Shoreline Situation Report
CITY OF HAMPTON, VIRGINIA

Supported by the National Science Foundation, Research Applied to National Needs Program
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Chesapeake Research Consortium Report Number 11
Special Report In Applied Marine Science and Ocean Engineering Number 76 of the
VIRGINIA INSTITUTE OF MARINE SCIENCE
William J. Hargis Jr., Director
Gloucester Point, Virginia 23062

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CITY OF HAMPTON, VIRGINIA

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CHAPTER 1
SHORELINE SITUATION REPORT

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. We have given particular attention to the area of shore erosion and to recommendations concerning the alleviation of problems resulting from erosion. In addition, we have tried to include in our assessment some of the potential uses of the shoreline, particularly with respect to recreational use, since such information could aid in the perception of a shoreline segment by potential users.

The basic advocacy of the authors who prepared this report is that the use of shorelands should be planned rather than haphazardly developed. Careful planning could reduce the conflicts which might arise between different potential users. Shoreland utilization in many areas of the country, and indeed in some places in Virginia, has proceeded in response to local, short term pressures 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:

- Transportation
- Waste disposal
- Extraction of living or 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 assigned to a given segment of shorelands, both the planners and the users want that use to operate most efficiently. We hope that the results of our work, by pointing out the technical feasibility of altering or enhancing the present configuration of the shore zone, will be useful to a park planner. Alternatively, if the use were a residential development, we would hope our work would be useful in specifying the shore erosion problem and by indication defenses likely to succeed in protecting the shore. 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 to state or federal agency levels. We feel our results will be useful at all these levels. Since the most basic unit of comprehensive planning and zoning in Virginia is at the county or city level, we have executed our report on that level, although we realize some of the information may be more useful at a higher governmental level. The Commonwealth of Virginia traditionally has chosen to place, as much as possible, the regulatory de-
CHAPTER 2
APPROACH USED AND ELEMENTS CONSIDERED
CHAPTER 2
APPROACH USED AND DATA CONSIDERED

2.1 APPROACH TO THE PROBLEM

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

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

The format of presentation in the report follows a sequence from general summary statements for the county (Chapter 3) to tabular segment summaries and finally detailed descriptions and maps for each subsegment (Chapter 4). The purpose in choosing this format was to allow selective use of the report since some users's 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 SHORELINE INCLUDED IN THE STUDY

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

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

a) Shorelands Physiographic Classification

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

Definitions:

Shore Zone

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

The physiographic character of the marshes has also been separated into three types (see Figure 1B). Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which has extensive acreage projecting into an estuary 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 the various types exist. The classification used is:

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

**Fastland Zone**

The zone extending from the landward limit of the shore zone is termed the fastland. The fastland is relatively stable and is the site of most material development or construction. The physiographic classification of the fastland is based upon the slope of the land near the water as follows:

- Low shore, 20-ft. (6 m) contour > 400 ft. (122 m)
- Moderately low shore, 20-ft. (6 m) contour < 400 ft. (122 m); with or without cliff
- Moderately high shore, 40-ft. (12 m) contour < 400 ft. (122 m); with or without cliff
- High shore, 60-ft. (18 m) contour < 400 ft. (122 m); with or without cliff

**Nearshore Zone**

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

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

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

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

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

**Subclasses:**

- with or without bars
- with or without tidal flats
- with or without submerged vegetation

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**Figure 1A**

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

**Figure 1B**

A generalized illustration of the three different 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 with the general commercial context. Marinas are considered commercial shore use.

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

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

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

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

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

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

a) Open: brush land, dune areas, wastelands; less than 40% tree cover.
b) Wooded: more than 40% tree cover.

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

Shore Zone

Bathing
Boat Launching
Bird watching
Waterfowl hunting

Nearshore Zone

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

d) Water Quality

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

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

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

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

e) Zoning

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

f) Shore Erosion and Shoreline Defense

The following ratings are used for shore erosion:

- slight or none - less than 1 foot per year
- moderate - 1 to 3 feet per year
- severe - greater than 3 feet per year

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

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

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

g) Potential Shore Uses

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

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subbasin is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. The material in this report is provided to indicate the physiographic types of marshes and to serve as a rough guide on acreages until detailed surveys are completed. Additional information of the wetlands characteristics may be found in Coastal Wetlands of Virginia:


i) Flood Hazard Levels

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

j) Shellfish Leases and Public Grounds

The data in this report shows 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 is periodically updated in other similar reports. Since the condemnation areas change with time they are not to be taken as definitive. However, some insight to the conditions at the date of the report are available by a comparison between the shellfish grounds maps and the water quality maps for which water quality standards for shellfish were used.
k) **Beach Quality**

Beach quality is a subjective judgment based on such considerations as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.
CHAPTER 3
PRESENT SHORELANDS SITUATION
CHAPTER 3
THE SHORELANDS OF HAMPTON

3.1 THE SHORELANDS OF HAMPTON

The physiographic make up of Hampton’s shorelands is responsible for most of the city’s shoreline problems. Most of Hampton is on a low terrace that was cut during the last higher stand of sea level. Of Hampton’s 337,000 feet of shoreline, 297,000 feet (88%) is “low shore.”

The remaining twelve percent is the low barrier beach and dune complex of the Buckeros Beach - Mill Creek - Factory Point area.

Because of the very low nature of the land, flooding from coastal storms poses a significant threat to the Hampton area (Table 1). Historically, several storms have flooded or isolated major portions of the city. The United States Army Corps of Engineers estimates that the Intermediate Regional Tidal Flood, which may be expected to occur roughly once a century, would have a height of eight feet above mean sea level. This coincides with flood height reached by the storm of August 1933. The Standard Project Tidal Flood, which would happen with the worst reasonably conceivable set of circumstances, is estimated to be on the order of thirteen feet above mean sea level.

There are no real flood defenses in Hampton. The beach area bulkheads and seawalls offer some protection from wave damage, but none from high water. It appears that there is little other than building design that can be done to lessen flood damages. The city does have flood plain regulations based on the hundred year flood frequency level (8 feet) as part of zoning ordinances.

There is a flood insurance program in Hampton run through the 1968 Housing and Urban Development Act’s National Flood Insurance Program.

TABLE 1

<table>
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<tr>
<th>RELATIVE FLOOD HEIGHTS AT HAMPTON, VIRGINIA</th>
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<tr>
<td>Standard Project Tidal Flood</td>
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<td>13 feet above MSL</td>
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<tr>
<td>Intermediate Regional Tidal Flood August 1933</td>
</tr>
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<td>8</td>
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</table>

Thirty-five percent of the city’s shoreline is protected by bulkheads or seawalls and is difficult to classify as beach or fringing marsh. All of Segments 5B and 6 are beach and much of Segments 7, 8, and 9 are marsh. A preliminary inventory by the Wetlands Section of the Virginia Institute of Marine Science defines over two thousand acres of marsh within Hampton. The largest single marsh is the nearly five hundred sixty acres of extensive marsh north of Grand View on Long Creek (Figure 2). Other large marshes are the embayed marshes of Newmarket and Brick Kiln Creeks; each has an area greater than two hundred acres.

Most of the shoreline use is controlled by the federal government. Langley Air Force Base and the Army’s Fort Monroe Military Reservation utilise significant portions of Hampton’s shorelands. The other prime user of the shorelands is the city itself controlling both preserved and recreational areas in several sections of the city particularly along the Chesapeake Bay waterfront.

The bulk of the privately controlled portions of the city’s shorelands are classified for residential use. Other than some of the lower portions of the Hampton River and Sunset Creek, (Figure 3) very little of the shoreline is involved with commercial or industrial uses.

Some of the lands bordering on the Back or Harris Rivers (Figure 4) are very little used and are classified either as agricultural or unused shorelands.

3.2 SHORELINE EROSION IN HAMPTON

Severe or significant erosion in Hampton is limited to the Chesapeake Bay shoreline beach area extending from Old Point Comfort to Northend (Factory) Point, Segments 5 and 6 (Figures 2 and 5) of this report. Average erosion rates of from 4.0 to over 6.4 feet per year have been determined for major portions of this shoreline.

One specific location, now partially stabilised, has experienced shoreline retreat of nearly a thousand feet in the past century.

At the present time, significant portions of this shoreline are protected by a bulkhead or seawall (35% of the city’s entire shoreline is so protected). Most of the property under management of Port Monroe has seawalls as do the major public use areas of Buckeros Beach (Figure 6) and portions of the Grand View area (Figure 7). Also,
a large groin field occupies the beach and nearshore areas south of the dredged inlet to the Salt Ponds. Most of this groin field (approximately 15 groins between 150 and 200 feet long and at a rough 600-foot spacing) was constructed in the late 1960's as an addition to the few pre-existing groins in the Buckroe - Fort Monroe area. Simultaneously with the most recent groin construction, a large promenade area at Buckroe was seawalled. There is little sediment moving in the nearshore system. The reasons for the lack of sediment in the nearshore system are (1) the lack of a major sediment source and (2) the shoreline orientation and exposure. The shoreline orientation is such that there is a bidirectional longshore drift with essentially no net transport into the area. Discussion with members of the Hampton Parks Committee indicated that the original plan was to fill, that is artificially nourish, the beach area following groin construction, however, for undetermined reasons, this never was done. Thus in ensuing several years, little has happened to stimulate beach growth or to protect the flatsland.

As the Buckroe Beach area is a major regional beach facility, it is important that the beach quality not be allowed to deteriorate. In terms of suggested beach protection or preservation action, the beach nourishment plan, and the installation of sills across the groins to create a perched beach appear to be the most suitable measures. The construction of secondary groins shorter than the existing groins and located between them might be additional, later beach stabilization measures.

The Factory Point (Figure 2) area already is the site of an experimental beach grass planting. The intent of this experiment is to stabilize the upper beach and dune areas by trapping windblown sand. Since there is a desire on the part of the city to leave this area in a preserved or natural state, construction of material structures such as groins or bulkheads would be out of place; thus artificial, though pseudo-natural structures as man made dunes or beach grass plantings, would be the most reasonable beach stabilization devices.

The erosion problem through these two segments is a function of two distinct factors. There is a definite paucity of sediment available for natural beach accretion and the area is exposed to one of the higher energy regimes on Chesapeake Bay. Situated near the mouth of Chesapeake Bay, the Buckroe - Grand View area is exposed to waves passing into the bay from the ocean and to waves that may have been generated along the full length of the bay. Thus, controlling shoreline erosion in this area requires the conservation of the natural materials already in the system and the construction of proper structures of sufficient strength to withstand the local environment.

In other areas of the Hampton waterfront, local erosion problems have been controlled by individual bulkheads or riprap. Nearly the entire length of Segment 1 (77,000 feet) is protected by a substantial seawall. The seawall is effective in minimizing or eliminating erosion along its length; however, it also has eliminated the shore zone as there is very little, if any, beach left between it and Hampton Roads.

3.3 POTENTIAL USB ENHANCEMENT OF THE HAMPTON SHORELINE

Only a few areas of Hampton's shoreline still retain the potential for enhanced recreational use. In the Wythe area (Figure 8), an artificial beach could be created in front of the seawall. Such a beach would not have to be large, its mere existence would enhance the waterfront by allowing increased, although informal, recreation use. Similarly, the beach in the Strawberry Banks area, west of the Hampton Roads Bridge Tunnel, (Figure 9) could be expanded to meet future needs. Public access to Mill Creek could be improved, thus realizing some of the recreational potential of the calm, shallow lagoon. Improved public facilities in the Buckroe area probably would be utilized as rapidly as they are constructed. Plans already are in motion to upgrade the beach quality in the present public access areas. Other sources have mentioned the great desirability of creating a marina in the Long Pond area behind Buckroe Beach. Such a marina, if properly constructed and designed, could be a major port for yachts plying the Intercoastal Waterway between New York and Florida.

Several recent studies on waterfront canals indicate that great care should be used in the design of artificial canals, such as shore being dug in upper Hampton Creek (Figure 10). The probability of severe water stagnation problems is great. In particular dead end canals and canal depths greater than adjacent natural water depths should be avoided.

And, finally, the city owned "preserved area" between Grand View and Factory Point might be
enlarged, utilizing more of the low undevelopable
land along the Back River's tributaries and bene-
fitting both the wild life of the area and those
people who are content merely to observe an un-
spoiled, unaltered beach and marsh system.

Other sections of town, specifically those
along the Back River's drainage system, might be
developed as parks or low key recreational areas.
Their susceptibility to flooding precludes ex-
tensive construction or development upon them.
Similarly, the numerous bridges across the Hampton
River close it to water borne recreational devel-
opment and to all but the smallest vessels.

In short summary, the potential of Hampton's
shoreline is severely limited by two factors:
(1) the existing uses and modifications of the
shoreline preclude new recreational development
and (2) the great flood hazard of much of the
city virtually forbids construction or develop-
ment.
Figure 2: Northend Point and the Back River from near Grand View. The dune area is the site of an experimental grass planting. Most of the marsh is city owned.

Figure 3: Hampton and Sunset Creeks, the city's sole industrial-commercial shore area.

Figure 4: The low-lying area of the Back River and its tributaries. Langley Air Force Base is in the background. The area appears to have reached its potential with some residential use and several marinas.

Figure 5: The beach north of Grand View. As the beach retreats over the marsh, peat blocks erode out of the thin beach face.

Figure 6: Seawall north of Buckroe. The groins are approximately 200 feet long and 600 feet apart.
Figure 7: The Grand View section of Hampton.
Figure 8: The Wythe area of Hampton on Hampton Roads. Most of the shoreline of this segment has been bulkheaded to the detriment of the beach. A better beach might be established through a program of artificial nourishment.

Figure 9: Strawberry Banks and the Hampton Roads Bridge Tunnel.
Figure 10: Hampton Creek near Syma Junior High School. The area is an example of dredge and fill canals dug into existing small creeks and upland areas to produce waterfront property.
MAP 1A
HAMPTON
SEGMENT LOCATION MAP

1. CHESAPEAKE AVENUE
2. HAMPTON RIVER
3A. STRAWBERRY BANKS
3B. SOUTH PHOEBUS
4. MILL CREEK
5A. OLD POINT COMFORT
5B. BUCKROE
6. GRAND VIEW
7. HARRIS RIVER
8. SOUTHWEST BRANCH OF BACK RIVER
9. NORTHWEST BRANCH OF BACK RIVER
MAP 1B
HAMPTON

SHORE PROTECTIVE STRUCTURES

Bulkhead

Groins

Riprap

MILITARY

MARINAS

(Location of one or more
marinas, yacht clubs, etc.)
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</table>
CHAPTER 4

4.1 SUBSEGMENT SUMMARIES

4.2 SEGMENT AND SUBSEGMENT DESCRIPTIONS

4.3 SEGMENT AND SUBSEGMENT MAPS
4.1 SUBSEGMENT SUMMARIES
## SHORELINE SITUATION REPORT SUMMARY FOR HAMPTON, VIRGINIA

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<td>**1. Chesapeake **&lt;br&gt;Avon&lt;br&gt;31,000 ft (5.2 mi.)</td>
<td>Shell/Beach&lt;br&gt;Artificial&lt;br&gt;Shoreline&lt;br&gt;Wide</td>
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<td>SUBSECTOR</td>
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<tr>
<td>8 SW Branch of Back River 52,000 ft (21.3 mi.)</td>
<td>Fastland: Low shore. Shore: Fringe marsh (42%), artificial (1%) and subdivided marsh (7%). Creek: Relatively wide, shallow tidal extension of Somersett Creek.</td>
<td>Fastland: Residential, government (Langley AFB), unmanaged open space. Shore: Boat storage, recreation. Creek: Boating, boating, water sports.</td>
<td>Private 69% Federal 15% City 2%</td>
<td>Residential</td>
<td>High</td>
<td>Unsatisfactory</td>
<td>Stable</td>
<td>Bulkheading along most of Langley shoreline. Numerous small, private piers, Langley Yacht Club.</td>
<td>None</td>
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<tr>
<td>9 NW Branch of Back River 24,000 ft (4.7 mi.)</td>
<td>Fastland: Low shore. Shore: Artificial containment (50%) and nearly equal portions fringe, extensive and subdivided marshes. Creek: Wide, shallow tidal creek.</td>
<td>Fastland: Government (60%) and preserved, open and wooded (20%). Shore: Unused. Creek: Boating, water sports.</td>
<td>Government Private City</td>
<td>Residential</td>
<td>High</td>
<td>Unsatisfactory</td>
<td>No erosion</td>
<td>Langley AFB is bulkheaded.</td>
<td>None</td>
</tr>
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</table>
4.2 SEGMENT AND SUBSEGMENT DESCRIPTIONS
4.2 SUBSEGMENT SUMMARIES

CHESAPEAKE AVENUE, HAMPTON, VIRGINIA
SEGMENT 1 (Maps 2A, 2B)

EXTENT: This segment extends 17,000 feet (3.2 ml.) from the Newport News - Hampton line to the mouth of Hampton Creek. Chesapeake Avenue follows the shoreline through most of the segment.

SHORELANDS TYPE
FASTLAND: Low shore and artificial fill (less than 5%).
SHORE: Beach, artificial containment, and two small areas of embayed marsh.
NEARSHORE: Wide, Hampton Flats.

SHORELANDS USE
FASTLAND: Residential, single and multiple family dwellings.
SHORE: Recreational.
NEARSHORE: Wading, boating, fishing, and shellfishing.

OFFSHORE: Hampton Roads.

WIND AND SEA EXPOSURE: The shoreline trend is generally ENE - SSW. The fetches are:

- SW 7 nm across Hampton Roads
- S 4 nm
- SW 3 nm

E generally open to the Chesapeake Bay and the Atlantic Ocean.

OWNERSHIP: Private.

ZONING: One family residential district.

FLOOD HAZARD: High.


BEACH QUALITY: Fair. What beach there is, is below a seawall.

SHORE EROSION SITUATION: Stable.

EROSION RATE: None. Historical studies show an erosion rate of 2-5 feet per year. The post 1930's seawall has stabilized the shoreline.

ENDANGERED STRUCTURES: None.

SHORE PROTECTION STRUCTURES: Nearly the full length of the segment is protected with a seawall, some sections of which are in poor repair. There are several (4-20) moderately effective groins.

Suggested Action: Seawall repairs where needed.

OTHER SHORE STRUCTURES: There is one small marina in the Kecoughtan area near the Hampton River and several piers.

POTENTIAL USE ENHANCEMENT: A quite satisfactory recreational beach might be created by artificial nourishment of the shore between selected groins in the Wythe area.


CABS: #400, 1120,000 scale, HAMPTON ROADS, 1965.

AERIAL: #562, 1:40,000 scale, CHESAPEAKE BAY, Cape Charles to Norfolk Harbor, 1971.

PHOTOS: Aerial-USDA 12Apr37 PG 108/137-139, 189, 190;

USDA 310cc57 ZW-4W/30, 32, 33, 38.

CABS: 3Mar59 5W856.

VAEM 2009c2 5114059/166, 167;

VAEM 239eb65 5141716/022, 023, 037, 064.

NASA 1505e71 7059, 7054, 7204.

VEAMS 270c97Z HP-1/1-44.

*Photograph filed with Newport News.

HAMPTON RIVER, HAMPTON, VIRGINIA
SEGMENT 2 (Maps 3A, 3B)

EXTENT: Hampton River is a tidal river that extends 14,000 feet (2.7 ml.) northward through the city. The river and its arms have a total of roughly 66,000 feet (12.5 ml.) of shoreline, and an area of 350 acres.

SHORELANDS TYPE
FASTLAND: Low shore (90%) and artificial fill (10%).
SHORE: Artificial containment (5%) and fringe marsh (45%).
NEARSHORE: Below Queen Street the creek is a dredged harbor, above it is a shallow tidal river.

SHORELANDS USE
FASTLAND: Residential (65%), commercial (25%), government, Veterans' Hospital, etc. (4%), industrial (5%), and recreational (3%).
SHORE: Boat support or unused.
NEARSHORE: The upper portions of the creek are used for small boats and light recreation. An amphibious airplane is based in the central portion of the river. The lower portions of the creek, where there is a dredged 12-foot channel, are used for marinas and commercial boating activities.

OWNERSHIP: Private, Federal, and City (due to the nature of this area, ownership percentages are not applicable).

ZONE: One family residential district (72%), light manufacturing district (12%), multiple family residential district (11%), heavy manufacturing district (3%), limited commercial district (1%), and general commercial district (1%).

FLOOD HAZARD: High. The entire area is below the level of the Intermediate Regional Tidal Flood.


BEACH QUALITY: There are no significant beaches in this segment.
SHORE EROSION SITUATION: Stable.

EROSION RATE: Apparently none.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are numerous piers and bulkheads (approx. 55,800 ft.) associated with the marinas and the boating industry and many "utility" bulkheads serving to improve the cosmetics of individual properties. Also, there are several private piers.

NAVIGABILITY: Generally good. There is a dredged 130-foot wide, 12-foot deep channel as far upstream as the Queen Street bridge. The approaches are similarly good. The upper reaches of the creek are not maintained, but are satisfactory for the use they now receive.

POTENTIAL USE ENHANCEMENT: None.


USGS, #400, 1:20,000 scale, HAMPTON ROADS, 1965.

USGS, #562, 1:40,000 scale, CHESAPEAKE BAY, Cape Charles to Norfolk Harbor, 1971.


USFS 310e55 DWI-4H/30, 32.

OSO! 3XMar59 W3955.

YADU 239e65 5114116/068, 073.

NASA 130i71 7093, 7094, 7204.

VIMS 270e72 HD-2/22-44.

VIMS 304e73 HD-2/197-214.

Ground - VIMS 12Jun73 HD-2/4-62.

STRAWBERRY BAYES, HAMPTON, VIRGINIA

SUBMERGEMENT 3A (Maps 3A, 3B)

EXTENT: This subsection extends 6,300 feet (1.2 mi.) from the mouth of Hampton Creek to the Hampton Roads Bridge Tunnel.

SHORELANDS TYPE

PARTIAL: Low shore (94%) and artificial fill (2%).

SHORE: Artificial containment (92%) and beach (2%).

WEARISOME: Wide, Hampton Flats.

SHORELANDS USE

PARTIAL: Government (70%), residential (20%), and commercial (10%).

SHORE: Boating, recreation, much of the shore has no specific use.

WASHSHORE: Boating and shellfishing.

OFFSHORE: Hampton Roads.

WIND AND SEA EXPOSURE: The shoreline trend is NW - SSE. The fetch from the South is 3 miles and Southwest about 9 miles into the Nansemond River. The area is protected on the east by Port Monroe and Willoughby Spit.

OWNERSHIP: Federal (65%), Private (30%), and State (5%).

WATERS: One family residential district (65%), and limited commercial district (30%).

FLOOD HAZARD: High.


BEACH QUALITY: The one small beach is fair, but its location near the Hampton Roads Bridge Tunnel toll is a detracting factor.

SHORE EROSION SITUATION

EROSION RATE: None. The area is artificially stabilized. Historical surveys indicate that the old shoreline retreat rate was under one foot per year.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: Except for the beach by the Hampton Roads Bridge Tunnel rempart and the small creek, most of the area is seawalled.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is a seawall and some small groins.

Suggested Action: Complete seawalling of the area would stop the already limited erosion. Further study is necessary if a solution to the shoaling problem is to be found.

OTHER SHORE STRUCTURES: One small private pier and a larger pier associated with a commercial fishing operation.

POTENTIAL USE ENHANCEMENT: As there is no public access to the shoreline along this subsegment and the area is privately owned, the potential for use enhancement is minimal.

C&GS, #400, 1:25,000 scale, HAMPTON ROADS, 1965. #562, 1:40,000 scale, CHESAPEAKE BAY, Cape Charles to Norfolk Harbor, 1971.


MILL CREEK, HAMPTON, VIRGINIA
SEGMENT 4 (Maps 3A, 3B)

EXTENT: Approximately 29,000 feet (8.6 mi.) of the shoreline enclose the nearly 650 acres of Mill Creek.

SHORELANDS TYPE
FASTLAND: Low shore (95%) and dunes (15%).
SHORE: Beach, fringe and extensive marsh, and artificial containment.
CREST: A shallow lagoon behind the Buckroe - Old Point Comfort barrier beach.

SHORELANDS USE
FASTLAND: Government (60%) and residential (40%).
SHORE: Recreation and unused.
CREST: Some boating, fishing, and recreation.

OWNERSHIP: Federal (60%) and Private (40%).

ZONING: One family residential district.

FLOOD HAZARD: High; both from increased water levels and wave overwash.

WATER QUALITY: Undetermined.

SHORE EROSION SITUATION: Stable.
EROSSION RATES: None.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: Roughly a third of the creek's shoreline, most at Fort Monroe, is covered with utility landscape bulkhead. There are several private piers and a boat ramp.

NAVIGABILITY: The size of vessels are limited by Mellen Street - Route 143 bridge. Low vertical clearance under railroad bridge and shallow depth permits only small motor boats without stand-up cabins to pass into Mill Creek.

POTENTIAL USE ENHANCEMENT: With improved public access, Mill Creek might be developed for water sport recreational uses.
OLD POINT COMFORT, HAMPTON, VIRGINIA
SUBSEMENT 5A (Maps 3A, 3B)

EXTENT: This subsegment extends 8,000 feet (1.4 mi.) from near the Fort Monroe entrance to the bend in the shoreline east of the old lighthouse. Although not included in the measurements, Fort Wool is included in the subsegment.

SHORELANDS TYPE
FIZEDLAND: Low shore.
SHORE: Artificial containment.
NEARSHORES: Wide to the west and narrow to the south. A dredged channel with deep water runs very close to the western edge of the subsegment.

SHORELANDS USE
FIZEDLAND: Government, Fort Monroe (90%) and commercial, a small boat marina and a hotel (10%).
SHORE: Boat support and unused.
NEARSHORES: Boating.

OFFSHORE: All shipping entering Hampton Roads must pass offshore of Old Point Comfort.

WIND AND SEA EXPOSURE: The shoreline trend is N - S. The fetch to the west is 1/4 miles across Hampton Plate and to the Southwest is 10 miles to the James River.

OWNERSHIP: Federal.

ZONING: One family residential district.

FLOOD HAZARD: Medium. Much of the area is above two feet (the Intermediate Regional Tidal Flood level is 8 feet). However, the Standard Project flood or high storm waves could inflict significant damage to portions of the subsegment.


SHORE EROSION SITUATION: Controlled.
EROSION RATE: None.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: The entire subsegment is protected by a seawall.

Suggested Action: None.

OTHER SHORE STRUCTURES: Those few associated with the small marina.

POTENTIAL USE ENHANCEMENT: None.

C&GS, #400, 1:20,000 scale, HAMPTON ROADS, 1965.
#562, 1:40,000 scale, CHESAPEAKE BAY, Cape Charles to Norfolk Harbor, 1971.

C&GS 3Apr59 W3695.
VaDH 23Feb63 5114111/073, 074, 081 to 084;
VaDH 16Mar66 5114212/010 to 014.
NASA 31Oct71 7053, 7094, 7204.
VIMS 30Apr73 H2-4/174-189.
BUCKroe, HAMPTON, VIRGINIA
SUBSEGMENT 5B (Maps 3A, 3B and 4A, 4B)

EXTENT: This subsegment extends 18,000 feet (3.4 mi.) from Old Point Comfort to Malo Beach.

SHORELANDS TYPE
PASTLAND: Low shore. The area is a somewhat stabilized barrier beach and dune complex.
SHORE: Artificial containment and sand beach.
NEARSHORE: The south two-thirds are narrow, the north one-third is of intermediate width.

SHORELANDS USE
PASTLAND: Government, Fort Monroe (65%) and recreational (15%).
SHORE: The beach areas are used for swimming.
NEARSHORE: Water sports.

WIND AND SEA EXPOSURE: This subsegment trends WNE - SSW. The fetch to the northeast is over 20 miles and to the southeast is 10 miles. The fetch to the east is unlimited through the mouth of Chesapeake Bay and into the open Atlantic.

OWNERSHIP: Federal (65%), Private (25%), and City (10%).

ZONING: One family residential district (60%), multiple family residential district (16%), and general commercial district (16%).

FLOOD HAZARD: High, both for high water levels and wave action.


BEACH QUALITY: Good. The Buckroe Beach area is one of the best public bathing beaches on the Chesapeake Bay.

SHORE EROSION SITUATION
EROSION RATE: Severe, critical. Erosion rates of over 6 feet per year are documented for this area.
ENDANGERED STRUCTURES: Houses at the Buckroe Beach area.
SHORE PROTECTIVE STRUCTURES: There is approximately 7,000 feet of seawall in this subsegment. 6,500 feet of the seawall is at the Fort Monroe Reservation area. The remaining 3,500 feet is in Buckroe. There are approximately 18 groins along the beach.

SUGGESTED ACTION: Building dunes along the outer edge of the groins and artificial nourishment might increase the size and stability of the beach in the Buckroe public areas.

OTHER SHORE STRUCTURES: There are piers at Buckroe.

POTENTIAL USE ENHANCEMENT: An enlarged beach and improved facilities at Buckroe would improve the utility of the area as a recreational site.

USGS, 1:40,000, 1:120,000 scale, HAMPTON ROADS, 1965.
USGS, 1:40,000 scale, CHESAPEAKE BAY, Cape Charles to Norfolk Harbor, 1971.

USGS 31Oct'55 WWJ-4N/5, 7.
USGS 11Oct'54 DG-2N/35.
CABBS 3Apr'55 WBG5.
VaDN 13Feb'65 512201/9/169.
VaDN 23Feb'65 511411/073, 074, 080-084.
VaDN 6Jan'66 511420/1/9, 10.
VaDN 10Mar'56 511420/1/014.
VaDN 7Sep'56 5114220/1/8.
VaDN 26Mar'66 AW116, 118.
VIMS 27Oct'72 HP-5B/62-54.
VIMS 30Apr'73 HP-5B/17-53.
Ground - VIMS 23May'73 HP-5B/65-66.
VIMS 26Jun'73 HP-5B/66-90.

GRAND VIEW, HAMPTON, VIRGINIA
SEGMENT 6 (Maps 4A, 4B)

EXTENT: This segment extends 25,000 feet (4.7 mi.) from Malo Beach to Northend (Factory) Point.

SHORELANDS TYPE
PASTLAND: Dunes. The segment primarily is a barrier beach-dune complex backed by an extensive tidal marsh.
SHORE: Beach.
NEARSHORE: Intermediate to wide with some nearshore bars.

SHORELANDS USE
PASTLAND: Preserved (60%), unmanaged (16%), residential (12%), and recreational (4%).
OWNERSHIP: Recreational.
NEARSHORE: Swimming, water sports, boating, and fishing.

OFFSHORE: Chesapeake Bay.

WIND AND SEA EXPOSURE: The southern half of the segment trends WNE - SSW. The northern half trends NW - WSW.

FREQUENCIES: 10 WU 15 14 15.

The segment faces the mouth of the Chesapeake Bay and is exposed to the Atlantic Ocean.

OWNERSHIP: City (65%) and Private (32%).

ZONING: One family residential district (90%) and limited commercial district (10%).

FLOOD HAZARD: High, both from high water levels and waves. The beach has been overwashed in several locations.


BEACH QUALITY: Generally quite good, but, surprisingly, the quantity of sand is very limited. In several locations the blocks poking through the beachface, locally lowering the beach quality.
HARRIS RIVER, HAMPTON, VIRGINIA
SEGMENT 7 (Maps 4A, 4B)

EXCEPT: This segment has 59,000 feet (11.2 mi.) of shoreline between Northpoint and Stony Point, including the Harris River.

SHORELANDS TYPE
FASTLAND: Low shore and artificial fill. Marsh areas in upper Harris River recently have been filled for residential housing development.
SHORE: Fringe, extensive, and embayed marsh, beach and artificial containment.
CREEK: Wide, shallow tidal creek. The Harris River is 3.6 miles long and drains 5.06 square miles.

SHORELANDS USE
FASTLAND: Residential, commercial, agricultural, and the city owned preserved area adjacent to Northpoint.
SHORE: Marinas.
CREEK: Boating, fishing, and water sports.

WIND AND SALT EXPOSURE: The exposure of this segment is limited by the opening of the Buck River. Except under extreme storm conditions, wave action is not a highly significant factor in this area.

OWNERSHIP: Private and City.

ZONING: One family residential district.

FLOOD HAZARD: High, critical. The area is quite low. Several houses and marinas would be flooded by the Intermediate Regional Tidal Flood. Frequently the area is isolated by storm high tides.


BEACH QUALITY: Good at Northpoint, there is little other beach area in the segment.

SHORE EROSION SITUATION: Stable.
EROSSION RATE: Slight.
ENDANGERED STRUCTURES: None.
SHORE PROJECTIVE STRUCTURES: Bulkheading at Windmill Point.

Suggested Action: None.

OTHER SHORE STRUCTURES: There is much utility bulkheading associated with the several marinas in the area.

NAVIGABILITY: Good.

POTENTIAL USE ENHANCEMENT: Low. The Factory Point area is part of a preserved area. The rest of the segment is so low and exposed to flood danger as to preclude development.

USGS, #562, 1:40,000 scale, BERMUDA BAY, Cape Charles to Norfolk Harbor, 1971.

PHOTOS: Aerial-USA 12Apr77 PG 106/155, 156, 163, 168.
USGS 310ct55 D3W-4A/7; D51-4Y/12.
USGS 800x90 AP5-95 R-21/1940-1944.
USGS 23Feb83 511411/6/085-085, 087, 093-095, 5147116/066.
VIMS 26Mar88 W-122, 118, 120.
NASA 310ct71 7055, 7055, 7304.
VIMS 27Oct72 HP-6/55-55;
VIMS 30Apr75 HP-6/151-155.

Ground - VIMS 23Mar73 HP-6/67-82;
VIMS 26Jun73 HP-6/85-55;
VIMS 12Aug73 HP-6/1-14.

35
SOUTHWEST BRANCH OF THE BACK RIVER,
HAMPTON, VIRGINIA
SEGMENT 8 (Maps 44, 43 and 54, 53)

EXTENT: This segment extends along 92,000 feet (15.5 mi.) of the shoreline from Stony Point upstream to Willoughby Point. This report is concerned only with the southern bank of the river as the Hampton City - York County, Poquoson boundary follows the center of the river.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Fringe marsh (45%), artificial fill or containment (20%), and embayed marsh (25%).
CREEK: Relatively wide, shallow tidal extension of Newport Creek. The Southwest Branch is a tributary to the Back River. The Back River is a restricted arm of a tidal river. Although northwest winds blow down its length, there is no direct exposure to open waves.

WIND & SEA EXPOSURE: The Southwest Branch of the Back River is a restricted arm of a tidal river. Although northwest winds blow down its length, there is no direct exposure to open waves.

OWNERSHIP: Private (80%), Federal, Langley AFB and NASA Langley Research Center (10%), and City (10%).

PROVIDER: One family residential district (95%) and multiple family residential district (5%).

LAND USE: Residential government (Langley AFB), unmanaged-open, recreational, and agricultural.
SHORE: Boat storage and recreation.
CREEK: Fishing, boating, and water sports.

WATER QUALITY: Good, unsatisfactory by the Bureau of Shellfish Sanitation as of July 1973.

BEACH QUALITY: Generally no beach.

SUGGESTED ACTION: None.

OTHER SHORE STRUCTURES: There are numerous small private piers, the Langley Yacht Club, and much cosmetic bulkheading.

POTENTIAL USE ENHANCEMENT: Extreme care should be used with the area between Langley View and Stony Point. Because of its very low open nature, the area might best be left as agricultural or open space.

OSBD, #562, 1:40,000 scale, CHESSAPEAKE BAY, DAVE CHARLES TO NORFOLK HARBOR, 1971.

USDA 31 Oct 37 DWI-4H/9, 10, 25.
YADH 23 Feb 63 514116/041-045, 067-069; 514176/066.
NASA 31 Oct 75 7065, 7202, 7205, 7207.
YIMS 30 Apr 75 RP-8/99-160, 279-204.

NORTHWEST BRANCH OF THE BACK RIVER,
HAMPTON, VIRGINIA
SEGMENT 9 (Maps 54, 53)

EXTENT: This segment extends 25,000 feet (4.7 mi.) from Willoughby Point upstream to the Big Bethel Reservoir. This report is concerned only with the southern bank of the river as the Hampton City - York County, Poquoson boundary follows the center of the river.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Artificial containment (20%) and nearly equal portions of extensive, embayed, and fringe creek marshes.
CREEK: Wide, shallow tidal creek. The Northwest Branch is 2.7 miles long and drains 23.26 square miles.

SHORELANDS USE
FASTLAND: Government, Langley AFB and NASA Langley Research Center (20%) and unmanaged, open and wooded (80%).
SHORE: Unused.
CREEK: Fishing and water sports.

WIND & SEA EXPOSURE: The Northwest Branch of the Back River is a sheltered tidal river. With the exception of a small area across the river from Tin Shell Point, there is no open access to the shoreline by waves of any appreciable depth.

OWNERSHIP: Government, Private, and City.

PROVIDER: One family residential district.

LAND USE: Residential government (Langley AFB), unmanaged-open, recreational, and agricultural.
SHORE: Boat storage and recreation.
CREEK: Fishing, boating, and water sports.

WATER QUALITY: Good, unsatisfactory by the Bureau of Shellfish Sanitation as of July 1973.

BEACH QUALITY: There are no beaches in this segment.

SUGGESTED ACTION: None.

SHORE EROSION SITUATION: Stable.

EROSION RATE: Stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: Langley AFB is bulkheaded.

Suggested Action: None.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: Minimal.

USGS, #562, 1:40,000 scale, CHEAP SK BAY, Cape Charles to Norfolk Harbor, 1977.

PHOTOS: Aerial-USDA 12Apr37 FG 106/143-144, 155, 188.
USDA 310ct53 TVJ-4t/25, 45.
USAF 110ct59 AP59-35 R-21/1940-1944.
VaDH 23Feb65 5114116/044, 045, 067; 5147116/066.
NASA 310ct71 7049, 7202, 7203, 7207.
VIMS 30Apr73 HP-9/76-97.
4.3 SEGMENT AND SUBSEGMENT MAPS
MAP 4B

HAMPTON - GRAND VIEW

SHORELANDS TYPES

Segments 5B, 6, 7, 8

FASTLAND
Low Shore  
Dunes  
Artificial

SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized

NEARSHORE
Intermediate
Wide