr>
<td>5: Bowlers Wharf</td>
<td>12</td>
</tr>
<tr>
<td>6: North of Browns Point</td>
<td>12</td>
</tr>
<tr>
<td>7: South of Lowery Point</td>
<td>12</td>
</tr>
<tr>
<td>8: Lowery Point</td>
<td>13</td>
</tr>
<tr>
<td>9: Tappahannock</td>
<td>13</td>
</tr>
<tr>
<td>10: East of Mount Landing Creek</td>
<td>13</td>
</tr>
<tr>
<td>11: Daingerfield Landing</td>
<td>13</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A: Comparison of Shorelands Use</td>
<td>10</td>
</tr>
<tr>
<td>1: Essex County Shorelands Physiography</td>
<td>19</td>
</tr>
<tr>
<td>2: Essex County Subsegment Summaries</td>
<td>22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MAPS</th>
<th>PAGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A-E: Essex County Summary Maps</td>
<td>14</td>
</tr>
<tr>
<td>2A-C: Mark Haven Beach</td>
<td>61</td>
</tr>
<tr>
<td>3A-C: Bowlers Wharf</td>
<td>44</td>
</tr>
<tr>
<td>4A-C: Piscataway Creek</td>
<td>47</td>
</tr>
<tr>
<td>5A-C: Tappahannock</td>
<td>50</td>
</tr>
<tr>
<td>6A-C: Mount Landing Creek</td>
<td>53</td>
</tr>
<tr>
<td>7A-C: Bottoms Neck</td>
<td>56</td>
</tr>
<tr>
<td>8A-C: Otterburn Marsh</td>
<td>59</td>
</tr>
<tr>
<td>9A-C: Horse Head Marsh</td>
<td>62</td>
</tr>
<tr>
<td>10A-C: Portobago Bay</td>
<td>65</td>
</tr>
</tbody>
</table>
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 shoreline and, in some instances, a discussion of some of the potential or alternate uses of the shoreline, 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. Alternatively, 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 or city level, we have executed our report on that level although we realize some of the information may be most useful at a higher governmental level. The Commonwealth of Virginia has traditionally chosen to place as much as possible, the regulatory decision processes at the county level. The Virginia Wetlands Act of 1972 (Chapter 2.1, Title 62.1, Code of Virginia), for example provides for the establishment of County Boards to act on applications for alterations of wetlands. Thus, our focus at the county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

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 04-5.158-50001. 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 the several drafts of the manuscript, Bill Jenkins, who prepared the photographs, and Glenn Carter and Sam White who piloted the aircraft through several photographic missions. Also, we thank the numerous other persons who, through their direct aid, criticisms, and suggestions, have assisted our work.
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 followed by a discussion of our treatment of each.

- a) Shorelands physiographic classification
- b) Shorelands use classification
- c) Shorelands ownership classification
- d) Zoning
- e) Water quality
- f) Shore erosion and shoreline defenses
- g) 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 the types for each of the three elements portrayed side by side on a map may provide the opportunity to examine joint relationships among the elements. As an example, the application of the system permits the user to determine miles of high bluff shoreland interfacing with marsh in the shorezone.

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 embayed 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 half time and a half tidal range above mean low water (refer to Figure 1). In operation with topographic maps the inner fringe of the marsh symbols is taken as the landward limit.

The physiographic character of the marshes has also been separated into three types (see Figure 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 estuarine or river. An embayed 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 embayed marsh. The central point is that planners, in the light of ongoing and future research, will desire to weight various functions of marshes and the physiographic delineation aids their decision making by denoting where various types exist. The classification used is:

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

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

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

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

Figure 2
A plan view of the three marsh types.

b) Shorelands Use Classification

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 de-
velopment.

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;
less than 40% tree cover.
b) Wooded: more than 40% tree cover.

The shorelands ownership 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.

d) 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 (305 (b) Report) (April, 1976).

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-
tceptable. In these cases an Intermediate rating
may be assigned temporarily, and the area will be
permitted to remain open pending an improvement in
conditions.

Although the shellfish standards are somewhat
more stringent than most of the other water quality
standards, they are included because of the eco-
omic 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.

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore ero-
sion:
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
dangerous.

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-
tions and interviews were held with local inhab-
thants.

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.

g) 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 wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 3, by G.M. Silberhorn, G.M. Dawes, and T.A. Barnard, Jr., ERAMSOE No. 46, 1974, and in other VIMS publications.

Flood Hazard Levels

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

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.

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.
CHAPTER 3
Present Shorelands Situation
CHAPTER 3

PRESENT SHORELINE SITUATION OF ESSEX COUNTY

3.1 THE SHORELANDS OF ESSEX COUNTY

Essex County is located along the southern bank of the Rappahannock River and is bounded by Middlesex County to the southeast and Caroline County to the northwest. The county is predominantly rural in nature, though sections of the shorelands are developed. The only fairly large population center along the shore is the Town of Tappahannock.

The fastland of Essex County ranges from low shore to high shore with bluff, with several areas of artificial stabilization. Table 1 is a comparison (see Figure 1). Although eighty-nine percent of the shoreline is low or moderately low shore (sometimes with bluffs), flooding is not usually a problem.

Tidal marshes, including fringe, embayed and extensive marshes, comprise eighty-four percent of the county’s shoreline (a tidal marsh inventory for Essex County is forthcoming). The Virginia Wetlands Act of 1972 controls any proposed alterations to these areas, as marshes, especially embayed and extensive marshes, serve vital ecological functions and have valuable flood and erosion protection qualities. As non-renewable resources, marshes should be preserved.

Eleven percent of the shoreline is comprised of beaches. Though there are several nice beaches fronting private residences, most areas have thin, strip beaches, often with vegetation.

Table 1: Comparison of Shorelands Use Statistics

<table>
<thead>
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<th>Miles (Percent of Section)</th>
<th>Subsegments</th>
<th>Subsegments</th>
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<tbody>
<tr>
<td>Fastland Use</td>
<td>1A - 4A</td>
<td>4B - 8C</td>
</tr>
<tr>
<td>Unmanaged, Wooded</td>
<td>33.3 mi. (43%)</td>
<td>15.3 mi. (19%)</td>
</tr>
<tr>
<td>Agricultural</td>
<td>27.7 mi. (35%)</td>
<td>63.7 mi. (78%)</td>
</tr>
<tr>
<td>Residential</td>
<td>13.9 mi. (18%)</td>
<td>1.6 mi. (2%)</td>
</tr>
<tr>
<td>Commercial</td>
<td>1.5 mi. (2%)</td>
<td>0.4 mi. (13%)</td>
</tr>
<tr>
<td>Industrial</td>
<td>1.5 mi. (2%)</td>
<td>0.2 mi. (1%)</td>
</tr>
<tr>
<td></td>
<td>78.1 mi. (100%)</td>
<td>81.2 mi. (100%)</td>
</tr>
</tbody>
</table>

There are several major differences in the two sections, as the table reveals. The most important aspect is the difference in residential usage. East of Tappahannock, eighteen percent of the shorelands are developed for residential purposes, as compared with only two percent of the shorelands to the west. Overall, seventy-eight percent of the shorelands east of Tappahannock are still agricultural - wooded, while ninety-seven percent of the shorelands to the west are agricultural - wooded. Another statistic showing the greater development in the eastern section is the amount of artificial stabilization. Thirteen percent of the shoreline east of Tappahannock is artificially stabilized, as compared with only one percent west of Tappahannock.

According to the Virginia Water Quality Inventory (305(b) Report), the Rappahannock River along Essex County generally has good water quality (Hoskins Creek, east of Tappahannock, has poor water quality due to natural swamp conditions and sewage waste treatment plants). Seasonal and sectional water problems do occur due to upstream industrial and domestic waste discharges and some agricultural rain runoff. Development along the county’s shorelands should be controlled so that the water quality of the Rappahannock River is not damaged.

3.2 SHORE EROSION SITUATION

Shoreline retreat in Essex County is dependent upon several factors, combinations of which control the rate of erosion or accretion in a given area at a given time. There are three basic causes of erosion which can affect a river system such as the Rappahannock River. A prevalent cause of shoreline retreat is downhill rain runoff. This is a basic weathering of the shoreline due to rain waters. Rain runoff erosion mainly affects bluffs, especially wooded bluffs, as it undermines the tree system along the shore. Continued washing away of the soil causes the trees to eventually fall, carrying with them large amounts of soil suspended in the root systems. Rain runoff erosion is not dependent upon the nearshore type and can pose a problem for any area.

It was observed that several agricultural areas have been plowed perpendicularly to the shoreline, such plowing encourages rain runoff erosion and is a prime contributor to non-point source pollution. The sediments suspended in the rain runoff contain large amounts of fertilizers and pesticides which contribute to seasonal water quality problems. Most runoff erosion and the ensuing pollution from agricultural areas could be eliminated by 1) plowing parallel to the shoreline, and 2) leaving a "green zone" along the shoreline (a "green zone" is a buffer area planted with grasses between the field and the shore). In Essex County, a buffer of fifty feet should be sufficient. Proper use of the shorelands would do much to control runoff erosion of the agricultural lands and the pollution of the river. The other two types of erosion are dependent upon the location of the area, the type of nearshore zone, and many other variables.

The primary cause of erosion in the Chesapeake Bay system is wave action generated by local winds. The height and growth of waves is controlled by four factors: The overwater distance across which the wind blows (the fetch), the velocity of the wind, the duration of time that the wind blows, and the depth of the water. The width of the water body is also important in describing erosion patterns for a given area. Wave action is responsible for most erosion along the county’s shoreline from Beverly Marsh east toward the river mouth. The longest fetches and usually the most powerful wind generated waves are from the southeast.
north, and the northwest along this section of the county's shoreline. However, winds from the southeast are generally very light. Those from the south are very powerful and thus can cause much erosion even without a large fetch. Winds approaching from any of these directions can cause much shoreline retreat along affected areas. (The 100-year average erosion rate for much of this section of the shoreline is 1.5 to 2.5 feet per year, with several areas having rates of from 3 to 4 feet per year). Approximately 7.4 miles of the shoreline have been artificially stabilized. However, erosion is continuing in unprotected areas.

Most of the erosion and accretion found along the upper Rappahannock River (above Beverly Marsh) occurs at the bends in the river. The river current is fastest on the outside of the meanders and is much less on the inside. As a result, the outside bends erode while the inside bends accrete. The amount and rate of erosion depends upon both the composition of the land in the bends and the speed of the current there (see Figure 3).

Beaches and marshes are natural barriers against erosion of the fastland. Both absorb the incident wave energy and therefore inhibit the erosion of the fastland. However, beaches are usually very thin along the shoreline of Essex County due to a limited supply of sand in the littoral drift. Many areas, especially around Tappahannock and east of the town, have been artificially stabilized. These structures have usually been constructed on an individual basis, as compared to a sectional or community basis. Attendant with these structures has been the disappearance of beaches downstream, as sediment sources have been withdrawn from the system. Many areas have attempted to reestablish beaches by employing groin systems. However, these systems have proven of little value for most areas, since they depend upon the littoral transport of sand for success. In order to reestablish or maintain existing beaches, probably the only course of action would be a program of beach nourishment coincident with site specifically designed structures to trap moving sands. Any action would be costly and should entail a detailed study of the area and a unified solution.

It should be noted that most areas still suffering from erosion in Essex County are either used for agriculture or are unused. Any program of protection for these areas would probably be too costly to be justified.

3.3 ALTERNATE SHORE USE

Essex County is overwhelmingly rural, with eighty-eight percent of the shorelands being used for agriculture or are unused. Approximately ten percent of the shoreline is used for residential purposes and two percent is used for commercial and industrial purposes. Most present activity along the shoreline is centered around Tappahannock and some areas further east toward the river mouth. The presently consumed shorelands can be characterized as thin strips of land along the river which are used as residential areas, most being second or vacation homes (Figures 4, 5, 7, and 8). These areas are usually backed by agricultural lands. Little new development is occurring from Mount Landing Creek west toward the head of the Rappahannock River.

It is expected that some continued development will occur around the Town of Tappahannock, mainly for residential use. However, no large scale development seems probable. Care should be taken to ensure that the water quality of the Rappahannock River is not endangered by shoreline development.

Little alternate shore use seems necessary for the present time, since organized recreational facilities are usually needed in areas serving a high density population center. The only facilities needed along the shoreline in Essex County would be public boat ramps in various areas of the county.
FIGURE 4: View of Mark Haven Beach, Subsegment 1A. Like much of the county's shorelands, a thin strip of land adjacent to the shore has been developed for residential use while the remaining lands are undeveloped. Notice the erosion of the bluffs in this section.

FIGURE 5: Bowlers Wharf, Subsegment 1A. A good example of strip development prevalent in Essex County. The groin fields fronting the bulkheaded shoreline have been moderately effective in trapping sand.

FIGURE 6: View between Browns Point and Wares Wharf, Subsegment 1B. Erosion of the bluffs in this area, besides causing the loss of valuable farmlands, is also a cause of non-point source pollution to the Rappahannock River. Rain runoff carries a variety of fertilizers and pesticides into the river. In order to reduce erosion of such farmlands, a "green zone" (an area that is planted in grasses, bordering the shoreline) should be established. Along the Essex County shoreline, a green zone fifty feet wide should be sufficient.

FIGURE 7: South of Lowery Point, Subsegment 1B. The numerous groins have not been successful in creating beaches in front of the bulkhead in this area.
FIGURE 8: Lowery Point, Subsegment 1C. These residences were built on artificial fill dumped on the marsh. The groins of cement bags have not been effective in building up a buffer beach in front of the bulkhead.

FIGURE 9: Tappahannock, Subsegment 4A. Tappahannock is the only town located along the shorelands in Essex County. The entire shoreline has been artificially stabilized in this area. Again, the groins have not been effective in trapping a buffer beach.

FIGURE 10: East of Mount Landing Creek, Subsegment 4A. Erosion is a problem for the shoreline in this area. As can be seen from the photo, a small housing development is being constructed in this section.

FIGURE 11: Daingerfield Landing, Subsegment 6A. The agricultural fields have been plowed perpendicular to the shoreline, which encourages rain runoff erosion. Plowing should be parallel to the shore with a fifty foot buffer zone along the shoreline.
ESSEX COUNTY

Bridge 

\ = Segment Boundary
\ = Subsegment Boundary

MAP 1A

1A COUNTY LINE TO BROWNS POINT
1B BROWNS POINT TO LOWERY POINT
1C LOWERY POINT TO MOUTH OF PISCATAWAY CREEK
2 PISCATAWAY CREEK
3A MOUTH OF PISCATAWAY CREEK TO MOUTH OF HOSKINS CREEK
3B HOSKINS CREEK
4A MOUTH OF HOSKINS CREEK TO MOUTH OF MOUNT LANDING CREEK
4B MOUNT LANDING CREEK
5A MALLORY'S POINT TO JENKINS LANDING
5B JENKINS LANDING TO MOUTH OF SLUICE CREEK
6A MOUTH OF SLUICE CREEK TO MOUTH OF FARMERS HALL CREEK
6B FARMERS HALL CREEK AND BRICK HILL CREEK
6C OCCUPIA CREEK AND BRIDGE CREEK
7A ISLAND POINT TO OTTERBURN MARSH
7B OTTERBURN MARSH TO MOUTH OF ELMWOOD CREEK
8A MOUTH OF ELMWOOD CREEK TO HORSE HEAD POINT
8B GREEN BAY
8C MARSH POINT TO COUNTY LINE
MAP 1D
EROSION AND
SHORELINE STRUCTURES

EROSION
Severe
Moderate
Slight or No Change
No Symbol

SHORE PROTECTIVE STRUCTURES
B Bulkhead
R Rubble riprap
G Grions
<table>
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<tr>
<th>Subsegment</th>
<th>Artificial</th>
<th>Low Store</th>
<th>Low Shore Bluff</th>
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<th>Moderately High Shore</th>
<th>High Shore</th>
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<th>Prime Marsh</th>
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CHAPTER 4

4.1 TABLE OF SUBSEGMENT SUMMARIES

4.2 SEGMENT AND SUBSEGMENT DESCRIPTIONS

4.3 SEGMENT AND SUBSEGMENT MAPS
### TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR ESSEX COUNTY, VIRGINIA

<table>
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<tr>
<th>Subsegment</th>
<th>Shoreline Type</th>
<th>Shoreline Use</th>
<th>Ownership</th>
<th>Flood Risk</th>
<th>Water Quality</th>
<th>Beach Quality</th>
<th>Shore Erosion Situation</th>
<th>Shoreline Use</th>
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<tr>
<td>12.0 miles of fastland</td>
<td>Low shore 12%, low shore with bluff 7%, moderately low shore 32%, moderately high shore 3%, extremely high shore 2%, moderately high shore 7%, moderately high shore with bluff 15%, and high shore with bluff 17%</td>
<td>Agriculturally stabilized 23%, commercial 4%, residential 20%, and unmanaged 45%</td>
<td>Private</td>
<td>Low to moderate, uncontrolled. The majority of the segment has elevations of at least 10 feet and is not subject to flooding.</td>
<td>Poor. The majority of this subsegment has narrow, straggly beaches.</td>
<td>Poor or no change to severe, uncontrolled. The area from Jones Point to Brown's Point has a severe erosion rate of approximately 2.5 feet per year. There are areas of effective bulkheading and stable riprap in this subsegment.</td>
<td>Low. The shoreline will probably remain basically rural, with very little residential development.</td>
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<td>10.0 miles of fastland</td>
<td>Low shore 14%, low shore with bluff 11%, moderately low shore 21%, and moderately low shore with bluff 25%</td>
<td>Agriculturally stabilized 14%, beach 43%, fringe marsh 13%, embayed marsh 12%, and extensive marsh 15%</td>
<td>Private</td>
<td>Low to moderate, uncontrolled. Although the majority of the segment has elevations of at least 10 feet, some areas have extremely high shore with bluff</td>
<td>Poor. The majority of this subsegment has narrow, straggly beaches.</td>
<td>Poor or no change to severe, uncontrolled. The area from Jones Point to Brown's Point has a severe erosion rate of approximately 2.5 feet per year. There are areas of effective bulkheading and stable riprap in this subsegment.</td>
<td>Low. The shoreline will probably remain basically rural, with very little residential development.</td>
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<tr>
<td>12.0 miles of fastland</td>
<td>Entirely low shore.</td>
<td>Entirely low shore.</td>
<td>Private</td>
<td>Low to moderate, uncontrolled. The entire segment has a low shore, most of which is subject to erosion. The elevation is above a 5-foot contour line and is not subject to flooding.</td>
<td>Poor. The only beaches in this subsegment are found in the segment.</td>
<td>Poor or no change to severe, uncontrolled. The area from Jones Point to Brown's Point has a severe erosion rate of approximately 2.5 feet per year. There are areas of effective bulkheading and stable riprap in this subsegment.</td>
<td>Low. The shoreline will probably remain basically rural, with very little residential development.</td>
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<td>2.0 miles of fastland</td>
<td>Low shore 44%, low shore with bluff 21%, moderately low shore 31%, high shore 1%, high shore with bluff 11%, and high shore with bluff 15%</td>
<td>Agriculturally stabilized 24%, beach 69%, fringe marsh 5%, embayed marsh 18%, and extensive marsh 21%</td>
<td>Private</td>
<td>Low to moderate, uncontrolled. The majority of the segment has elevations of at least 10 feet, some of which could be inundated during floods.</td>
<td>Poor. The majority of this subsegment has narrow, straggly beaches.</td>
<td>Poor or no change to severe, uncontrolled. The area from Jones Point to Brown's Point has a severe erosion rate of approximately 2.5 feet per year. There are areas of effective bulkheading and stable riprap in this subsegment.</td>
<td>Low. The shoreline will probably remain basically rural, with very little residential development.</td>
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<td>14.0 miles of fastland</td>
<td>Low shore 5%, low shore with bluff 21%, moderately low shore 31%, low shore with bluff 54%, and low shore with bluff 11%</td>
<td>Agriculturally stabilized 24%, public use 11%, residential 33%, and unmanaged 2%</td>
<td>Private</td>
<td>Low to moderate, uncontrolled. The majority of the segment has elevations of at least 10 feet, some of which could be inundated during floods.</td>
<td>Poor. The majority of this subsegment has narrow, straggly beaches.</td>
<td>Poor or no change to severe, uncontrolled. The area from Jones Point to Brown's Point has a severe erosion rate of approximately 2.5 feet per year. There are areas of effective bulkheading and stable riprap in this subsegment.</td>
<td>Low. The shoreline will probably remain basically rural, with very little residential development.</td>
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<th>SHORELAND USE</th>
<th>SHORELANDS TYPE</th>
<th>WATER QUALITY</th>
<th>SHORE QUALITY</th>
<th>SHORE EROSION ( \text{E} )</th>
<th>ALTERNATE SHORE USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>35 HOGSNECK CREEK</td>
<td>Artificial fill 45%, low shore 15%, low shore with bluff 7%, moderately low shore 15%, moderately low shore with bluff 3%, high shore 8%</td>
<td>Poor, erosion rate of 2.7 feet per year.</td>
<td>Poor, some erosion,但在 slides are shallow and narrow.</td>
<td>Poor, some erosion, but little damage.</td>
<td>Moderate, no critical erosion.</td>
</tr>
</tbody>
</table>

34 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

33 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

32 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

31 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

30 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

29 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

28 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

27 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

26 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

25 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

24 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |

23 HOGSNECK CREEK TO BUCKES \( \text{SHORE} \) | Low shore 45% and low shore with bluff 3%, moderately low shore 15%, moderately low shore with bluff 7%, high shore 8% | Poor, erosion rate of 1.9 feet per year. | Poor, some erosion, but little damage. | Poor, some erosion, but little damage. | Moderate, no critical erosion. |
TABLE 2 (cont’d.)

<table>
<thead>
<tr>
<th>SUBSEGMENT</th>
<th>SHORELANDS TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st ORDER CREEK</td>
<td>Low shore 89% and low shore with bluff 11%</td>
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<tr>
<td>1st ORDER CREEK</td>
<td>Low shore 89% and low shore with bluff 11%, moderately low shore 8%, and moderately low shore with bluff 2%</td>
</tr>
<tr>
<td>1st ORDER CREEK</td>
<td>Artificially stabilized 2%, beach 2%, and extensive marsh 96%</td>
</tr>
<tr>
<td>1st ORDER CREEK</td>
<td>Entirely narrow.</td>
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</tbody>
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<th>SHORELANDS TYPE</th>
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<td>2nd ORDER CREEK TO BAYSIDE</td>
<td>Low shore 89%, moderately low shore 8%, and moderate low shore with bluff 2%</td>
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<tr>
<td>2nd ORDER CREEK TO BAYSIDE</td>
<td>Artificially stabilized 2%, beach 2%, and extensive marsh 96%</td>
</tr>
<tr>
<td>2nd ORDER CREEK TO BAYSIDE</td>
<td>Entirely narrow.</td>
</tr>
</tbody>
</table>

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<th>SUBSEGMENT</th>
<th>SHORELANDS TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>3rd ORDER CREEK TO BAYSIDE</td>
<td>Low shore 89%, low shore with bluff 11%, moderately low shore 8%, and moderately low shore with bluff 2%</td>
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<tr>
<td>3rd ORDER CREEK TO BAYSIDE</td>
<td>Artificially stabilized 2%, beach 2%, and extensive marsh 96%</td>
</tr>
<tr>
<td>3rd ORDER CREEK TO BAYSIDE</td>
<td>Entirely narrow.</td>
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</tbody>
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<tr>
<th>SUBSEGMENT</th>
<th>SHORELANDS TYPE</th>
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<tbody>
<tr>
<td>4th ORDER CREEK TO SUBSEGMENT</td>
<td>Low shore 89%, low shore with bluff 11%, moderately low shore 8%, and moderately low shore with bluff 2%</td>
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<tr>
<td>4th ORDER CREEK TO SUBSEGMENT</td>
<td>Artificially stabilized 2%, beach 2%, and extensive marsh 96%</td>
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<tr>
<td>4th ORDER CREEK TO SUBSEGMENT</td>
<td>Entirely narrow.</td>
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SUBSEGMENT 1A
COUNTY LINE TO BROWNS POINT
Maps 2 and 3

EXTENT: 45,800 feet (8.6 mi.) of shoreline on the Rappahannock River from the Essex/Middlesex county line to Browns Point. The subsegment also includes 78,200 feet (14.8 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 37% (5.4 mi.), low shore with bluff 5% (0.7 mi.), moderately low shore 37% (5.5 mi.), moderately low shore with bluff 9% (1.4 mi.), moderately high shore 7% (1.1 mi.), moderately high shore with bluff 2% (0.3 mi.), high shore 2% (0.2 mi.), and high shore with bluff 1% (0.2 mi.).
SHORE: Artificially stabilized 19% (1.6 mi.), beach 63% (5.5 mi.), fringe marsh 1% (0.1 mi.), embayed marsh 12% (1.0 mi.), and extensive marsh 4% (0.4 mi.).
NEARSHORE: Narrow 29% and wide 71%.

SHORELANDS USE
FASTLAND: Agricultural 26% (3.9 mi.), commercial 4% (0.6 mi.), residential 29% (4.2 mi.), and unmanaged, wooded 41% (6.1 mi.).
SHORE: Private use along the residential sections, and some commercial use (marinas). The remainder of the shoreline in this subsegment appears to be unused.
NEARSHORE: Boating and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically SE - NW in this subsegment. Fetches at Jones Point are ESE - 5.8 nm and NW - 10.0 nm. At Brown Point, fetches are SE - 11.5 nm and NW - 4.1 nm.

OWNERSHIP: Entirely private.

FLOOD HAZARD: Low to moderate, noncritical. The majority of the subsegment has elevations of at least 10 feet with the exception of the marsh areas. There are no dwellings below 5-foot elevations.

WATER QUALITY: Fair to good. According to the Water Quality Inventory (305(b)Report) (Virginia State Water Control Board, April, 1976), this section of the Rappahannock River usually meets the state water quality standards. However, this section sometimes has lessened water quality due to upstream industrial pollution and agricultural runoff.

BEACH QUALITY: Poor to good. The majority of the subsegment has narrow, strip beaches. The area just north of the Middlesex county line has a long, wide beach of fine-grained sand.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. The Jones Point area is experiencing a moderate erosion rate, while the area just west of Jones Point to Bowlers Wharf has a severe erosion rate of approximately 3.3 feet per year. Erosion is compounded along the bluff areas in the subsegment. The bluffs are affected by wave actions attacking the unprotected cliff base and by downhill rain runoff.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: Most artificial stabilization is effective bulkhead. There are some areas of effective riprap and also several groin fields of moderate effectiveness.
OTHER SHORE STRUCTURES: There are numerous boat ramps and piers in this subsegment. Garrets Marina at Bowlers Wharf has berths for approximately 60 vessels.
SHORE USE LIMITATIONS: This subsegment is basically rural in nature, sixty-seven percent of the shorelands being either agricultural lands or unmanaged woods. The residential - commercial usage is generally confined to a thin strip of land along the shore. The residences are usually found in clusters of fewer than ten houses, some of which are used as primary dwellings and others as vacation homes. Much of the shoreline is experiencing erosion due to wind and wave attacks and downhill rain runoff. The many bluff areas are very susceptible to these forces.

ALTERNATE SHORE USE:
Low. The subsegment will probably remain basically rural in nature. Though some continued residential development along the shorelands is to be expected, little change in the makeup of shorelands' use is foreseen.


PHOTOS: Aerial-VIMS 1May76 ES-1A/1-54.
SUBSEGMENT 1B  
BROWNS POINT TO LOWERY POINT  
Maps 3 and 4  

EXTENT: 22,000 feet (4.2 mi.) of shoreline from Browns Point to Lowery Point along the Rappahannock River. The subsegment also includes 46,600 feet (8.9 mi.) of fastland.  

SHORELANDS TYPE  
FASTLAND: Low shore 93% (8.2 mi.), low shore with bluff 1% (0.1 mi.), moderately low shore 3% (0.3 mi.), and moderately low shore with bluff 3% (0.3 mi.).  
SHORE: Artificially stabilized 24% (1.0 mi.), beach 49% (2.0 mi.), fringe marsh 5% (0.2 mi.), and embayed marsh 22% (1.0 mi.).  
NEARSHORE: Interimmediate.  

SHORELANDS USE  
FASTLAND: Agricultural 24% (2.1 mi.), commercial 3% (0.2 mi.), recreational 2% (0.2 mi.), residential 33% (2.9 mi.), and unmanaged, wooded 36% (3.4 mi.).  
SHORE: Some private and commercial use (marinas), but mostly unused.  
NEARSHORE: Sport boating and fishing.  

WIND AND SEA EXPOSURE: The shoreline trends basically SE - NW. Fetches at Lowery Point are NW - 5.8 nm and SE - 11 nm. The fetch at Wares Wharf is SE - 15.7 nm.  

OWNERSHIP: Private.  
FLOOD HAZARD: Low to moderate, critical. Though the majority of the subsegment has elevations of at least 10 feet, some structures along the shoreline are below elevations of 5 feet. These structures are susceptible to flooding during periods of abnormally high water.  
WATER QUALITY: Fair to good. According to the State Water Control Board’s 305(b) Report, the Rappahannock River usually has good water quality. Seasonal water quality problems stem from upstream industrial and domestic discharges as well as agricultural runoff.  
BEACH QUALITY: Poor. The majority of this subsegment has narrow, strip beaches.  

PRESENT SHORE EROSION SITUATION  
EROSION RATE: Slight or no change to moderate, noncritical. The area from Browns Point to Wares Wharf has a moderate historical erosion rate of approximately 2.1 feet per year. However, much of the shoreline has been artificially stabilized. Erosion here is caused by storm induced wave actions and by downhill rain runoff, both of which attack the exposed cliff face.  
ENDANGERED STRUCTURES: None.  
SHORE PROTECTIVE STRUCTURES: There is approximately 3,000 feet of bulkhead and 2,000 feet of rubble riprap in the subsegment. Several areas have groin systems fronting the bulkhead or riprap. Though the bulkheads and riprap appear to be effective, most of the groins have been only partially effective in creating buffer beaches.  
OTHER SHORE STRUCTURES: There are numerous piers and several privately owned boat ramps in this subsegment.  
SHORE USE LIMITATIONS: As in Subsegment 1A, the shoreline is extensively used for residential purposes, many houses being vacation homes. Behind the shoreline, the subsegment is used for agriculture or is unused. Twenty-two percent of the shoreline is embayed marsh, which is protected by the Virginia Wetlands Act of 1972. The bluff areas are susceptible to erosion and should be developed with caution.  
ALTERNATE SHORE USE: Low. The residential/recreational shoreline development will probably continue in some areas of the subsegment. The rural nature of the subsegment should not be changed because of this development. Care should be taken to ensure that the shoreline does not become congested by residential build-up. This would not only despoil the rural atmosphere of the subsegment but would probably cause pollution of this section of the Rappahannock River.  

SUBSEGMENT IC
LOWERY POINT TO MOUTH OF PISCATAWAY CREEK
Map 4

EXTENT: 13,000 feet (2.4 mi.) of shoreline from Lowery Point to the mouth of Piscataway Creek. The subsegment also includes 19,400 feet (3.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Artificially stabilized 48% (1.2 mi.), beach 4% (0.1 mi.), fringe marsh 9% (0.2 mi.), embayed marsh 25% (0.6 mi.), and extensive marsh 14% (0.3 mi.).
MEANSHORE: Narrow 4%. The remainder of the subsegment is located in the mouth of Piscataway Creek.

SHORELANDS USE
FASTLAND: Agricultural 27% (1.0 mi.), commercial 4% (0.2 mi.), residential 47% (1.7 mi.), and unmanaged, wooded 22% (0.8 mi.).
SHORE: Private use in the residential sections and some commercial use (marinas). The remainder appears to be unused.
MEANSHORE: Sport boating, fishing, and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically ESE - WNW in this subsegment. The fetch at Fairview is NW - 2.2 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate, critical. The entire subsegment has low shore, most of which is subject to flooding during periods of abnormally high water. Many dwellings are below the 5-foot contour, some of which could be inundated during floods.

WATER QUALITY: Fair to good. The Rappahannock River usually has good water quality. Seasonal water quality problems stem from upstream pollution.

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. The area from Lowery Point to the mouth of Piscataway Creek had an historical erosion rate of 1.5 feet per year. Field investigations show little or no recent erosion except for the tip of Lowery Point, which is experiencing a slight shoreline retreat.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: This subsegment has a total of 6,200 feet of bulkhead, much of which is fronted by groin systems. Lowery Point has cement bag groins fronting the bulkheading and one residence has cement bags protecting the bulkhead toe. All bulkhead and some of the groins appear to be effective.

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

SHORE USE LIMITATIONS: Fifty-one percent of the shorelands are presently used for residential and commercial purposes. Many of the residences are used as second or vacation homes. Most remaining shoreline is comprised of embayed and extensive marshes which are protected by the Virginia Wetlands Act of 1972. The interior fastland is used for agriculture.

ALTERNATE SHORE USE: Low. There is little available shoreline property in this subsegment which can be developed. Since residences are mainly for vacation recreation, interior fastland behind marshes would hold little appeal for developers. It is expected that the subsegment will remain basically rural in nature.

MAPS: USGS, 7.5 Min.Ser. (Topo.), TAPPAHANNOCK Quadr., 1968.
C&GS, 4fml2237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, COBBOTMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: Aerial-VIMS 11May76 ES-1C/86-100.
SEGMENT 2
PISCATAWAY CREEK

Map 4

EXTENT: 93,600 feet (17.7 mi.) of shoreline along Piscataway Creek and Taylors Creek. The segment also includes 149,000 feet (28.2 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 44% (12.5 mi.), moderately low shore 31% (8.7 mi.), moderately high shore 9% (2.6 mi.), high shore 12% (3.3 mi.), and high shore with bluff 1% (0.4 mi.).
SHORE: Fringe marsh 26% (4.7 mi.), embayed marsh 47% (8.3 mi.), and extensive marsh 27% (4.7 mi.).
CREEK: Piscataway Creek has depths of 4 feet at the entrance, with greater depths for 5 miles upstream.

SHORELANDS USE
FASTLAND: Agricultural 46% (13.2 mi.), residential 3% (0.7 mi.), and unmanaged, wooded 51% (14.3 mi.).
SHORE: Some waterfowl hunting in the marsh areas, though mostly unused.
CREEK: Some sport boating and fishing.

WIND AND SEA EXPOSURE: The shoreline trends first NNE - SSW, then SE - NW. There are no significant fetches affecting the creek.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The majority of the segment has elevations of at least 5 feet and is not exposed to direct wind and wave actions. The marsh areas are subject to flooding during periods of high rainfall upstream. There are no endangered structures.

WATER QUALITY: Satisfactory. The only possible sources of pollution in Piscataway Creek would be from boating activities and agricultural runoff.

BEACH QUALITY: There are no beaches in this segment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:
Seventy-four percent of the shoreline in this segment is either embayed or extensive marsh. These areas should remain in their natural state, as they are important flood and erosion control agents. Little or no new development is expected in these areas. There is little access to Piscataway Creek except at the Route 17 bridge.

ALTERNATE SHORE USE:
Low. The wooded area near the Route 17 bridge could be developed as a campground with nature trails and a boat ramp for fishing access. Other areas will probably remain mostly unchanged.

MAPS: USGS, 7.5 Min. Ser. (Topo.), TAPPANNAHOOK Quadr., 1966;
USGS, 7.5 Min. Ser. (Topo.), DUNNSVILLE Quadr., 1968;
USGS, 7.5 Min. Ser. (Topo.), MOUNT LANDING Quadr., 1968;
G&GS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, COROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

SUBSEGMENT 3A

PISCATAWAY CREEK TO HOSKINS CREEK
Maps 4 and 5

EXTENT: 20,000 feet (3.8 mi.) of shoreline from the mouth of Piscataway Creek to the mouth of Hoskins Creek. The subsegment also includes 17,000 feet (3.2 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Artificial fill 13% (0.4 mi.) and low shore 87% (2.8 mi.).
SHORE: Artificially stabilized 25% (1.0 mi.), beach 19% (0.7 mi.), fringe marsh 21% (0.8 mi.), embayed marsh 6% (0.2 mi.), and extensive marsh 2% (0.1 mi.).
NEARSHORE: Narrow.

SHORELANDS USE
FASTLAND: Agricultural 56% (1.8 mi.) and residential 44% (1.4 mi.).
SHORE: Private use along the residential sections, such as strolling and bathing.
NEARSHORE: Sport boating, fishing, and other water-related activities.

WIND AND SEA EXPOSURE: The subsegment trends basically SE - NW. Fetches at Jones Point are ESE - 3.2 nm and NW - 4 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate, critical. Most of the segment has elevations of 5 feet and would probably be subject to flooding during abnormally high water. Most dwellings are placed along the 5-foot contour line, some on artificial fill. These structures could be damaged due to flooding during severe storm surges.

WATER QUALITY: Poor. The water just south of Hoskins Creek is polluted due to effluents from several sewage treatment plants and industrial discharges which flow into Hoskins Creek.

BEACH QUALITY: Poor. The only beaches have been trapped by the groin fields.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. While most of the subsegment has a moderate historical erosion rate of from 2.4 to 2.5 feet per year, most residential areas have been artificially stabilized.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: The subsegment has approximately 5,000 feet of effective bulkhead, located mainly at Island Farm and near Hoskins Creek. A marina on a creek near Jones Point has some bulkhead and two riprap jetties at its entrance. The bulkheads at Island Farm and near Hoskins Creek are fronted by groin fields, some of which are effective.

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

SHORE USE LIMITATIONS: Nearly all the fastland with direct river access has been developed for residential purposes. Marshes, which comprise the remaining shoreline, are protected by state law.

ALTERNATE SHORE USE: Low. The present development of available shoreline prohibits further or alternate development in this subsegment. The area will probably remain basically agricultural with a residual shoreline fringe.

MAPS: USGS, 7.5 Min.Ser. (Topo.), TAPPAHANNOCK Quadr., 1968.
C&GS, 1:2237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.
PHOTOS: Aerial-VIMS 1May76 ES-3A/103-117.

SUBSEGMENT 3B

HOSKINS CREEK
Map 5

EXTENT: 68,800 feet (13.0 mi.) of shoreline along Hoskins Creek. The subsegment also includes 82,000 feet (15.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Artificial fill 41% (0.6 mi.), low shore 48% (7.5 mi.), low shore with bluff 2% (0.3 mi.), moderately low shore 26% (4.1 mi.), moderately low shore with bluff 4% (0.6 mi.), high shore 11% (1.7 mi.), and high shore with bluff 5% (0.9 mi.).
SHORE: Artificially stabilized 2% (0.2 mi.), fringe marsh 41% (5.3 mi.), and embayed marsh 57% (7.5 mi.).
CREEK: The entrance channel to Hoskins Creek had controlling depths of 10 feet in 1972. The remainder of the creek is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 26% (4.1 mi.), commercial 3% (0.4 mi.), industrial 10% (1.5 mi.), residential 6% (0.9 mi.), and unmanaged, wooded 55% (8.7 mi.).
SHORE: Some waterfowl hunting in the marshes. There are two sewage outfalls and one industrial waste outfall emptying into Hoskins Creek.
CREEK: Some fishing but very little other use.

WIND AND SEA EXPOSURE: Hoskins Creek trends basically NE - SW. The creek is protected from winds and waves.

OWNERSHIP: Private 92% and county 8%.

FLOOD HAZARD: Low. The majority of the shoreline has elevations of at least 20 feet. Only the marsh areas are subject to flooding.

WATER QUALITY: Poor. Hoskins Creek has been degraded by point source sewage disposal. The creek does not meet applicable water quality standards or the State Water Control Board's 305(b)(1)(B) criteria.
BEACH QUALITY: There are no beaches in this subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 1,200 feet of effective bulkhead at the mouth of Hoskins Creek in Tappahannock.

OTHER SHORE STRUCTURES: There are several piers at the marinas and at the industrial site near the mouth of Hoskins Creek.

SHORE USE LIMITATIONS:
Fifty-seven percent of the shoreline is embayed marsh, which is protected by the Virginia Wetlands Act of 1972. Nineteen percent of the fastland is already actively used. Little access to the creek fastland limits inland development.

ALTERNATE SHORE USE:
Low. The wooded bluff areas along the creek head and limited access to the shoreline hinder any development along the creek. Little alternate use is seen for Hoskins Creek.


PHOTOS: Aerial-VIMS 11 May 76 ES-3B/117-120.
SUBSEGMENT 4A
HOSKINS CREEK TO MOUNT LANDING CREEK
Maps 5 and 6

EXTENT: 19,200 feet (3.6 mi.) of shoreline along the Rappahannock River from the mouth of Hoskins Creek to the mouth of Mount Landing Creek. The subsegment also includes 19,400 feet (3.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 69% (2.6 mi.) and low shore with bluff 31% (1.1 mi.).
SHORE: Artificially stabilized 48% (1.7 mi.), beach 36% (1.3 mi.), fringe marsh 3% (0.1 mi.), and embayed marsh 12% (0.5 mi.).
NEARSHORE: Narrow 56% and wide 21%. The remainder of the shoreline is found on a creek north of Tappahannock and is too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 43% (1.6 mi.) and residential 57% (2.1 mi.). The Town of Tappahannock has some commercial use along the shoreline near the Downing Bridge, but is too small to be included in the fastland use figures.
SHORE: Waterfowl hunting in the marshes and access to the water along Tappahannock's shoreline.
NEARSHORE: Sport boating, fishing, and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically SE - NW in this subsegment. Fetches at the Downing Bridge are ESE - 4.7 nm and NNW - 3.3 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The majority of the shoreline has average elevations of 10 feet, and only the marshes are subject to flooding. There are no dwellings below the 10-foot contour.

WATER QUALITY: Fair to good. Though boating activities tend to lower water quality, the State Water Control Board has determined that the Rappahannock River along this subsegment usually has good water quality.

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. The bluffs along the shoreline south of Mount Landing Creek are experiencing moderate erosion at an historical rate of 2.7 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 9,000 feet of bulkhead and 200 feet of riprap in this subsegment, most of which is located along the shoreline of the Town of Tappahannock. These structures all appear to be effective. Several areas have groin systems fronting the shoreline, some of which are partially effective.

OTHER SHORE STRUCTURES: There are numerous piers and several boat ramps in the subsegment. The Tappahannock Marina, northwest of the bridge, has a boat ramp and berths for approximately 40 boats.

SHORE USE LIMITATIONS: Approximately one-half of the shoreline in this subsegment is included in the Town of Tappahannock. This shoreline is already "consumed" by residential and some commercial development. The rest of the subsegment, located northeast of Tappahannock, is basically rural in nature. However, the strip of land bordering the shoreline in this section is used for residential purposes. The eroding bluffs along the shoreline could endanger any structure built too close to the shore.

ALTERNATE SHORE USE: Low. There is little available land in Tappahannock for development. The rest of the shoreline is either being used or is being developed for residential purposes. No alternate shore use is expected for this subsegment.

MAPS: USGS, 7.5 Min. Ser. (Topo.), TAPPAHANNOCK Quadr., 1966; USGS, 7.5 Min. Ser. (Topo.), MOUNT LANDING Quadr., 1968; CGG, #12237 (605-SC), 1:60,000 scale, RAPPAHANNOCK RIVER, CORKTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: Aerial-VIMS 11May76 ES-4A/118-137.
Ground-VIMS 25Feb73 ES-4A/ 1-33.
EXTENT: 61,000 feet (11.5 mi.) of shoreline, including Mount Landing Creek and the Rappahannock River to Mallory Point. The subsegment also includes 80,000 feet (15.5 mi.) of fastland.

SHORELAINS TYPE
FASTLAND: Low shore 67% (10.2 mi.), moderately low shore 4% (0.6 mi.), moderately low shore with bluff 3% (0.4 mi.), moderately high shore 8% (1.2 mi.), high shore 13% (2.0 mi.), and high shore with bluff 5% (0.7 mi.).
SHORE: Beach 2% (0.3 mi.), fringe marsh 14% (1.6 mi.), and embayed marsh 84% (9.6 mi.).
NEARSHORE: Wide 11%. The remainder of the subsegment is located along Mount Landing Creek.
CREEK: Mount Landing Creek has depths of 3 feet at the entrance with deeper water inside for 3.5 miles.

SHORELAINS USE
FASTLAND: Agricultural 31% (4.7 mi.) and unmanaged, wooded 69% (10.5 mi.).
SHORE: Some waterfowl hunting in the marshes, but mostly unused.
CREEK: Some fishing, but little other use.

WIND AND SEA EXPOSURE: Mount Landing Creek trends basically W - E; the shoreline from the creek to Mallory Point trends basically SW - SE. Fetches at Mallory Point are NW - 2.5 nm and SE - 3.9 nm. Mount Landing Creek is protected from any significant fetches.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The fastland is usually fronted by large marsh areas which help control flood waters. The lack of direct wind and wave actions on the shore and relative height of the fastland makes flooding unlikely along the creek. Some flooding is possible southwest of Mallory Point, where the fastland has average elevations of 5 feet. No structures are endangered.

WATER QUALITY: Good. There are no pollution sources along Mount Landing Creek.

BEACH QUALITY: Poor. There is only a small section of narrow, strip beach in this subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:
The present agricultural use of the shoreline along the river, combined with its low elevation, would limit development of this area. The Mount Landing Creek shorelands are almost entirely fronted by embayed marshes. The fastland is generally wooded and many areas have bluffs. These factors would tend to limit development along the creek.

ALTERNATE SHORE USE:
Low. The subsegment will probably remain basically rural in nature. Little alternate development seems probable for the near future.

MAPS: USGS, 7.5 Min. Ser. (Topo.), MOUNT LANDING Quadr., 1968.
C&GS, 4fol2237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.


32
SUBSEGMENT 5A

MALLORYS POINT TO JENKINS LANDING

Map 6

EXTENT: 18,600 feet (3.5 mi.) of shoreline along the Rappahannock River from Mallorys Point to Jenkins Landing. The subsegment also includes 23,000 feet (4.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 63% (2.8 mi.), low shore with bluff 18% (0.8 mi.), moderately low shore 11% (0.5 mi.), and moderately low shore with bluff 6% (0.3 mi.).

SHORE: Artificially stabilised 16% (0.6 mi.), beach 33% (1.1 mi.), fringe marsh 9% (0.3 mi.), embayed marsh 1% (0.1 mi.), and extensive marsh 41% (1.4 mi.).

NEARSHORE: Intermediate 59% and wide 26%. The remainder of the subsegment is located along the marsh creek.

SHORELANDS USE

FASTLAND: Agricultural 63% (2.7 mi.), residential 32% (1.4 mi.), and unmanaged, wooded 6% (0.2 mi.).

SHORE: Some waterfowl hunting in the marshes and private use.

NEARSHORE: Sport boating, fishing and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically E - W in this subsegment. Fetches at the middle of the subsegment are N - 2.7 nm and ENE - 2.2 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The fastland elevations range from 5 to 20 feet, with no structures located below the 5-foot contour. Only marsh areas are subject to flooding.

WATER QUALITY: Fair to good. Although the Rappahannock River in this subsegment usually has good water quality, seasonal problems arise due to upstream industrial and domestic waste pollution and agricultural runoff.

BEACH QUALITY: Poor. The majority of the beaches in this subsegment are located in the groin fields.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate, non-critical. Though the entire subsegment has an historical erosion rate of 2.3 feet per year, most of the shoreline near Mallorys Point has been artificially stabilized. The bluffs along the shoreline fronting the agricultural lands and residences near Jenkins Landing are still retreating at a moderate rate.

ENDANGERED STRUCTURES: No structures are endangered at the present time.

SHORE PROTECTIVE STRUCTURES: There is 3,000 feet of effective bulkhead in the subsegment. Groins fronting some areas seem to be at least partially effective.

OTHER SHORE STRUCTURES: There are numerous piers and one boat ramp in the subsegment.

SHORE USE LIMITATIONS:

One-third of the fastland is already developed for residential use. The bluffs along the shoreline fronting some residences are eroding, which could become a problem in future years. Undeveloped shoreline areas are rural, being either wooded or used for agriculture. Many of these areas are also eroding, which limit shoreline development.

ALTERNATE SHORE USE:

Low. Though some continued residual development is probable, little significant change is expected in the shoreline use. The rural nature of the subsegment will probably remain unchanged.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MOUNT LANDING Quad., 1968.

C&GS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORSTOGIAN RIVER to Fredericksburg, VA, 12th ed., 1975.


SUBSEGMENT 5B

JENKINS LANDING TO SLUICE CREEK

Maps 6 and 7

EXTENT: 58,000 feet (10.9 mi.) of shoreline from Jenkins Landing to the mouth of Sluice Creek, including Broad Creek. The subsegment also includes 25,200 feet (10.4 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 64% (6.6 mi.), moderately low shore 9% (0.9 mi.), moderately high shore 10% (1.1 mi.), moderately high shore with bluff 3% (0.3 mi.), high shore 5% (0.5 mi.), and high shore with bluff 9% (1.0 mi.).

SHORE: Artificially stabilized 16% (0.6 mi.), fringe marsh 28% (2.4 mi.), embayed marsh 22% (2.4 mi.), and extensive marsh 50% (5.4 mi.).

SHORELANDS USE

FASTLAND: Agricultural 71% (7.4 mi.) and unmanaged, wooded 29% (3.0 mi.).

SHORE: Some waterfowl hunting in the marshes but mostly unused.

NEARSHORE: Sport boating, fishing, and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically S - N in the subsegment. Fetches at Blantfield Point are N - 2.3 nm and SE - 2.0 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The fastland is fronted by an extensive marsh system, which acts as a flood control agent.

WATER QUALITY: Fair to good. The water quality of the Rappahannock River is usually good. Some pollution is caused by upstream industrial and domestic discharges, agricultural runoff and by boating activities.

BEACH QUALITY: There are no beaches in this subsegment.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Severe, non-critical. The marshes
in this subsegment have an historical erosion rate of 3.9 to 4.4 feet per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: There is one pier with a boat house attached in Sluice Creek.

SHORE USE LIMITATIONS:
The fastland in this subsegment is fronted by an extensive marsh system, which would limit access to the shoreline. These marshes are protected by the Virginia Wetlands Act of 1972. Also, this area has no viable inland access to the fastland. The lack of roads also would limit the desirability of this area for development.

ALTERNATE SHORE USE:
Low. It is expected that the subsegment will remain basically rural in nature. No new development is probable for this area.


PHOTOS: Aerial-VIMS 1May76 ES-5B/161-171.
SUBSEGMENT 6A
SLUICE CREEK TO FARMERS HALL CREEK

Map 7

EXTENT: 21,000 feet (4.0 mi.) of shoreline from the mouth of Sluice Creek to the mouth of Farmers Hall Creek. The subsegment also includes 16,200 feet (3.1 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Beach 10% (0.4 mi.), fringe marsh 24% (0.9 mi.), and extensive marsh 66% (2.7 mi.).
NEARSHORE: Intermediate 41%. The remainder of the nearshore is in the entrance to Farmers Hall Creek.

SHORELANDS USE
FASTLAND: Agricultural 90% (2.8 mi.) and unmanaged, wooded 10% (0.3 mi.).
SHORE: Mostly unused.
NEARSHORE: Sport boating, fishing and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends basically SE - NW in the subsegment. The fetch at Daingerfield Landing is SE ~ 2.0 nm.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The majority of the shoreline has elevations of 10 feet. There are no endangered structures.

WATER QUALITY: Fair to good. Although the Rappahannock River usually has good water quality, some problems arise from upstream pollution and from agricultural runoff.

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical. This subsegment has an historical erosion rate of 1.9 feet per year. Erosion mainly affects the low bluffs southeast of Daingerfield Landing, where wind and waves undercut the toe and rain runoff causes slumping of the cliff face.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:
This area is used extensively for agricultural purposes. Any development would be at the sacrifice of the agriculture. The shoreline, however, is eroding at a moderate rate of 1.9 feet per year. Any building along the shoreline would have to cope with this problem.

ALTERNATE SHORE USE:
Low. The subsegment will probably remain as an agricultural area. With little good access, the area would not be a prime target for any alternate type of development.

C&GS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

SUBSEGMENT 6B
FARMERS HALL CREEK AND BRICK HILL CREEK

Map 7

EXTENT: 37,000 feet (7.0 mi.) of shoreline along Farmers Hall Creek and Brick Hill Creek. The subsegment also includes 26,200 feet (5.0 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Fringe marsh 26% (1.9 mi.), embayed marsh 72% (5.0 mi.), and extensive marsh 2% (0.1 mi.).
CREEK: The creeks in this subsegment are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 97% (4.8 mi.) and industrial 3% (0.2 mi.).
SHORE: Some waterfowl hunting in the marshes. The industrial section is a gravel pit along Farmers Hall Creek.
CREEK: Some fishing, but mostly unused.

WIND AND SEA EXPOSURE: Farmers Hall Creek trends basically SW - NE; Brick Hill Creek trends basically NW - SE. There are no significant fetches affecting the subsegment.

OWNERSHIP: Private.

FLOOD HAZARD: Low. This subsegment is not exposed to wind and wave actions, and the majority of the fastland has elevations of 10 feet.

WATER QUALITY: Good. Any pollution in this subsegment would be from agricultural runoff and the gravel pit.

BEACH QUALITY: There are no beaches in this subsegment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: No data. The area appears stable.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.
SHORE USE LIMITATIONS:

Seventy-four percent of the shoreline is either embayed or extensive marsh, which should be preserved. The creeks in this subsegment are too shallow to allow good boat access to the creek heads. Also, there is no good inland access to the area, and without water fronted fastland, limited development for this area seems probable.

ALTERNATE SHORE USE:

Low. Little alternate use for the shorelands seems probable. The area will probably continue to be used primarily for agriculture.

MAPS:

CGS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: None.

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SUBSEGMENT 6C

OCCUPACIA CREEK AND BRIDGE CREEK

Maps 7 and 8

EXTENT: 102,800 feet (19.4 mi.) of shoreline along Occupacia and Bridge Creeks. The subsegment also includes 75,800 feet (14.3 mi.) of fastland.

SHORELANDS TYPE

FASTLAND: Low shore 99% (14.2 mi.) and low shore with bluff 1% (0.1 mi.).
SHORE: Fringe marsh 55% (10.6 mi.), embayed marsh 36% (7.0 mi.), and extensive marsh 9% (1.8 mi.).
CREEKS: The creeks included in this subsegment are too narrow and shallow for classification.

SHORELANDS USE

FASTLAND: Agricultural 91% (13.0 mi.) and unmanaged, wooded 9% (1.3 mi.).
SHORE: Some waterfowl hunting in the marshes, but mostly unused.
CREEKS: Some fishing but mostly unused.

WIND AND SEA EXPOSURE: The creeks trend basically N-S. No fetches affect the subsegment.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The fastland is fronted by marshes which act as natural flood control agents. There are no dwellings below the 10-foot contour line.

WATER QUALITY: Good. It appears the creeks are experiencing no water quality problems. Any agricultural runoff is filtered by the marshes fronting the fastland.

BEACH QUALITY: There are no beaches in this subsegment.

PRESENT SHORE EROSION SITUATION

EROSION RATE: No data. The area appears stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.
OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:

The embayed and extensive marshes, which comprise forty-five percent of the shoreline, should be preserved. The creeks are too narrow and shallow for good boat access to most areas.

ALTERNATE SHORE USE:

Low. Without access to the water and without boat access to the river, the area has very limited development possibilities. The subsegment will probably remain rural in nature, with agriculture continuing to be the prime user of the fastland.

CGS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: None.
WIND AND SEA EXPOSURE: The shoreline trends first

WATER QUALITY: Fair to good. The Rappahannock

FLOOD HAZARD: Low. With the fastland having ele­

OWNERSHIP: Private.

EXTENT: 69,600 feet (13.2 mi.) of shoreline along

SHORELANDS TYPE

FASTLAND: Low shore 78% (6.8 mi.), low shore

SHORE: Artificially stabilized 1% (0.1 mi.),

NEARSHORE: Narrow for the entire subsegment.

SHORELANDS USE

FASTLAND: Agricultural 97% (8.5 mi.) and com­

SHORE: Some commercial use (marina), but mostly unused.

NEARSHORE: Sport boating, fishing and other water-related activities.

WIND AND SEA EXPOSURE: The shoreline trends first

SSE - NNW. The fetch at Island Point is SSE -

3.3 nm. The fetch at Layton is ESE - 3.1 nm.

MAPS: UGS, 7.5 Min.Ser. (Topo.), CHAMPLAIN


OWNERSHIP: Private.

FLOOD HAZARD: Low. With the fastland having ele­

vations of 10 feet, only the marshes are sub­

ject to flooding. There are no endangered

structures.

WATER QUALITY: Fair to good. The Rappahannock

River generally has good water quality. Some

pollution may occur due to upstream industrial and
domestic waste discharge and by agricul­
tural runoff.

BEACH QUALITY: Poor. There are only narrow,

strip beaches in this subsegment.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to moderate,

noncritical. The marshes at Island Point and

Beverly Marsh are experiencing moderate erosion

at an historical rate of 1.7 to 1.9 feet per

year. The area from Otterburn Marsh to south of

Layton has an historical erosion rate of 1.3

feet per year. The bluffs along the Layton

shoreline are susceptible to both wind and wave

attacks and downhill rain runoff.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is approxi­
mately 200 feet of rubble riprap and 200 feet

of bulkhead near Layton. Both structures ap­

pear to be effective.

OTHER SHORE STRUCTURES: There are several piers

in the subsegment and a boat ramp at Layton.

SHORE USE LIMITATIONS:

Sixty-two percent of the shoreline is either

embayed or extensive marsh, which limits any

development in the fastland behind. This sub­

segment is used extensively for agricultural

purposes. Any construction would be at the

sacrifice of these lands. Also, the eroding

bluffs along the shoreline near Layton would

limit residential construction.

ALTERNATE SHORE USE:

Low. The rural nature of the subsegment

will probably remain unchanged. There appears

to be no need for any alternate type of develop­
ment.

MAPS: UGS, 7.5 Min.Ser. (Topo.), CHAMPLAIN

QUADR., 1968, pr. 1973; UGS, 7.5 Min.Ser. (Topo.), LORETTO


thin, strip beaches.

PRESENT SHORE EROSION SITUATION
   EROSION RATE: Slight or no change to moderate, noncritical. The shoreline in the meander is suffering from minor erosion due to normal river currents, which locate to the outside of a bend.
   ENDANGERED STRUCTURES: None.
   SHORE PROTECTIVE STRUCTURES: There are three areas which have a combined total of approximately 1,000 feet of bulkhead. All structures appear to be effective.

OTHER SHORE STRUCTURES: There are several piers in the subsegment. A boat house is located west of Saunders Wharf.

SHORE USE LIMITATIONS:
   Though some houses are located along the shoreline, the subsegment is used predominantly for agriculture. Any construction would be at the sacrifice of these lands. Though there is only minor erosion in the subsegment, this would limit development of the shoreline.

ALTERNATE SHORE USE:
   Low. The subsegment will probably remain a rural area. The section lacks good beaches and shore access, which limits its desirability as a residential or recreational area.


SUBSEGMENT 8A
ELMWOOD CREEK TO HORSE HEAD POINT
Map 9

EXTENT: 22,600 feet (4.3 mi.) of shoreline on the Rappahannock River, from the mouth of Elmwood Creek to Horse Head Point. The subsegment also includes 14,400 feet (2.7 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 81% (2.2 mi.) and low shore with bluff 19% (0.5 mi.).
SHORE: Beach 25% (1.1 mi.), fringe marsh 17% (0.7 mi.), and extensive marsh 58% (2.5 mi.).
NEARSHORE: Narrow for the entire length of the subsegment.

SHORELANDS USE
FASTLAND: Entirely agricultural.
SHORE: Some waterfowl hunting in the marshes but mostly unused.
NEARSHORE: Sport boating and fishing.

WIND AND SEA EXPOSURE: The shoreline trends basically S - N in the subsegment. No significant fetches affect the subsegment.

OWNERSHIP: Private.

FLOOD HAZARD: Low. This area is not subject to wind and wave actions. There are no endangered structures.

WATER QUALITY: Fair to good. The Rappahannock River generally has good water quality. Some seasonal problems result from agricultural runoff and from upstream industrial and domestic waste discharges.

BEACH QUALITY: Poor. This subsegment has thin, strip beaches.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. The bluff area to the north of Elmwood Creek is experiencing a moderate erosion rate of 1.5 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:
This subsegment is used exclusively for agricultural purposes, which limits other use. Also, the area is isolated from any existing residential-industrial-commercial center, thus limiting the need for development. Lastly, the shoreline is located at least one mile from any existing state-maintained road.

ALTERNATE SHORE USE:
Low. There seems to be little need for any alternate shore use. The subsegment will probably continue to be a rural-agricultural area.

MAPS: USGS, 7.5 Min. Ser. (Topo.), ROLLINS FORK Quadr., 1968;


SUBSEGMENT 8B
GREEN BAY
Maps 9 and 10

EXTENT: 42,600 feet (8.0 mi.) of shoreline on the Rappahannock River from Horse Head Point to Marsh Point. The subsegment also includes 17,600 feet (3.3 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 65% (2.1 mi.), low shore with bluff 27% (0.9 mi.), and moderately low shore 8% (0.3 mi.).
SHORE: Beach 2% (0.2 mi.) and extensive marsh 97% (7.8 mi.).
NEARSHORE: Narrow for the entire subsegment.

SHORELANDS USE
FASTLAND: Entirely agricultural.
SHORE: Some waterfowl hunting in the marshes but mostly unused.
NEARSHORE: Sport boating and fishing.

WIND AND SEA EXPOSURE: The shoreline trends first N - S, then S - N through a meander. There are no significant fetches affecting the subsegment.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The majority of the fastland is fronted by marsh, which acts as a natural flood control agent. There are no endangered structures.

WATER QUALITY: Fair to good. The Rappahannock River generally has good water quality.

BEACH QUALITY: Poor. The subsegment has one section of thin, strip beach.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical. The marshes in Green Bay are experiencing an erosion rate of approximately 2.1 to 2.5 feet per year. One section of bluffs is also eroding.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

OTHER SHORE STRUCTURES: None.
SHORE USE LIMITATIONS:
The fastland, which is used for agricultural purposes, is fronted by an extensive marsh system. These marshes severely limit any access to the water. Also, this area is removed from any residential-industrial-commercial center, thus limiting the need for development.

ALTERNATE SHORE USE:
Low. There seems to be no need for alternate shore use in the subsegment. The area will probably remain basically rural in nature.

MAPS: USGS, 7.5 Min.Ser. (Topo.), ROLLINS FORK Quadr., 1968.
C&GS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.


SUBSEGMENT 8C
MARSH POINT TO COUNTY LINE
Map 10

EXTENT: 24,200 feet (4.5 mi.) of shoreline from Marsh Point to the Essex-Caroline county line along Portobago Creek. The subsegment also includes 20,800 feet (3.9 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Entirely agricultural.
SHORE: Some waterfowl hunting in the marshes but mostly unused.
NEARSHORE: Sport fishing and boating.

WIND AND SEA EXPOSURE: The shoreline trends basically NE - SW. The fetch at Portobago Creek is NW - 2.3 nm. However, the shallowness of Portobago Bay makes the fetch mostly insignificant.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The majority of the fastland has elevations of 20 feet and is not subject to flooding. There are no endangered structures.

WATER QUALITY: Fair to good. The Rappahannock River usually has good water quality. Occasional problems are caused by upstream industrial and domestic waste discharges, agricultural runoff, and by boating activities.

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change. The bluff areas just south of the extensive marsh is suffering from some minor erosion.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.
OTHER SHORE STRUCTURES: None.

SHORE USE LIMITATIONS:
As with subsegments 8A and 8B, this area is used for agriculture. The area's lack of access and its distance from any residential-industrial-commercial center severely limits any development.

ALTERNATE SHORE USE:
Low. Like most of the county's shorelands, this area is used for agriculture. There seems to be little need for development in the subsegment.

MAPS: USGS, 7.5 Min.Ser. (Topo.), ROLLINS FORK Quadr., 1968.
C&GS, #12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, CORROTOMAN RIVER to Fredericksburg, VA, 12th ed., 1975.

MAP 2B
MARK HAVEN BEACH
SHORELANDS TYPES
Subsegment 1A

FASTLAND
Low Shore
Low Shore
with Bluff
Moderately Low Shore
Moderately Low Shore
with Bluff
Moderately High Shore
Moderately High Shore
with Bluff
High Shore
High Shore
with Bluff

SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized

NEARSHORE
Narrow
Wide
MAP 5B
TAPPANNOCK
SHORELANDS TYPES
Subsegments 3A, 3B and 4A

FASTLAND
- Low Shore
- Low Shore with Bluff
- Moderately Low Shore
- Moderately Low Shore with Bluff
- Moderately High Shore
- High Shore
- High Shore with Bluff
- Artificial Fill

SHORE
- Beach
- Fringe Marsh
- Extensive Marsh
- Embayed Marsh
- Artificially Stabilized

NEARSHORE
- Intermediate
- Intertidal
- Submerged

70°52' 30"
MAP 6C
MOUNT LANDING CREEK
FASTLAND USE, OWNERSHIP, EROSION

Subsegments 4A, 4B, 5A and 5B

USE
- Agricultural: A
- Industrial: I
- Recreational: RC
- Residential: RS
- Unmanaged
- Wooded: W

OWNERSHIP
- Private

EROSION
- Moderate
- Slight or No Change
- Severe

No Symbol
MAP 7B
BOTTOMS NECK
SHORELANDS TYPES
Subsegments 5B, 6A, 6B, 6C and 7A

FASTLAND
Low Shore
Moderately Low Shore
Moderately High Shore
Moderately High Shore with Bluff
High Shore
High Shore with Bluff

SHORE
Beach
Fringe Marsh
Extensive Marsh
Embedded Marsh
Nearshore
Narrow
MAP 9B
HORSE HEAD POINT
SHORELANDS TYPES
Subsegments 7B, 8A, and 8B

FASTLAND
Low Shore
Low Shore with Bluff
Moderately Low Shore
Moderately Low Shore with Bluff

SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized

NEARSHORE
Narrow
PORTO BAGO BAY

FASTLAND USE, OWNERSHIP, EROSION
Subsegments 8B and 8C

USE
- Agricultural: A
- Unmanaged: U
- Wooded: W

OWNERSHIP
- Private: P
- Public: G

EROSION
- Moderate: M
- Slight or No Change: N
- No Symbol: X