1975

Shoreline Situation Report Mathews County, Virginia

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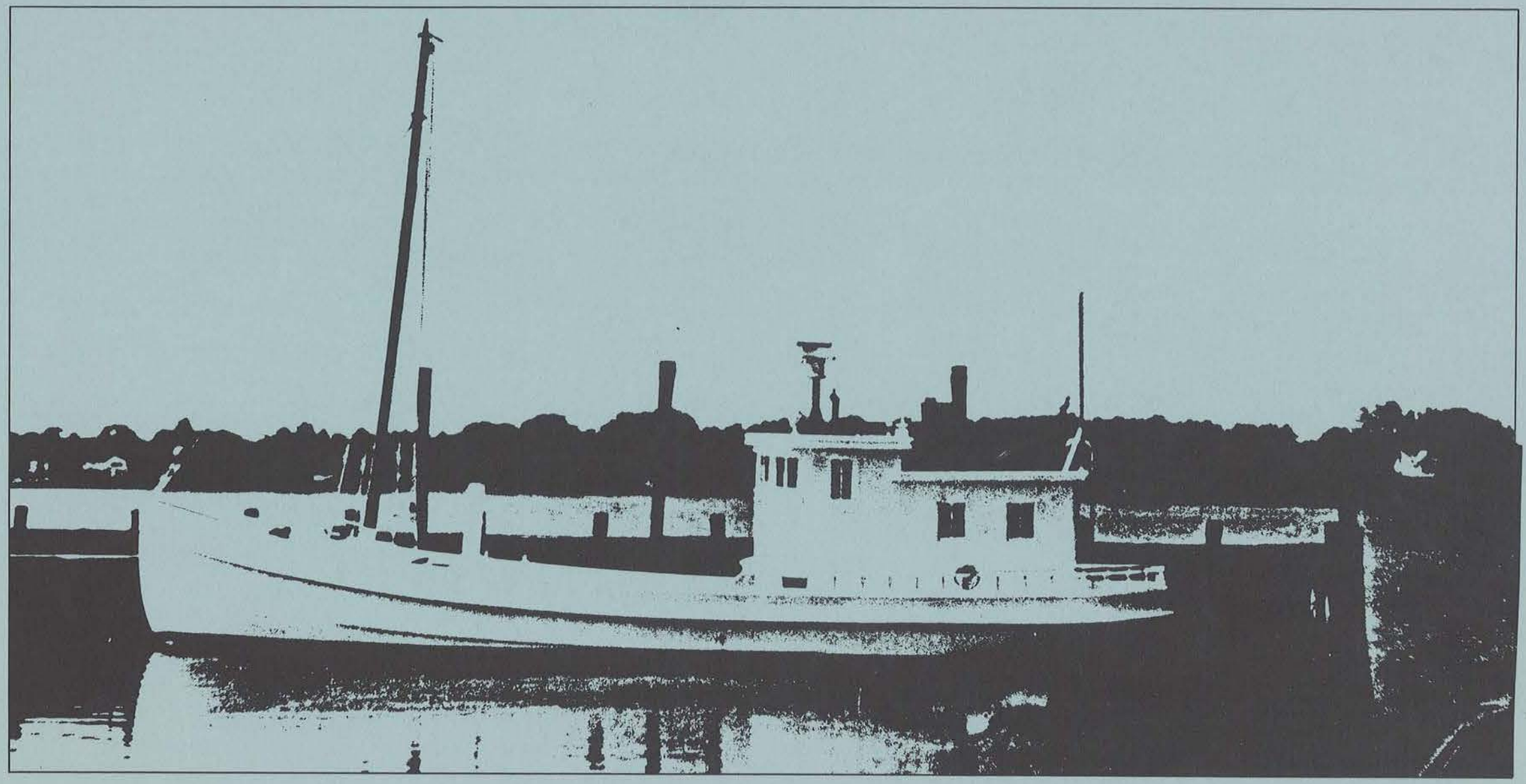

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Chesapeake Research Consortium Report Number 12

Special Report In Applied Marine Science and Ocean Engineering Number 77 of the

VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

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INTRODUCTION

1.1 PURPOSES AND GOALS

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

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

The major man-induced uses of the shorelands are:

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

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

The role of planners and managers is to optimize the utilization of the shorelands and to minimize the conflicts arising from competing demands. Furthermore, once a particular use has been decided upon for a given segment of shoreland, both the planners and the users want that selected use to operate in the most effective manner. A park planner, for example, wants the alloted 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 configuation of the shore zone. Alternately, if the use were residential development, we should 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 shorelands 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 the regulatory decision processes at the county level, as much as possible. 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 county level is intended to interface with and to support the existing or pending county regulatory mechanisms concerning activities in the shorelands zone.

1.2 ACKNOWLEDGEMENTS

This report was prepared with the funds provided by the Research Applied to National Needs (RANN) program of the National Science Foundation administered through the Chesapeake Research Consortium, Inc. George Dawes, Gene Silberhorn, and Jim Mercer of the VIMS Wetlands Section contributed many useful ideas and criticisms. Gaynor Williams, David Byrd, and Dennis Owen assisted with data reduction and preparation. Peter Rosen, Jane Davis, Kaye Stubblefield, Russell Bradley, Joe Gilley, Ken Thornberry, and Bill Jenkins prepared the graphics. Beth Tillage typed the manuscript. We thank the numerous other persons in both Maryland and Virginia who have criticized and commented upon our methods and ideas.

CHAPTER 2
Approach Used and Elements Considered

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APPROACH USED AND ELEMENTS CONSIDERED

2.1 APPROACH TO THE PROBLEM

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

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

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

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

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

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

a) Shorelands Physiographic Classification:

The shorelands of the Chesapeake Bay System may be considered as being composed of three interacting physiographic elements: the fastlands, the shore and the nearshore. A graphic classification based on these three elements has been devised so that the types for each of the three elements protrayed 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 A). 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 B). 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) from fastlands shore boundary

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

Dune

Artificial fill, urban and otherwise

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 satistical 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

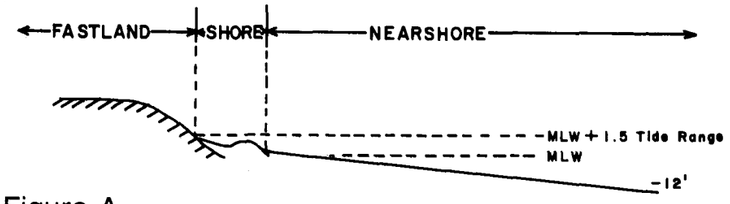


Figure A

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

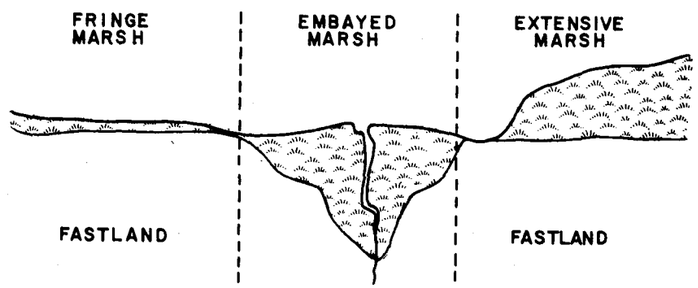


Figure B

A generalized illustration of the three different marsh types.

b) Shorelands Use Classification:

Fastland Zone

Residential

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

Commercial

Includes buildings, parking areas, and other land directly related to retail and wholesale trade and business. This category includes small industry and other anomalous areas 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 wildfowl 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 less 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

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

d) Water Quality

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

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

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

Although these limits are somewhat more stringent than those used in rating recreational waters

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

e) Zoning

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

f) Shore erosion and Shoreline defenses

The following ratings are used for shore erosion:

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

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

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

The existing shoreline defenses were evaluated as to their effectiveness. In some case 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 emphases 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 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 survey include detailed acreages of the grass species composition within individual marsh systems. The material in this report is provided to indicate the physiographic types of marshes and to serve as a rough guide on acreages until detailed surveys are completed. Additional information of the wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report by Marvin L. Wass and Thomas D. Wright, SRAMSOE Report No. 10, Virginia Institute of Marine Science, 1969, and in other VIMS publications.

i) Flood Hazard Levels

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

j) Shellfish leases and Public Grounds

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

k) Beach Quality

Beach quality is a subjective judgement based upon considerations such as the nature of the beach material, the length and width of the beach area, and the general aesthetic appeal of the beach setting.

CHAPTER 3
Present Shorelands Situation

3.1 THE SHORELANDS OF MATHEWS COUNTY, VIRGINIA

The total area of Mathews County, Virginia, is 130.5 square miles (83,520 acres) of which 88.7 square miles (68%) is land. There are 214.5 miles of shoreline. The dominant feature of the county's shoreline is its very low nature. Over ninety-nine percent of the shoreline is classified as low shore or low shore with bluff. The few tenths of miles that are not low shore are the moderately low to moderately high shores, with bluff, along the Piankatank River. This level, low character of the shore is further expressed in the generally great flood hazard along most of the county's shorelands. It is only the spongelike facility of the marshes which prevents more frequent extensive flooding of the low lands. As this report is being prepared, federally financed flood insurance is becoming available in Mathews County.

The marshlands of the county constitute another major feature of the shorelands. The Mathews County Tidal Marsh Inventory (Special Report 47 in Applied Science and Ocean Engineering, of the Virginia Institute of Marine Science, by Gene M. Silberhorn, 1974) describes 2,937 acres of tidal wetlands within the boundaries of Mathews County. Approximately eighty-three percent of the shore zone is classified as fringe, embayed, or extensive marsh. Of the remainder of the county's shore zone, most is beach (16% of the county total) or artificially stabilized (less than 1%).

The majority of the true beach area is on Chesapeake Bay. The eastern shore of Gwynn Island, Bethel Beach, and its southward extentions to Winter Harbor are the most appealing bathing beaches in the county. Some of the bluff areas along the Piankatank River (Segment 1) are fronted by a narrow beach. Their utility as medium-high density recreational beaches is severely limited by the narrowness and the lack of suitable access points.

Fastland use in Mathews primarily is agricultural,. although much of the agricultural is coincident with residential use. Forty-eight percent of the shorelands are used for agricultural purposes, twenty-eight percent for residential. Just over a fifth of the county's shorelands are unmanaged, either woodlands or open; while about one and a half percent are committed to recreational use. Approximately one percent of the shorelands are used for commercial purposes. The number one map series graphically depicts the various county-wide shorelands parameters and Table 1 summarizes them.

3.2 SHORE EROSION PROCESSES, PATTERNS, AND DEFENSES

The magnitude of shoreline erosion in Mathews County varies from severe to insignificant. Along the Chesapeake Bay shoreline the erosion is severe as the shore is exposed to large fetches and correspondingly great wave action. In the river areas erosion is slight as the shore is sheltered from wave attack.

Prior to a discussion of the characteristics of erosion in Mathews County, it would be worthwhile to discuss the processes of erosion.

Waves generated by local winds are the dominant agent of erosion in the Chesapeake Bay system. The growth and height of waves is controlled by four factors: the over water distance across which the wind blows, known as the fetch; the velocity of the wind; the duration of the wind; and the depth of the water.

Due to the weather patterns affecting the Chesapeake Bay area, maximum winds occur during storms and frontal passages. The winds of northeast storms during the fall, winter, and spring, generate waves which attack the western shore of the bay. The winds and low barometric pressure near the bay mouth have an indirect effect on erosion in the bay by forcing additional water into the bay. This storm surge or "wind tide" may be two or more feet above the normal tide level. For example, the severe northeast storm of March 1962 caused water elevations in Norfolk Harbor, Virginia, to reach an elevation approximately six feet above usual spring high tide levels. When similar high water levels occur, the wave driven erosional action is concentrated higher on the fastland, above the natural buffer zone or beach.

In addition to the height of the waves, the direction at which they impinge upon the shore controls the magnitude of long shore transport. In theory, the transport of material along the beach is greatest when the waves break on the shoreline at an angle of forty-five degrees.

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

The role played by beaches in the physical processes of the coastline, merits reiteration: beaches are natural land forms which serve to absorb incident wave energy thereby inhibiting erosion of the fastland. The configuration of any beach may change hour by hour or day by day as the accumulation of sand adjusts to changing conditions. By and large the natural maintenance of Virginia's Chesapeake Bay beaches is attained at the expense of erosion of the fastland. For any particular segment of shoreline, the beach sand is derived from erosion of fastland either at that site or from an up-drift site. A problem along the bayshore in Mathews County is the very low topography and resulting small sediment supply of the fastlands.

The Chesapeake Bay shoreline of Gwynn Island (Subsegment 3B) has an average historical erosion rate of over seven feet per year. Other areas on Chesapeake Bay appear to have lesser erosion rates, but as historic averages were not calculated for some of the beach areas, the intensity of erosion may rival that on Gwynn Island.

In terms of shore defenses, the upper two-thirds of Gwynn Island is fairly well protected with much bulkheading and many groins. Little of the remaining bay shoreline is defended. The mouths of the larger creeks, e.g., Winter Harbor, are maintained, dredged and jettied, but there are no ongoing attempts to stabilize the shoreline. Stabilization of the area probably would be difficult as the beach areas are so thin. Groins might locally slow the longshore movement of sand and a program of nourishment in a groined area might enhance the recreational aspects of the area. Unless there were a demand for improved public beaches in the county, such action probably is unnecessary. In any event, no shoreline stabilization or defense program should be undertaken without competent, expert advice and careful planning.

The only other heavily defensed area in Mathews County is the western shore of Gwynn Island (Subsegment 3A). For practical purposes all of the 11,000 feet of shoreline in this subsegment is either bulkheaded or riprapped. Groins also fortify much of the subsegment and appear to protect those small areas not armored.

Elsewhere in the county there are no severe erosion problems. A portion of Subsegment 2A, Godfrey Bay, experiences moderate erosion as a result of its open northeast exposure to Chesapeake Bay. A major effort at shore protection in this area does not appear necessary.

Shoreline erosion is not a significant problem of the remainder of the county's shorelands. Along many naturally protected shores there are many bulkheads which serve cosmetic or convenience purposes rather than shore protection purposes.

3.3 POTENTIAL SHORELANDS USES

Except for a few isolated locations, the potential for significantly enhanced shorelands use in Mathews County is slight. Some sections of the county might be quite suitable for residential development but lack the composite of features necessary for total shorelands utilization. Similarly, where the beach and nearshore zone might support greatly increased recreational use, the adjacent fastlands might not be able to bear the pressure. In all cases, our suggestion for potential use enhancement of an area are primarily based upon consideration of the shorelands and not upon consideration of fresh water supplies, sewage treatment or disposal, drainage, and soil analysis.

The highlands along the Piankatank River (Segment 1) are a type example of an area that is probably quite suitable for increased residential development, but lacks significant shore features. The already developed Cobbs Creek area is the only boat harbor area in the segment. Its present ownership and utilization prohibits significant alteration or expansion of the present facilities. The residential potential for the Piankatank area, however, appears great as the area is high, fairly stable, and offers pleasant, scenic views of the river. The area does lack beaches and points of easy public access to the shore.

Gwynn Island has perhaps the highest recreational use enhancement potential of any area within the county. Sandy Point (Subsegment 3C), the southeast corner of the island, is a fine, little used, beach area. Improved access to the beach and rudimentary support facilities such as parking space, rest rooms, and changing areas would be all that is necessary. Gwynn Island offers reasonably good beaches and satisfactory harbors all in close proximity to one another.

Numerous creeks such as Queens, Lanes, and Stutts Creeks, in Segments 2 and 4, provide anchorages for some vessels but generally are too shallow for larger railing yachts. Also the beach facilities are minimal or non-existant.

The beach area of Segment 5 might be suited for some development as a local beach park area. The beach, however, is not outstanding. In general the beach is very thin and narrow. Marsh blocks protrude through the beach and shallow water extends far offshore. A carefully planned project

of beach modification might improve the potential of the area, but such a program probably would be complicated and expensive. Also, parking might be a problem as in most sections the beach is separated from the fastland by a broad marsh.

Winter and Horn Harbors already are reasonable harbors for small vessels and might be able to be expanded in scope.

The Mobjack Bay segments offer great possibilities for increased small craft facilities. Both the East and North Rivers have relatively deep channels extending many thousand yards upstream and many coves which might be suitable for development as marinas or boat yards. At a minimum, increased public landing and access facilities would improve the public recreational utility of the area.

In summary, the shorelands of Mathews County on Chesapeake Bay have a strong potential for increased recreational utilization. The marinas and boat yards of the East and North Rivers at Gwynn Island might be expanded to handle what probably will be a vastly increasing demand for recreational facilities. The overall recreational use enhancement potential for the county is only fair due to the lack of areas combining boating and bathing facilities adjacent to one another.

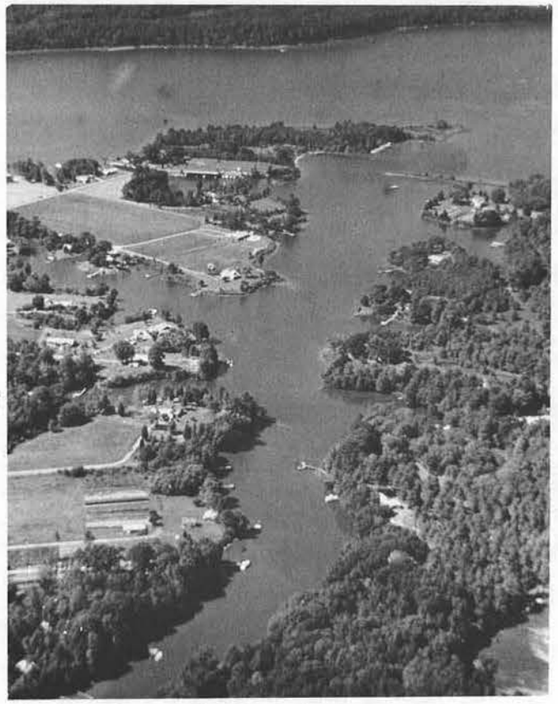


FIGURE 1

FIGURE 2

FIGURE 3

FIGURE 4

1: Cobbs Creek on the Piankatank River, Segment 1, note the great number of small piers.

2: The bridge joining Gwynn Island to the mainland of Mathews County. The view is from the island across the Narrows to the Coast Guard facility.

3: A composite photograph of the lower portion of Subsegment 3A, the western edge of Gwynn Island. The groins have trapped some sand forming small beaches. The area adjacent the highway is rip-rapped.

4: Groins and piers near Cherry Point, Subsegment 3B, the north end of Gwynn Island.

FIGURE 5

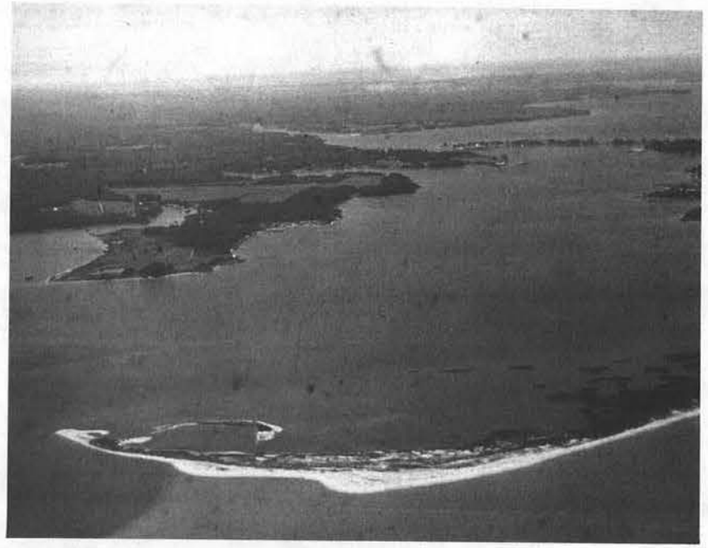


FIGURE 6

5: Beach along the Chesapeake Bay shore of Gwynn Island, Subsegment 3B.

6: Over-view of Sandy Point and Milford Haven.

7: Rigby Island and Whites Creek, view toward the southeast.

8: View north up Bethel Beach and Rigby Island. Note that this photograph shows Rigby Island (upper right) connected to Bethel Beach whereas the topographic maps (dated 1965) show them separated. The maintained inlet is Garden Creek.

9: Garden Creek inlet, the jetties are nearly closed by sand, the inlet is usable only at high tide.

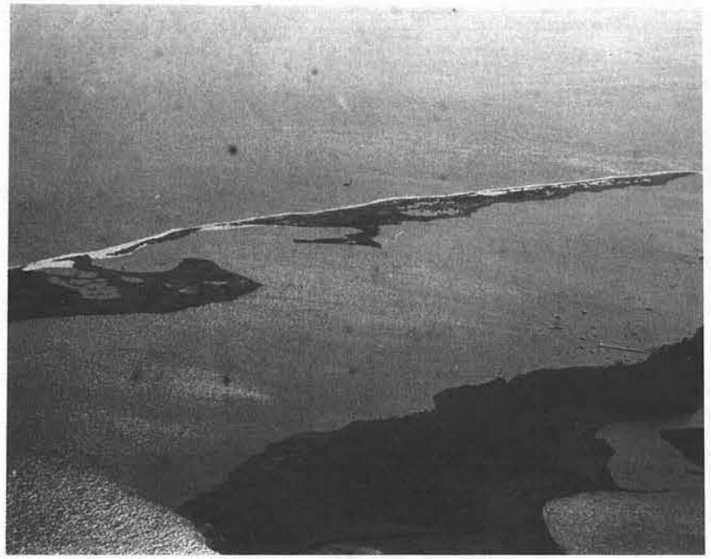


FIGURE 7

FIGURE 8

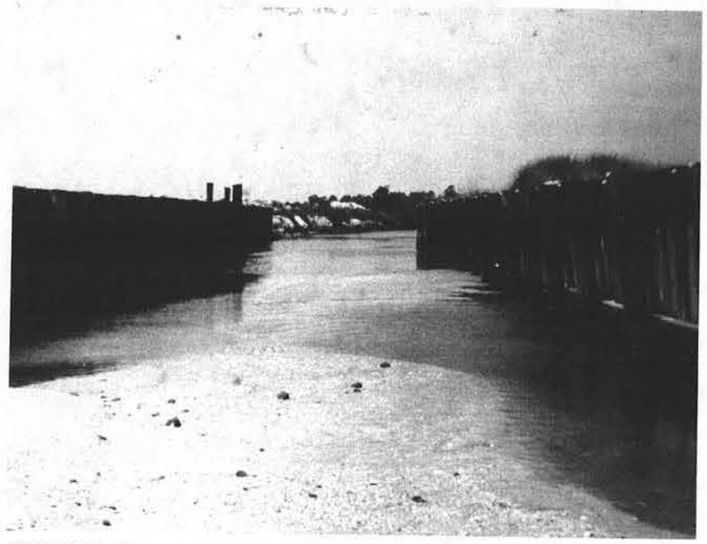


FIGURE 9

FIGURE 10

FIGURE 11

FIGURE 12

FIGURE 13

10: Bethel Beach near Onemo. The beach is subject to severe erosion. There is a very small quantity of sand above the eroding marsh peats.

11: New Point Comfort and the old New Point Lighthouse. Many local residents remember the light and island being connected to the mainland.

12: Put In Creek, a branch of the East River extending to Mathews Court House.

13: The village of Mobjack at the mouth of the East River on Mobjack Bay.

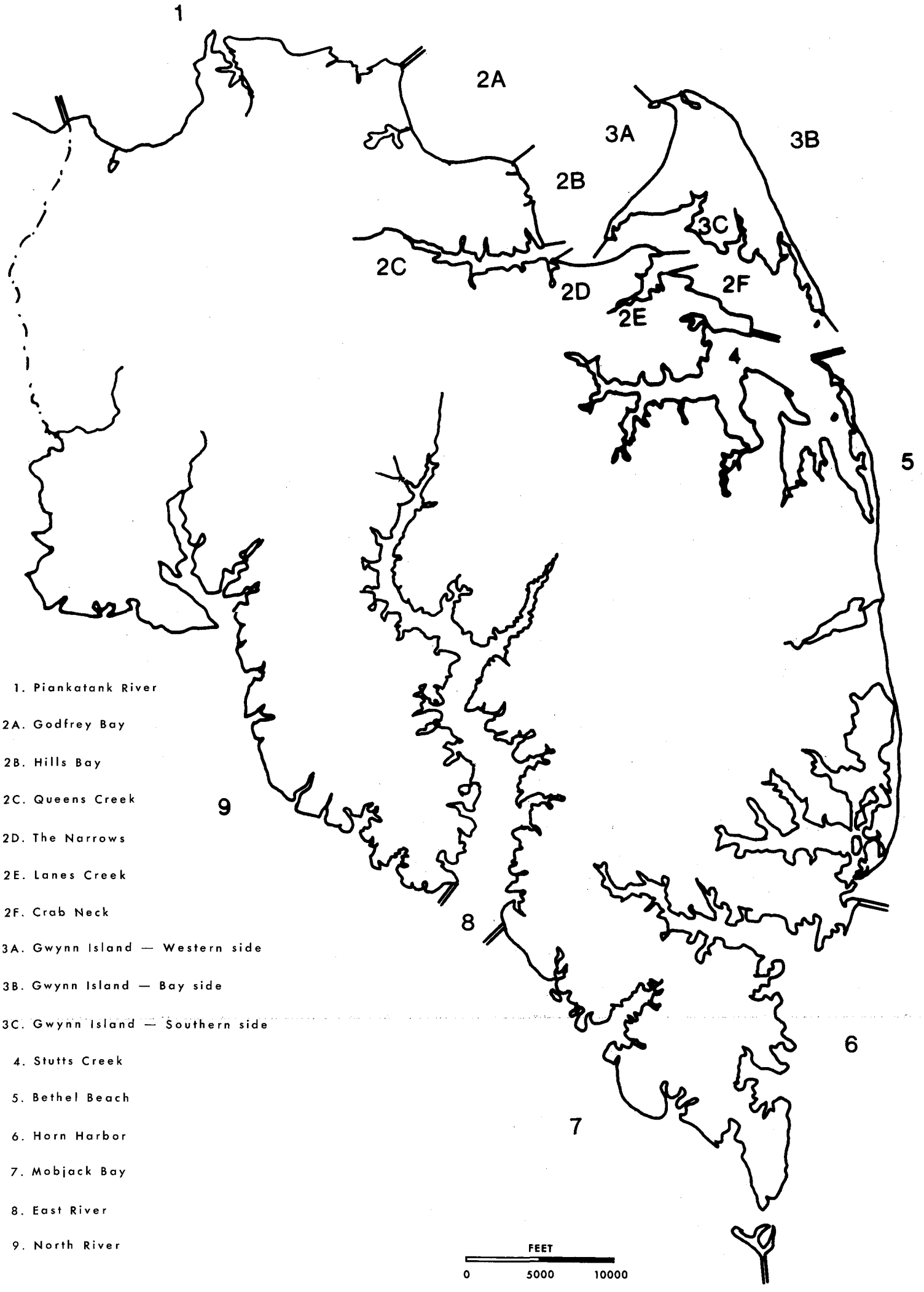
MAP 1A

MATHEWS COUNTY

SEGMENT LOCATION MAP

// = Segment Boundary

/ = Subsegment Boundary



1. Piankatank River

2A. Godfrey Bay

2B. Hills Bay

2C. Queens Creek

2D. The Narrows

2E. Lanes Creek

2F. Crab Neck

3A. Gwynn Island — Western side

3B. Gwynn Island — Bay side

3C. Gwynn Island — Southern side

4. Stutts Creek

5. Bethel Beach

6. Horn Harbor

7. Mobjack Bay

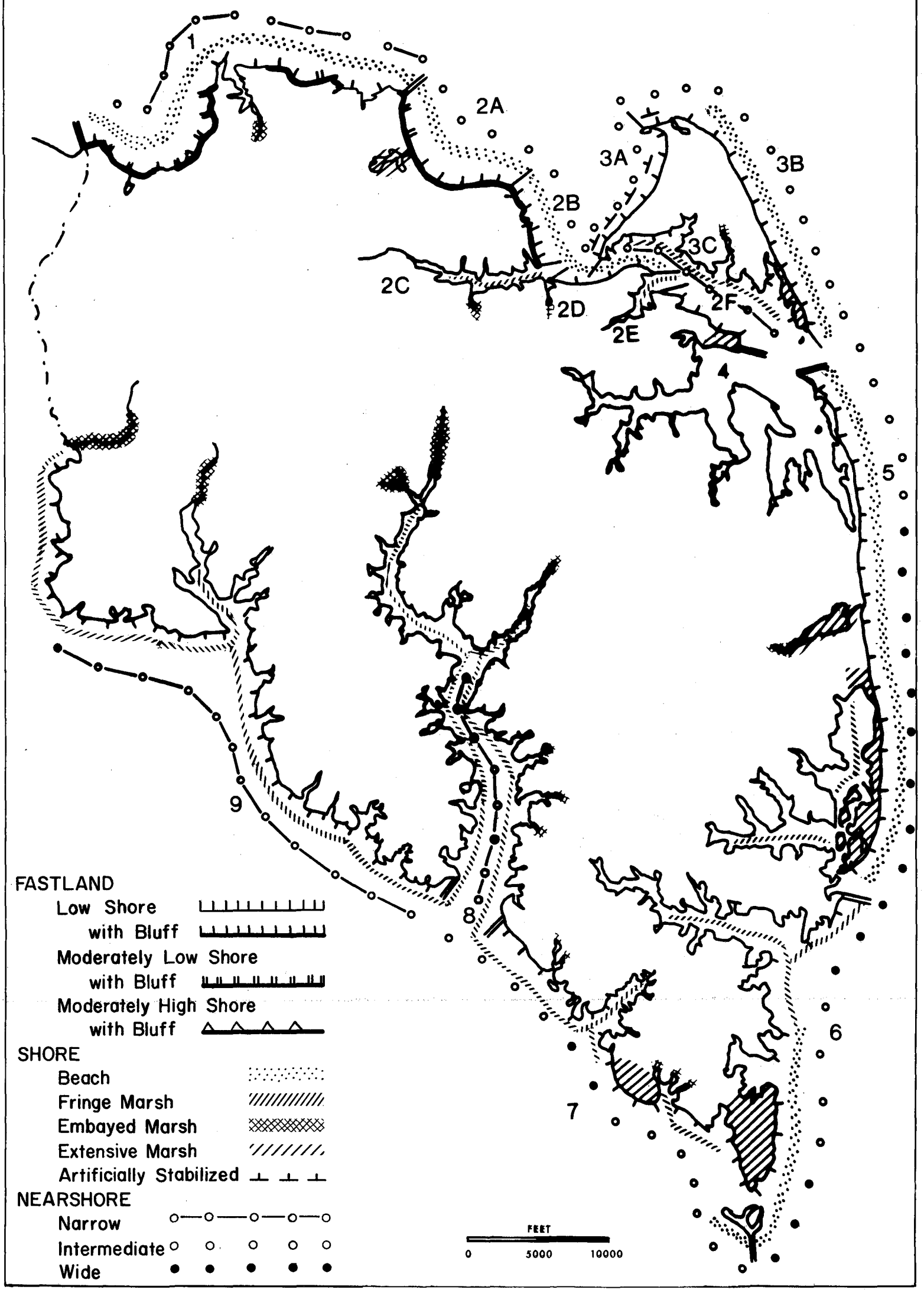
8. East River

9. North River

MAP 1B

MATHEWS COUNTY

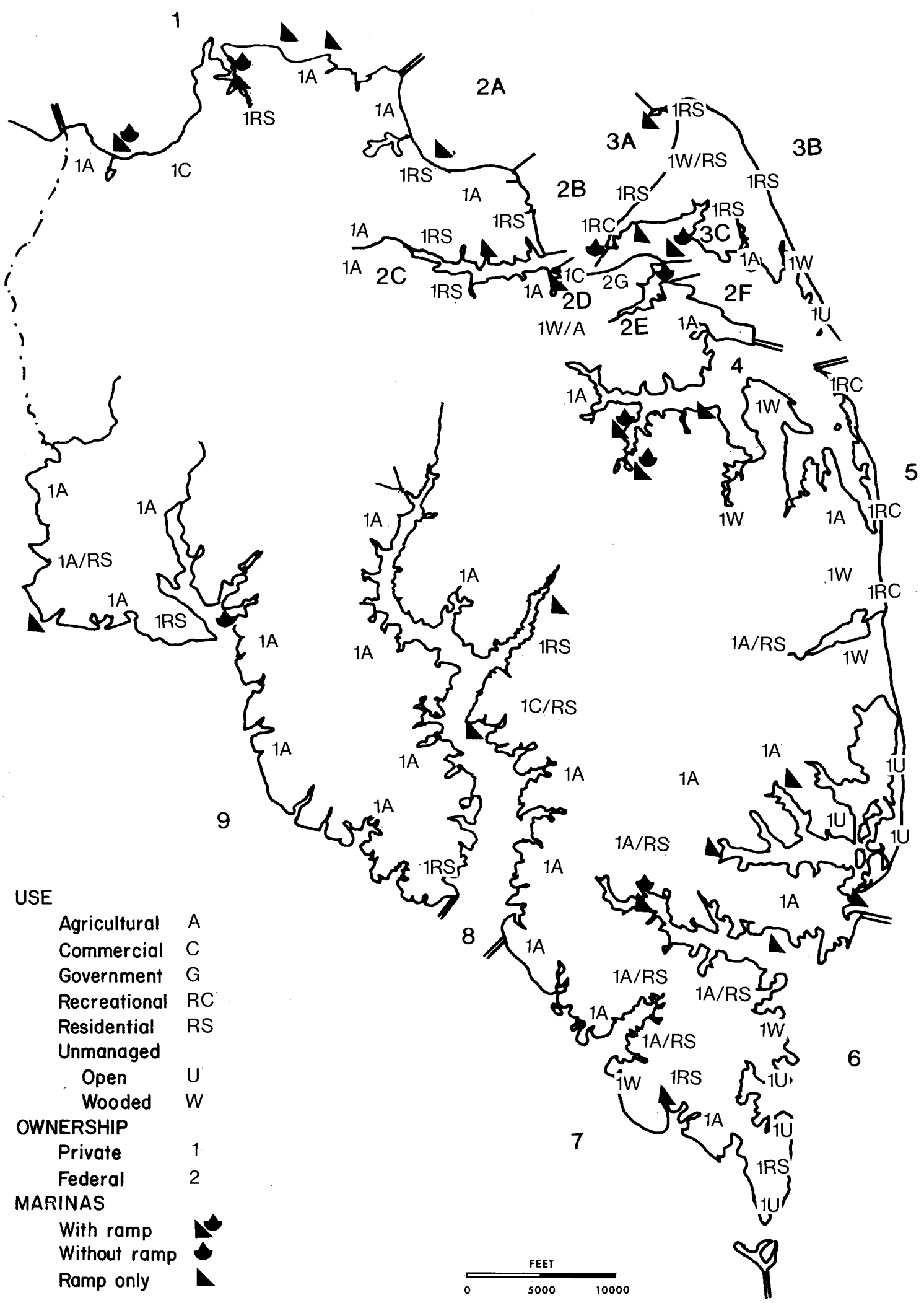
SHORELANDS TYPES



MAP 1C

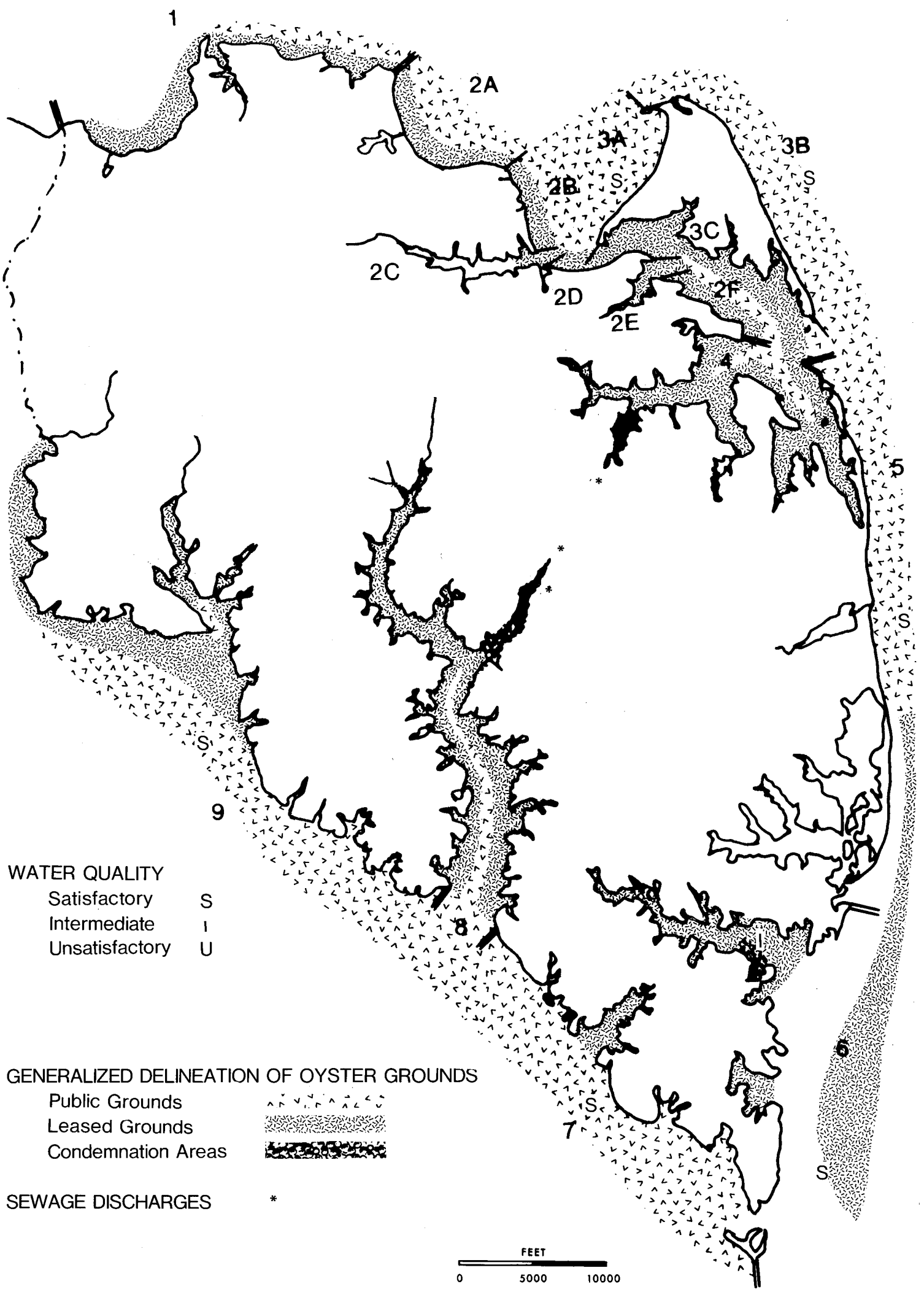
MATHEWS COUNTY

FASTLAND USE; OWNERSHIP



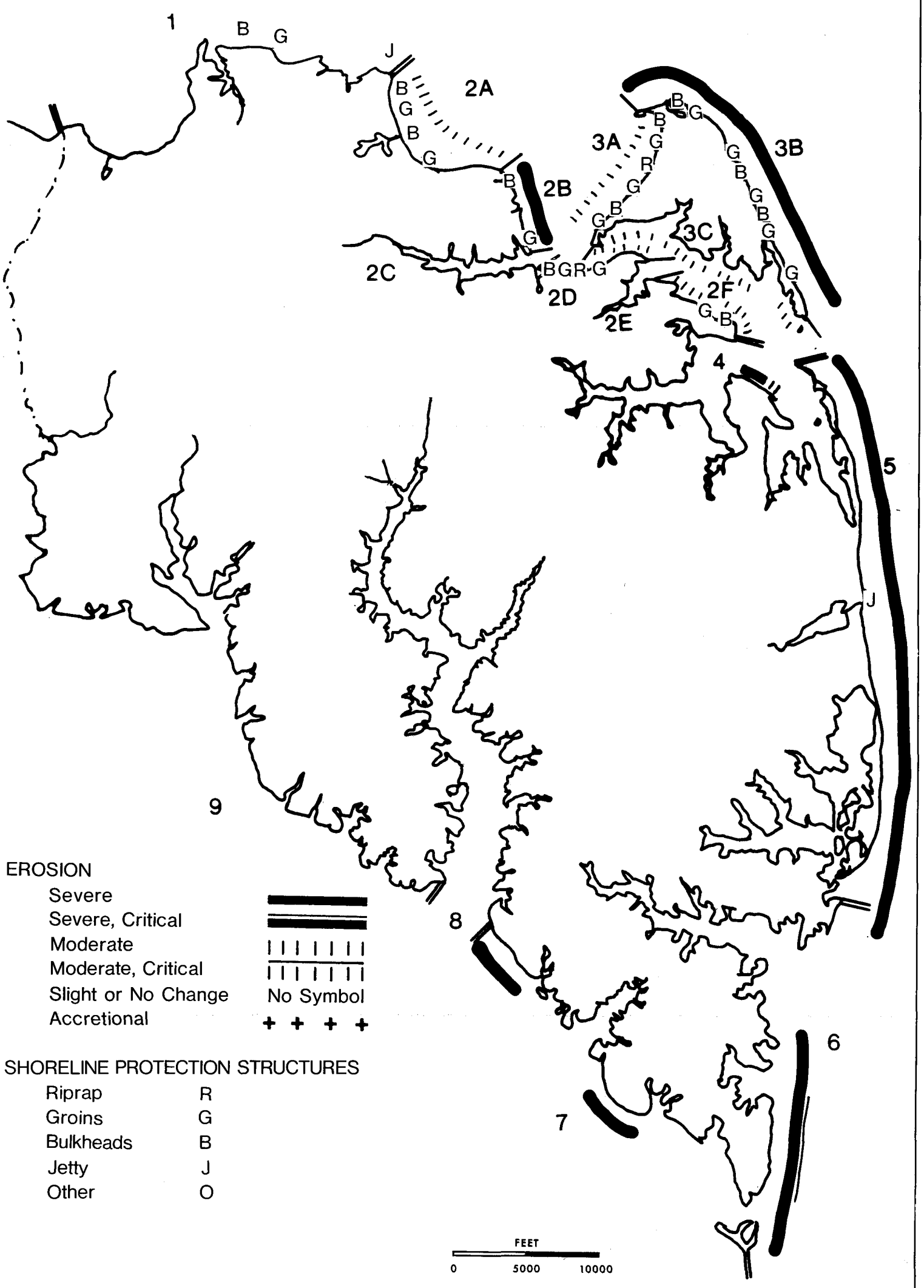
MAP 1D

WATER QUALITY, OYSTER GROUNDS, AND SEWAGE DISCHARGES



ADAPTED FROM MAPS PREPARED BY THE STATE WATER CONTROL BOARD

MAP 1E


1
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G
J
2A
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5
J
6
7
8
9
EROSION
Severe
Severe, Critical
Moderate
Moderate, Critical
Slight or No Change
No Symbol
Accretional
SHORELINE PROTECTION STRUCTURES
Riprap R
Groins G
Bulkheads B
Jetty J
Other O
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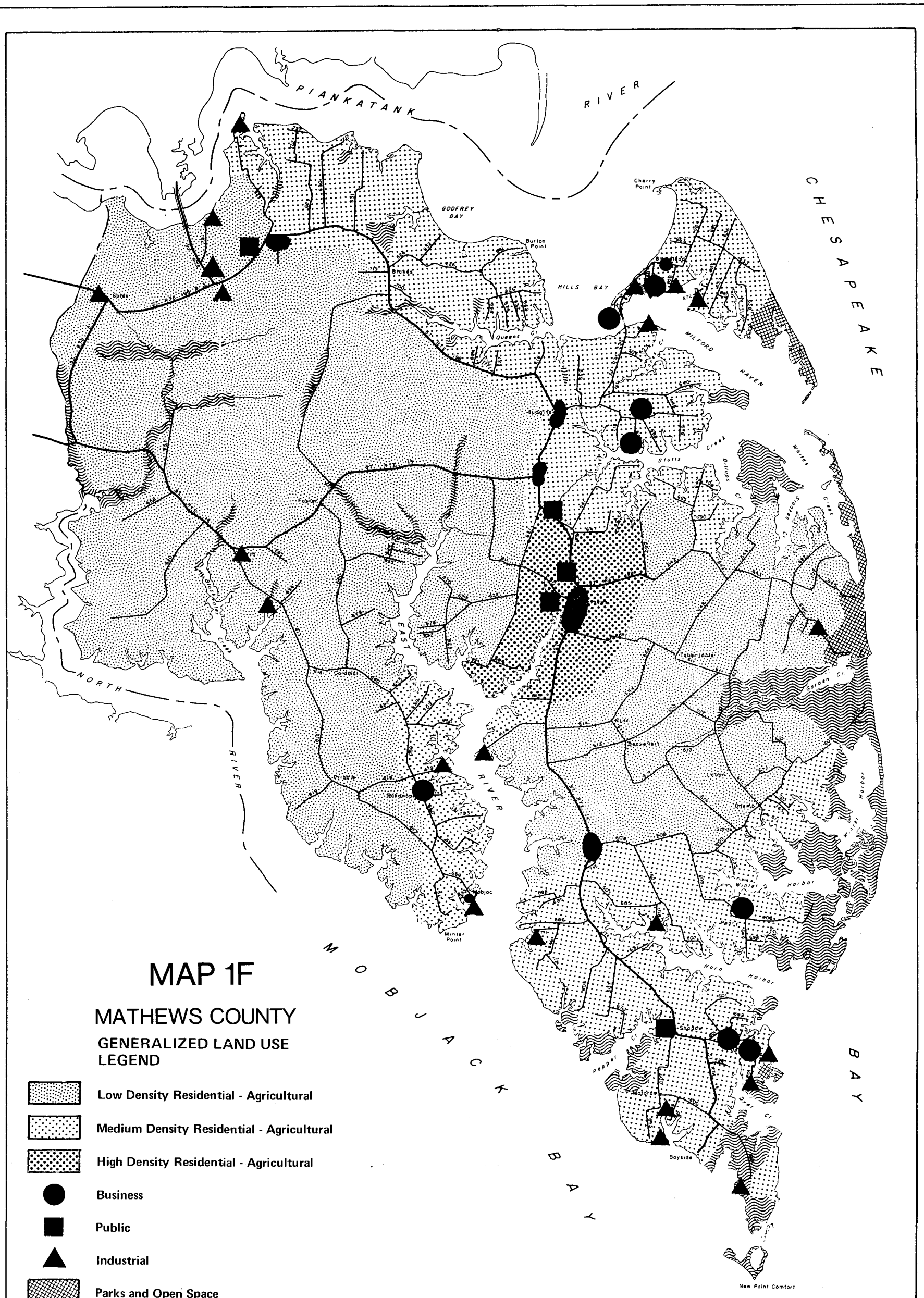
5000
10000



MAP 1F

MATHEWS COUNTY

GENERALIZED LAND USE LEGEND

- Low Density Residential - Agricultural
- Medium Density Residential - Agricultural
- High Density Residential - Agricultural
- Business
- Public
- Industrial
- Parks and Open Space
- Conservation

SCALE IN FEET
2000 0 2000 4000 6000 8000 10000

VIRGINIA DIVISION OF PLANNING AND COMMUNITY AFFAIRS

TABLE 1. MATHEWS COUNTY, VIRGINIA SHORELANDS PHYSIOGRAPHY, FASTLANDS USE, OWNERSHIP (STATUTE MILES)

Ownership, use and physiographic classification / Subsegment	SHORELANDS PHYSIOGRAPHY												FASTLANDS USE					OWNERSHIP	TOTAL MILES
	FASTLANDS				SHORE					NEARSHORE									
	LOW SHORE	LOW SHORE WITH BLUFF	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE WITH BLUFF	BEACH	FRINGE MARSH	EXTENSIVE MARSH	EMBAYED MARSH	ARTIFICIALLY STABILIZED	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	RECREATIONAL	RESIDENTIAL	UNMANAGED	PRIVATE	
1	6.0	3.3		0.3	9.0	0.6				5.2	2.4		9.1	0.2			0.3	9.6	9.6
2A		2.3	0.2		2.3	0.2				2.1	0.2	0.2	1.2			1.3		2.5	2.5
2B		1.0			0.8	0.2					1.0		0.5			0.5		1.0	1.0
2C	5.8				1.0	4.2		0.6					2.9			2.9		5.8	5.8
2D	1.9				1.3	0.6				0.6	1.1	0.2	1.7	0.2				1.9	1.9
2E	3.0				0.7	2.1		0.2					2.4				0.6	3.0	3.0
2F	1.7				0.8	0.5		0.4			1.7		1.3				0.4	1.7	1.7
3A	2.1				0.5				1.6		2.1					1.0	1.1	2.1	2.1
3B	4.4				4.4						4.4					2.9	1.5	4.4	4.4
3C	8.0				0.4	7.4			0.2				1.2			6.8		8.0	8.0
4	28.2				0.2	24.4		3.6					2.8			2.8	22.6	28.2	28.2
5	9.8				9.8						1.0	8.8	1.7		3.2	1.7	3.2	9.8	9.8
6	47.7				2.8	34.5	10.4				2.2	2.8	15.3	0.4		15.3	16.7	47.7	47.7
7	18.9				0.4	13.7	4.0	0.8			7.6	11.4	9.5			9.4		18.9	18.9
8	40.9					37.7		3.2		40.9			38.9	0.8		1.2		40.9	40.9
9	29.1					27.0		2.1					14.6			14.5		29.1	29.1
SUBTOTAL	207.5	6.6	0.2	0.3	34.4	153.1	14.4	10.9	1.8	48.8	21.7	23.3	103.1	1.6	3.2	60.3	46.4	214.6	214.6
% of SHORELINE	96.7	3.1	0.1	0.1	16.1	71.3	6.7	5.1	0.8	22.3	10.1	10.9	48.2	0.8	1.5	28.1	21.4	100.0	100.0

CHAPTER 4

4.1 Table of Subsegment Summaries

4.2 Segment and Subsegment Descriptions

4.3 Segment and Subsegment Maps

4.1 Table of Subsegment Summaries

SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR MATHEWS COUNTY, VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION				POTENTIAL USE ENHANCEMENT
							RATE	ENDANGERED STRUCTURES	PROTECTIVE STRUCTURES	SUGGESTED ACTION	
1 PIANKATANK RIVER 50,500 feet	FASTLAND: Low shore - 63%; moderately low shore, usually with bluff - 34%; moderately high shore, usually with bluff - 3%. SHORE: Beach, fringe marshes, embayed marsh. NEARSHORE: Narrow - 95%, intermediate - 5%.	FASTLAND: Agricultural; unmanaged, wooded; small commercial port. SHORE: Unused and recreational, some commercial near Twigg Bridge.	Private.	Low.	Satisfactory.	Fair to poor, most narrow width, poor access.	Low, under 1 ft/yr.	None.	1 small bulkhead, about 1 dozen groins.	None.	Area has good potential as a small density waterfront community; beaches need improving.
2A GODFREY BAY 13,400 feet	FASTLAND: Low shore with bluff - 94%; moderately low shore with bluff - 6%. SHORE: Beach, fringe marsh, embayed marsh. NEARSHORE: Narrow - 85%, intermediate - 7%, wide - 8%, ample sand, half dozen bars parallel to shore.	FASTLAND: Agricultural, and residential. SHORE: Occasional recreational use. NEARSHORE: Fishing, shellfishing, and water sports.	Private.	Low, non-critical, all land above 10 feet.	Satisfactory.	Fair.	Moderate 2.2 ft/yr.	None.	18 groins, bulkheads.	None.	Fair - present use seems best for area.
2B HILLS BAY 5,400 feet	FASTLAND: Low shore, usually with bluff. SHORE: Beach - 4,400 feet, fringe marsh - 1,000 feet (3 acres). NEARSHORE: Intermediate with bars.	FASTLAND: Agricultural and residential. SHORE: Recreational. NEARSHORE: Fishing, shellfishing, and water sports.	Private.	Low, non-critical, all land above 10 feet, some above 15 feet.	Satisfactory.	Fair, too narrow to be really good beach.	Severe, non-critical, 3.7 ft/yr.	None.	5 groins, 1 bulkhead.	None.	Fair - present use seems best for area.
2C QUEENS CREEK 30,700 feet	FASTLAND: Low shore. SHORE: Beach, fringe marsh, and embayed marsh.	FASTLAND: Residential and agricultural. SHORE: Dockage. CREEK: Boating and water sports.	Private.	Low, non-critical.	Satisfactory.	Poor, shoreline usually marsh.	Slight or none.	None.	None.	None.	Fair - continued low-density residential use.
2D THE NARROWS 10,000 feet	FASTLAND: Low shore. SHORE: Beach - 70%, fringe marsh - 30% (9 acres). NEARSHORE: Narrow - 30% (3,000 feet); intermediate - 60% (6,000 feet); wide - 10% (1,000 feet).	FASTLAND: Commercial - 8%; agricultural - 92% (includes some residential and woods). SHORE: Recreational, boating, unused. NEARSHORE: Boating and water sports.	Private, except for bridge abutment.	High, critical, much of area below 7 feet.	Satisfactory.	Fair.	Slight to moderate.	None.	1 bulkhead, 7 groins near Winder Creek; some riprap at Gwynn Island Bridge, 3 groins east of bridge.	Areas with incomplete bulkhead should be completely bulkheaded.	Area could support a few more residences; marina facilities could be expanded, if demand so requires.
2E LANES CREEK 16,000 feet	FASTLAND: Low shore. SHORE: Fringe marsh - 81.25%; beach - 18.75%. CREEK: Narrow (under 1,000 feet), shallow (less than 8 feet).	FASTLAND: Mainly agricultural, some wooded. SHORE: Mostly unused, some small boat dockage. CREEK: Shellfishing, boating, and water sports.	Private.	High, non-critical, most of area below 10 feet.	Satisfactory.	Poor, shoreline mostly fringe marsh.	Slight or none.	None.	None.	None.	Low.
2F CRAB NECK 8,800 feet	FASTLAND: Low shore. SHORE: Beach - 50%; fringe marsh - 50%. NEARSHORE: Intermediate.	FASTLAND: Agricultural - 77%; unmanaged, unwooded - 23%. SHORE: Some boat dockage, mostly unused. NEARSHORE: Fishing, shellfishing, and water sports.	Private.	High, most under 10 feet, much under 5 feet.	Satisfactory.	Poor, most of shoreline is marsh, beaches are narrow and thin.	Moderate 2-2⅔ ft/yr.	None.	3 groins, 2 small bulkheads.	None.	Minimal.
3A GWYNN ISLAND - HILLS BAY 11,000 feet	FASTLAND: Low shore. SHORE: Beach and artificially stabalized - 91%; fringe marsh - 6%. NEARSHORE: Intermediate.	FASTLAND: Residential and unmanaged, wooded. SHORE: Recreation. NEARSHORE: Water sports, fishing, and shellfishing.	Private.	High, all below 12 feet, much below 7 feet.	Satisfactory.	Poor to good.	Moderate non-critical, 2 ft/yr.	None.	Bulkhead - 64% (7,000); riprap - 27% (3,000); 5 groins.	None.	None. Present use quite satisfactory.
3B GWYNN ISLAND - CHESAPEAKE BAY 23,000 feet	FASTLAND: Low shore. SHORE: Beach. NEARSHORE: Intermediate with parallel bars.	FASTLAND: Residential - 65%, unmanaged, wooded and unwooded - 35%. SHORE: Recreation. NEARSHORE: Fishing and water sports.	Private.	High.	Satisfactory.	Good, one of better sandy beaches in the Bay.	Severe non-critical, over 7 ft/yr.	None.	70 groins, bulkheads.	Establish uniform bulkhead construction standards and complete bulkheading of the area.	Beach at southern portion of segment could become a larger recreation area with improved access and public facilities.

SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR MATHEWS COUNTY, VIRGINIA (CONTINUED)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	OWNERSHIP	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION				POTENTIAL USE ENHANCEMENT
							RATE	ENDANGERED STRUCTURES	PROTECTIVE STRUCTURES	SUGGESTED ACTION	
3C GWYNN ISLAND, SOUTH 42,100 feet	FASTLAND: Low shore. SHORE: Beach, fringe marsh and artificially stabalized. NEARSHORE: Narrow.	FASTLAND: Residential, light agricultural. SHORE: Unmanaged, wooded and unwooded. NEARSHORE: Commercial.	Private.	High, critical.	Satisfactory.	Poor.	Slight to moderate, non-critical, 1-1.5 ft/yr.	None.	1 groin near Cockrell Point; 2 bulkheaded areas.	None.	Continued development along present lines.
4 STUTTS CREEK 149,000 feet	FASTLAND: Low shore. SHORE: Some beach, most fringe marsh, extensive marsh, and embayed marsh. NEARSHORE: Narrow.	FASTLAND: Residential and agricultural - 20%; unmanaged, wooded - 80%. SHORE: Mostly unused, access to boats. CREEKS: Boating, fishing, shellfishing, and water sports.	Private.	Moderate, non-critical.	Satisfactory.	Poor.	Slight, non-critical.	None.	None.	None.	Low - high flood hazard and limited beach areas limit development of area.
5 BETHEL BEACH 51,500 feet	FASTLAND: Low shore. SHORE: Narrow beach, fringe marsh, embayed marsh, extensive marsh. NEARSHORE: Wide - 90% and intermediate - 10%.	FASTLAND: Agricultural and residential; unmanaged, wooded and open; and recreational. SHORE: Mostly unused, some recreational. NEARSHORE: Water sports, boating, and fishing.	Private.	High, area is extremely low.	Satisfactory.	Fair to good, most narrow, thin, and sandy.	Severe, non-critical.	None.	Jetty at mouth of Garden Creek.	None.	Low - very low marsh nature of area limits development of residential and industrial areas, possibility for development of Winter Harbor area and Bethel Beach area.
6 HORN HARBOR 252,000 feet	FASTLAND: Low shore - much of area below 5 feet. SHORE: Fringe marsh, extensive marsh, embayed marsh, and beach - 15,000 feet. NEARSHORE: Wide.	FASTLAND: Agricultural and residential - 64%; commercial - 1%; unmanaged, wooded and open - 35%. SHORE: Unused, boat dockage and recreational. NEARSHORE: Boating and fishing.	Private.	High, entire area quite low.	Satisfactory, except intermediate for Horn Harbor.	Fair to poor, beaches along bay shoulders generally narrow, thin, and not good access	Severe, critical for Bay shoreline: Slight for rest	Approximately 1 dozen beach front houses NE of Bavon.	None.	None.	Low - may be possible to improve access to some beach areas for use as swimming, beaches, etc. - high flood risk and poor drainage in area.
7 MOBJACK BAY 100,000 feet	FASTLAND: Low shore. SHORE: Fringe marsh, extensive marsh, embayed marsh. NEARSHORE: Intermediate - 40% and wide - 60%.	FASTLAND: Residential and agricultural. SHORE: Water sports and access to boats. NEARSHORE: Fishing, boating, shellfishing, and water sports.	Private.	High, non-critical.	Satisfactory.	No beaches in area.	Slight to severe, non-critical, from 0-4 ft/yr.	None.	None.	None.	Possible use of Davis and Pepper Creeks for pleasure boating marina areas, if soil conditions are suitable.
8 EAST RIVER 21,600 feet	FASTLAND: Low shore - 100%. SHORE: Fringe marsh and embayed marsh. CREEK: Narrow, marked channel of 10 feet depth for 3½ miles, 4 foot depth for 2 miles, shoals.	FASTLAND: Low density residential and agricultural - 95%; residential - 3%; and commercial - 2%. SHORE: Access to boats and boat yards. CREEK: Boating.	Private.	Moderate to low.	Satisfactory.	Poor, no real beaches, just river bank.	Slight, non-critical.	None.	None.	None.	Fair - could be more fully developed as a residential area, recreational aspects could also be improved with more boat ramps.
9 NORTH RIVER 154,000 feet	FASTLAND: Low shore. SHORE: Fringe marsh. CREEK: Wide with many shoals.	FASTLAND: Agricultural and residential. SHORE: Access to boats. CREEK: Boating and water sports.	Private.	Moderate to low.	Satisfactory.	No beaches in the segment.	None, non-critical stable.	None.	None.	None.	Minimal - more residential development a possibility, as is improved public access to creeks.

4.2 Segment and Subsegment Descriptions

PIANKATANK RIVER, MATHEWS COUNTY, VIRGINIA

SEGMENT 1 (Maps 2)

EXTENT: 50,500 feet (9.6 mi.) along the Piankatank River East from Gloucester - Mathews County line to (the eastern) Iron Point on Godfrey Bay. Except for approximately 13,600 feet of shoreline on Cobbs Creek, this segment is adjacent to 32,000 feet of Piankatank River Channel.

SHORELANDS TYPE
FASTLAND: Low shore - 63%, moderately low shore, usually with a bluff - 34%, and moderately high shore, usually with bluff - 3%. The northern portion of Mathews County is a terrace at a 30 to 40-foot elevation.
SHORE: Beach, fringe and embayed marshes. There are 23.4 acres of marsh in the segment ranging in size from $\frac{1}{4}$ of an acre to 17 acres.
NEARSHORE: Narrow - 95% and intermediate - 5%.

SHORELANDS USE
FASTLAND: The primary fastland use is agricultural; there are some unmanaged, wooded portions and a small commercial portion near the Twigg Bridge. Frequently, there is a narrow woods border between the fields and the river.
SHORE: Some recreational and some commercial near Twigg Bridge.
NEARSHORE: Fishing, shellfishing and water sports.

OFFSHORE BOTTOM: In some areas the offshore bottom has transverse or parallel bars.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Fair to poor. Most beaches are narrow and have poor access.

WIND AND SEA EXPOSURE: The Piankatank River is protected from most seas which might enter from the Chesapeake Bay. Fetches generally are less than 3 miles.

OWNERSHIP: Private.

FLOOD HAZARD: Low. Virtually all the fastland is well above the extreme flood levels.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight, noncritical. Historically, the average shoreline retreat along the Piankatank River is under 1 foot per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is one small bulkhead between Cobbs Creek and Pond Point and perhaps a dozen small groins scattered among several locations. The small inlet near Iron Point is protected by jetties.

Suggested Action: None.

OTHER SHORE STRUCTURES: The Twigg Bridge (constructed in 1953) crosses the Piankatank River in this segment. There are many piers along the shoreline, 4 ramps (2 at marinas and one each at the bridge and Cobbs Creek).

NAVIGABILITY: The Piankatank River is easily navigable through this segment. According to the Coast Pilot most traffic is fish, shellfish, petroleum products, and pulpwood. Vessels using the river usually draw 6 feet but drafts of 11 feet are on record. Depths of 16 feet extend as far as the Highway bridge at Dixie. The lower portion of the channel is marked with lights and buoys.

POTENTIAL USE ENHANCEMENT: The potential of this area as a low density residential waterfront community is great. The only feature really lacking is a good beach, but the existing beaches are servicable for swimming.

MAPS: USGS, 7.5 Min.Ser. (Topo.), WILTON AND DELTAVILLE Quadrs., 1964.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA1 1-4.

GODFREY BAY, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2A (Maps 2 and 3)

EXTENT: 13,400 feet (2.5 mi.) from Iron Point to Burton Point. Chapel Creek is included in this subsegment, although it is not measured.

SHORELANDS TYPE
FASTLAND: Low shore with bluff - 94% (12,600 ft.) and moderately low shore with bluff - 6% (800 ft.).
SHORE: Beach, 12 acres fringe marsh, and an additional 2 acres of embayed marsh in Chapel Creek.
NEARSHORE: Narrow - 85% (11,500 ft.), wide - 8% (1,000 ft.) and intermediate - 7% (1,000 ft.). The nearshore appears to have an ample quantity of sand. There are approximately half a dozen bars parallel to the shore.

SHORELANDS USE
FASTLAND: Agricultural and residential.
SHORE: Low density use.
NEARSHORE: Fishing, shellfishing, and water sports.

OFFSHORE: The mouth of the Piankatank River. The charts indicate that the bottom is soft sand and mud.

WIND AND SEA EXPOSURE: This subsegment is a pocket generally open to the northeast. The maximum fetch is greater than 20 nautical miles across Godfrey and Chesapeake Bays. The fetches from the north and east are about 2 nautical miles.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical. All of the land in this subsegment is above 10 feet.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Fair. The beaches are sandy but usually are narrow.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical. Historical studies indicate an erosion rate of 2.2 feet per year.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are about 18 groins and roughly 2,000 feet of bulkhead along the shoreline of this segment.

Suggested Action: No immediate action is required. More extensive bulkheading, if properly designed and implaced, might alleviate some of the erosion related problems.

OTHER SHORE STRUCTURES: There is a boat ramp at the end of Route 632.

POTENTIAL USE ENHANCEMENT: Fair. The present agricultural - residential use is probably the best use for the area. Godfrey Bay lacks the sufficiently large (wide) beach and protected anchorage necessary for recreational development.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2A 44-64.

HILLS BAY, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2B (Maps 3)

EXTENT: 5,400 feet (1 mi.) from Burton Point to Queens Creek.

SHORELANDS TYPE
FASTLAND: Low shore, usually with bluff.
SHORE: Beach (4,400 ft.), fringe marsh (1,000 ft.), and 3 acres of embayed marsh in coves, etc.
NEARSHORE: Intermediate width with bars.

SHORELANDS USE
FASTLAND: Agricultural and residential.
SHORE: Access to boats and swimming.
NEARSHORE: Fishing, shellfishing, and water sports.

OFFSHORE: Hills Bay, which has depths of 14 to 20 feet, is the approach to Queens Creek.

WIND AND SEA EXPOSURE: The shoreline trends NNW - SSE. The shore is exposed to the NE with a fetch of over 20 nautical miles. Across the Chesapeake Bay, the fetch to the east is limited by Gwynn Island. To the north the fetch is 3 nautical miles across the shallow water of the mouth of the Piankatank River.

OWNERSHIP: Private.

FLOOD HAZARD: Low, noncritical. All of the land is above 10 feet, some above 15 feet.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Fair. As with most beaches along the Chesapeake Bay, this area lacks the width necessary to be a really good beach.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Severe, noncritical. The VIMS historical study indicates an erosion rate of 3.7 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is a field of approximately 5 groins about 1,500 feet from Queens Creek and a single small bulkhead near the northern end of the subsegment.

Suggested Action: Even though the historical

erosion rate is high, no immediate action appears necessary.

OTHER SHORE STRUCTURES: There is a single (privately owned and used ?) boat ramp.

POTENTIAL USE ENHANCEMENT: Fair. The present agricultural - residential use appears to be the best use for the land. This subsegment, as subsegment 2A, lacks some of the elements necessary for significantly more intensive utilization.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964 and MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2B 65-72.

QUEENS CREEK, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2C (Maps 3)

EXTENT: 30,700 feet (5.8 mi.) of shoreline along Queens Creek and its tributaries and Winder Creek.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach, and fringe and embayed marsh. The VIMS Wetlands inventory indicates that there are roughly 19 acres of fringe and embayed marsh associated with Queens Creek.
CREEK: Queens Creek is a small tidal river approximately 2 miles long and several hundred yards wide. Water depths decrease from a maximum of 10 feet near the mouth to 1 or 2 feet near the creek head. There are several narrow, shallow arms such as Kenney and Miller Cove.

SHORELANDS USE
FASTLAND: Residential and agricultural.
SHORE: Dockage.
CREEK: Boating and water sports.
OFFSHORE: Transverse bars off mouth.

OWNERSHIP: Private.

FLOOD HAZARD: Low. The fastland rises above 10 feet within a few hundred feet of the shore.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. The shoreline is usually marsh.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or none, noncritical. The area appears fairly stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None, although 1937 aerial photographs show a substantial jetty north of the entrance to Queens Creek.

Suggested Action: None.

OTHER SHORE STRUCTURES: Numerous piers and utility bulkheading or riprap.

NAVIGABILITY: Queens Creek is approached from Hills Bay via a marked 6-foot deep, dredged channel.

POTENTIAL USE ENHANCEMENT: Fair. The low density residential use appears to be the best utilization of the area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2C 73-77, 80-105.

THE NARROWS, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2D (Maps 3)

EXTENT: 10,000 feet (1.9 mi.) from the mouth of Winder Creek to the spit at the mouth of Lanes Creek.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach (7,000 ft.), fringe marsh (3,000 ft.), total marsh 9 acres.
NEARSHORE: Intermediate - 60% (6,000 ft.), narrow - 30% (3,000 ft.), and wide - 10% (1,000 ft.). "The Narrows" and "Middle Grounds" are between the Mainland and Gwynn Island.

SHORELANDS USE
FASTLAND: Agricultural, including some residential and woods (9,200 ft.) and commercial, marina and fish pier (800 ft.).
SHORE: Some recreational and boating.
NEARSHORE: Boating and water sports.

OWNERSHIP: Private, except for the bridge abutment.

FLOOD HAZARD: High, critical. Much of the area is below 7 feet and a few houses are within the flood limits.

BEACH QUALITY: Fair.

WATER QUALITY: Satisfactory.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight to moderate, noncritical.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: A discontinuous bulkhead and 7 groins 1,000 to 1,500 feet east of Winder Creek. A little riprap by the abutment to the Gwynn Island Bridge, and 3 groins 1,000 feet east of the bridge.

Suggested Action: The areas of incomplete bulkhead should be completely bulkheaded.

OTHER SHORE STRUCTURES: There are a marina and boat ramp at the foot of the bridge and two other piers.

POTENTIAL USE ENHANCEMENT: Minimal. If there were the demand, the marina facilities in the area could be expanded. The area perhaps could support a few more residences.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2D 106-108, 162-176.

LANES CREEK, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2E (Maps 3)

EXTENT: 16,000 feet (3.0 mi.) of shoreline along Lanes Creek. Lanes Creek is 5,000 feet long.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: There are 8 acres of fringe and some embayed marsh (1,300 ft.) and beach (3,600 ft.).
CREEK: Lanes Creek is a fairly narrow (width usually under 1,000 ft.), shallow (less than 8 ft.), tidal creek opening into Milford Haven.

SHORELANDS USE
FASTLAND: Primarily agricultural, although some area is forestland.
SHORE: Mostly unused, some small boat dockage.
CREEK: Shellfishing, boating, and water sports.

OWNERSHIP: Private.

FLOOD HAZARD: High, noncritical. Most of the area is below 10 feet.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. The shoreline is mostly fringe marsh.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or none, noncritical. The shoreline is stable.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: Some utility bulkheading in a cove near the creek mouth. There are numerous piers along the creek.

NAVIGABILITY: Fair. Lanes Creek is entered from Milford Haven, water depths are on the order of 6 feet.

POTENTIAL USE ENHANCEMENT: Minimal. The potential susceptibility of the area to coastal flooding limits the development potential of the area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2E 160, 168-176.

CRAB NECK, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 2F (Maps 3)

EXTENT: 8,800 feet (1.7 mi.) from Lanes Creek to Point Breeze.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach (4,400 ft.) and fringe and embayed marsh (4,400 ft.). A preliminary VIMS Wetlands survey indicates that there are 4 acres of marsh in this segment.
NEARSHORE: Intermediate width, some transverse bars.

SHORELANDS USE
FASTLAND: Agricultural (6,800 ft.) and unmanaged, unwooded (2,000 ft.).
SHORE: Some boat dockage, mostly unused.
NEARSHORE: Fishing, shellfishing, and water sports.

OFFSHORE: Crab Neck overlooks Milford Haven and faces Gwynn Island.

WIND AND SEA EXPOSURE: The area has a limited exposure to waves from open water.

OWNERSHIP: Private.

FLOOD HAZARD: High, noncritical. Most of Crab Neck is under 10 feet much is under 5 feet, but there are no structures endangered.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. Most of the shoreline is marsh. The few beaches that do exist are narrow and thin.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical. Historical studies indicate an erosion rate of 2 to $2\frac{1}{2}$ feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is one small field of 3 groins and 2 small bulkheads.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are several piers along the Crab Neck shoreline.

POTENTIAL USE ENHANCEMENT: Minimal.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-2E 177-181.

GWYNN ISLAND, HILLS BAY, MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 3A (Maps 3)

EXTENT: 11,000 feet (2.1 mi.) from Narrows Point to inside Cherry Point.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach and artificially stabilized, 700 feet of fringe marsh inside Cherry Point.
NEARSHORE: Intermediate width, with transverse bars.

SHORELANDS USE
FASTLAND: Residential and unmanaged, wooded.
SHORE: Recreation.
NEARSHORE: Water sports, fishing, and shell-fishing.

OFFSHORE: Hills Bay and the Piankatank River.

WIND AND SEA EXPOSURE: The shoreline trend is SW - NE.
Fetches are:

W	1 nm
NE	4 nm
N	.3 nm.

OWNERSHIP: Private.

FLOOD HAZARD: High, critical. Much of the subsegment is below 7 feet, all is below 12 feet.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor to good. In some areas there is no beach in front of the riprap, in other areas there is a very reasonable beach between groins.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical. Historically the erosion rate for the northern half of the subsegment is just over 2 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: Approximately 7,000 feet of bulkhead and 3,000 feet of riprap (64% and 27% of the segment length) protects the fastland. Most of the riprap is along Route 633. There are approximately 50, generally effective groins, associated with the bulkhead.

Suggested Action: None, present course of action appears satisfactory. Routine repairs of structures.

OTHER SHORE STRUCTURES: Piers.

POTENTIAL USE ENHANCEMENT: Present use as low or medium density residential use with water related recreation appears quite satisfactory.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE and MATHEWS Quadrs., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-3A 109-121.

GWYNN ISLAND - CHESAPEAKE BAY,

MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 3B (Maps 3)

EXTENT: 23,000 feet (4.4 mi.) from Cherry Point to Sandy Point.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach.
NEARSHORE: Intermediate width, with parallel bars.

SHORELANDS USE
FASTLAND: Residential - 65% and unmanaged, wooded and unwooded - 35%.
SHORE: Recreation.
NEARSHORE: Fishing and water sports.

OFFSHORE: Chesapeake Bay.

WIND AND SEA EXPOSURE: The shoreline trends NNW - SSE.
Fetches across the Chesapeake Bay are:

NE	over 25 nm
E	14 nm
SE	15 nm.

OWNERSHIP: Private.

FLOOD HAZARD: High, critical. The area is quite low, and it is exposed to waves from the Chesapeake Bay.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Good, one of the better sandy beach areas on the Chesapeake Bay.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Severe, noncritical. Historically the rate is over 7 feet per year. Waves from across the Chesapeake Bay, strike the low, unconsolidated shore of Gwynn Island and cause the greatest percentage of the erosion.
ENDANGERED STRUCTURES; None.
SHORE PROTECTIVE STRUCTURES: There are approximately 70, at least slightly effective, groins. Several thousand feet of shoreline is bulkheaded or seawalled. Usually the properly constructed

bulkheads are quite successful, however in some areas alternate lots are bulkheaded and not backfilled or bulkheaded along different lines. In the first case, erosion is accelerated in the unprotected area. In the second, the connection between bulkheads are weak and prone for failure.

Suggested Action: Establishment of a uniform bulkhead line and uniform standards for bulkheads construction. Also, finish the complete bulkheading of the small unbulkheaded areas.

OTHER SHORE STRUCTURES: None.

POTENTIAL USE ENHANCEMENT: With improved access and public facilities the beach of the southern portion of this segment could become a significant recreational area. Higher density residential development probably would be impractical due to the high flood hazard and the limited fresh water and sewage treatment facilities.

MAPS: USGS, 7.5 Min.Ser. (Topo), DELTAVILLE and MATHEWS Quadrs., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-3B 122-147.

GWYNN ISLAND (SOUTH), MATHEWS COUNTY, VIRGINIA

SUBSEGMENT 3C (Maps 3)

EXTENT: 42,100 feet (8 mi.) of Gwynn Island shoreline along Milford Haven and the several creeks between Sandy Point and Narrows Point.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Beach, fringe marsh (50.6 acres), and artificially stabilized.
NEARSHORE: Narrow.

SHORELANDS USE
FASTLAND: Residential, with light agricultural.
SHORE: Unmanaged, wooded and unwooded.
NEARSHORE: Commercial.

OFFSHORE: The Narrows and Milford Haven.

OWNERSHIP: Private.

FLOOD HAZARD: High, critical in the developed central and western portions of the subsegment. High, noncritical in the unmanaged eastern third of the subsegment.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. Most of the shore is vegetated.

SHORE EROSION SITUATION
EROSION RATE: Slight to moderate, noncritical. Some small areas have moderate, long term erosion rates of 1 to 1.5 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is one groin near Cockrell Point, that is effective in trapping sand against its eastern side, and two areas of bulkhead, approximately 1,000 feet around Mill Point and about 200 feet east of Callis Wharf.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are several piers and docks in the creeks, also some utility bulkheading along the commercial boat yard areas and in some of the creeks.

POTENTIAL USE ENHANCEMENT: Minimal. Continued development along the present line to the capability of the facilities.

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE and MATHEWS Quadrs., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-3C 143-162.

STUTTS CREEK AREA, MATHEWS COUNTY, VIRGINIA

SEGMENT 4 (Maps 4)

EXTENT: 149,000 feet (28.2 mi.) of shoreline along numerous tidal creeks between Point Breeze and the tip of Rigby Island.

SHORELANDS TYPE
FASTLAND: Low shore. Much of the area is below 5 feet, most is below 10 feet.
SHORE: Fringe, extensive and embayed marsh, totaling approximately 260 acres, and a small quantity of beach.
NEARSHORE: Stutts Creek has depths over 6 feet to the pier. Morris, Hudgins and Callis Creeks are shallow tidal creeks. Billups, Stoakes, Back and Whites Creeks are shallow with depths less than five feet. The Hole in the Wall is shallow, with a 3-foot controlling depth and is exposed to "heavy" seas from the Chesapeake Bay.

SHORELANDS USE
FASTLAND: Residential-agricultural - 20% and unmanaged, wooded - 80%.
SHORE: Mostly unused, access to boats.
NEARSHORE: Boating, fishing, shellfishing, and water sports.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate, noncritical. The area is quite low, but few dwellings are below 5 feet. The area between Whites and Stoakes Creeks, Lilley's Neck and portions of Crab Neck between Redart and Ganney's Point are very susceptible to flooding. Unusually high water would endanger several of the houses on Billups Creek.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. The only sand beaches in the segment are on Lilley's Neck. They are fairly thin and narrow and have little access from the mainland.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight, noncritical, except on Lilley's Neck where erosion rates of up to 3½ feet per year have been calculated. One or two other small areas experience an average of 1.3 to 1.6 feet of erosion per year.

ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: Several small private piers, Mathews Yacht Club on Stutts Creek, some cosmetic bulkheading and 2 boat ramps in the area. There is some evidence of dredged upland channels (MA-4 249-286).

POTENTIAL USE ENHANCEMENT: Low. The high flood hazard and limited beach areas limit the development potential of the area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965.
C&GS, #534, 1:40,000 scale, RAPPAHANNCOK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY ENTRANCE, 1973.

PHOTOS: Aerial-VIMS 10Sep73 MA-4 249-285.

BETHEL BEACH, MATHEWS COUNTY, VIRGINIA

SEGMENT 5 (Maps 4 and 5)

EXTENT: 51,500 feet (9.8 mi.) of shoreline from the tip of Rigby Island to Potato Neck.

SHORELANDS TYPE

FASTLAND: Low shore. The 5-foot contour is over a mile from the shore throughout most of the segment. Rigby Island is shown as connected to Bethel Beach in the 1938 USDA and 1973 VIMS photographs but as an island on maps and photographs of the intervening years. About half the segment is a thin barrier island on Chesapeake Bay.

SHORE: A narrow sand beach fronts Chesapeake Bay throughout the length of the segment. Approximately 800 acres of fringe, embayed, and extensive marsh are associated with the several creek systems.

NEARSHORE: Wide - 90% and intermediate - 10%. The C&GS Coast Pilot notes that shoals of 5 to 10 feet, in the vicinity of Wolf Trap light, are found as much as 3 miles offshore.

SHORELANDS USE

FASTLAND: Agricultural-residential, unmanaged, wooded and open, and recreational.

SHORE: Mostly unused, some recreational use.

NEARSHORE: Water sports, boating, and fishing.

WIND AND SEA EXPOSURE: The shoreline trend is N - S. Fetches are open across the Chesapeake Bay to the NE, E, and SE.

OWNERSHIP: Private.

FLOOD HAZARD: High, noncritical. The area is extremely low, only the spongelike facility of the marshy areas keeps the area from experiencing repeated flooding.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Fair to good. Most of the beach area is narrow, thin, sandy beach. The proximity of marshes, the offshore vegetation, the narrowness and the thinness of the beach all detract from the overall quality.

PRESENT SHORE EROSION SITUATION

EROSION RATE: Severe, noncritical.

ENDANGERED STRUCTURES: None.

SHORE PROTECTIVE STRUCTURES: There is a jetty at the mouth of Garden Creek.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are numerous piers, docks, and small bulkheads associated with the maintenance of small boats. The mouth of Winter Harbor is dredged. There are 2 boat ramps in Winter Harbor.

POTENTIAL USE ENHANCEMENT: Low. The very low marsh nature of the area significantly limits residential or industrial development. The Winter Harbor area might be developed as a recreational harbor. It might be possible to create a more suitable recreational beach in the Bethel Beach area through artificial nourishment and the use of shoreline control structures.

MAPS: USGS, 7.5 Min.Ser. (Topo.), MATHEWS Quadr., 1965 and NEW POINT COMFORT Quadr., 1964.
C&GS, #1222, 1:80,000 scale, CHESAPEAKE BAY ENTRANCE, 1973.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.
C&GS, #534, 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, Piankatank to Great Wicomico Rivers, 1973.
C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1970.

PHOTOS: Aerial-VIMS 10Sep73 MA-5 286-334.

HORN HARBOR, MATHEWS COUNTY, VIRGINIA

SEGMENT 6 (Maps 5 and 6)

EXTENT: 252,000 feet (47.7 mi.) of shoreline from Potato Neck to New Point Comfort. The segment includes the very crenulate shorelines of Horn Harbor and several smaller creeks.

SHORELANDS TYPE
FASTLAND: Entirely low shore; much of the area is below 5 feet and very little of the lower Mathews Peninsula is above 10 feet.
SHORE: Fringe, extensive and embayed marsh (approximately 500 acres) and beach, approximately 6% (15,000 ft.).
NEARSHORE: Wide, the Chesapeake Bay, and intermediate.

SHORELANDS USE
FASTLAND: Agricultural-residential - 64%, unmanaged, wooded and unwooded - 35%, and commercial - 1%.
SHORE: Unused, boat dockage, and recreational.
NEARSHORE: Boating and fishing.

WIND AND SEA EXPOSURE: The Chesapeake Bay shoreline of the segment trends NNE - SSW. Exposure is open across the bay with fetches from the

E 12 nm
SE 20 nm
NE 18 nm.

Exposure from the south is open through the mouth of the bay and the Atlantic Ocean and from the north is open up the length of the Chesapeake Bay and Pocomoke Sound.

OWNERSHIP: Private.

FLOOD HAZARD: High. The entire area is low.

WATER QUALITY: Satisfactory, except for Horn Harbor which is intermediate.

BEACH QUALITY: Fair to poor. The only beach areas are along the bay shoreline. Generally they are narrow, appear to be thin, and do not have very good access.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Erosion of the creeks and harbor shorelines is slight, noncritical. Erosion of the open bay shoreline is severe, critical and noncritical. Historical evidence shows a hundred year average of approximately 30 feet of erosion per year near Dyer Creek. The New Point Comfort area has undergone significant change. A channel has been formed between the old lighthouse and the point and the shoals are constantly shifting.
ENDANGERED STRUCTURES: Approximately a dozen beach front houses along the shore southeast of Bavon are endangered both by erosion and storm action.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None. A major erosion protection program would be quite costly.

OTHER SHORE STRUCTURES: There are two areas of dredged and bulkheaded canals, one about half way up Horn Harbor, the other is the unnamed creek north of Dyer Creek. There are two boat launching ramps and a large marine railway on Horn Harbor. The topographic map indicates that a small area called the Horn Harbor Nursing Home has been diked, probably to prevent flooding. There are many, many piers along the creeks.

POTENTIAL USE ENHANCEMENT: Minimal. It might be possible to improve the access to some of the beach areas for use as swimming, beach walking, etc. areas, but the potential for significant development is low due to the high flood risk and poor drainage of the area.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEW POINT COMFORT Quadr., 1964.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.
C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1970.

PHOTOS: Aerial-VIMS 10Sep73 MA-6 225-248;
VIMS 11Sep73 MA-6 335-362.

NEW POINT COMFORT TO THE EAST RIVER,

MATHEWS COUNTY, VIRGINIA

SEGMENT 7 (Maps 6 and 7)

EXTENT: 100,000 feet (19 mi.) on Mobjack Bay, from New Point Comfort to the East River.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Fringe, extensive, and embayed marsh comprises 340 acres, some beach.
NEARSHORE: Wide - 60% and intermediate - 40%.

SHORELANDS USE
FASTLAND: Residential-agricultural.
SHORE: Water sports and access to boats.
NEARSHORE: Fishing, boating, shellfishing, and water sports.

OFFSHORE: Mobjack Bay.

WIND AND SEA EXPOSURE: The shoreline trend is NW - SE.
Fetches are:
W 6 nm
SW 4 nm
S 12 nm.

OWNERSHIP: Private.

FLOOD HAZARD: High, noncritical. The entire area is below 10 feet. Few houses are near the shore and most are above 5 feet.

WATER QUALITY: Satisfactory.

BEACH QUALITY: There are no beaches in this segment.

PRESENT SHORE EROSION SITUATION
EROSION RATE: None to severe, noncritical. Historical erosion rates vary from no erosion to 4 feet per year on a point near Pepper Creek.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are numerous piers along the shore and a boat ramp on Davis Creek.

POTENTIAL USE ENHANCEMENT: If soil conditions are suitable to the increased septic load, Davis and Pepper Creeks might be used for pleasure boating and marina areas.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEW POINT COMFORT Quadr., 1964.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.
C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1970.

PHOTOS: Aerial-VIMS 11Sep73 MA-7 363-389.

EAST RIVER, MATHEWS COUNTY, VIRGINIA

SEGMENT 8 (Maps 7 and 8)

EXTENT: 216,000 feet (40.9 mi.) of shoreline along the banks of the East River and its arms. The East River has a centerline length of approximately 38,000 feet (7.2 mi.) and Put in Creek, the main arm, has a centerline length of over 10,000 feet (2 mi.). The shoreline of the entire segment is very crenulate.

SHORELANDS TYPE
FASTLAND: Entirely low shore. The level of the fastland slopes from 5 feet near the mouth of the river to terraces at 10 and 15 feet at the upper ends of the creeks.
SHORE: About 183 acres of fringe and embayed marsh along the creek banks.
CREEK: The Coast Pilot describes the East River as having a narrow, marked channel with depths of 10 feet for 3½ miles, and depths of 4 feet for 2 miles. Shoals extend off of many of the points.

SHORELANDS USE
FASTLAND: Low density residential-agricultural - 95%, residential - 3%, and commercial - 2%.
SHORE: Access to boats and boat yards.
CREEK: Boating.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate to low, noncritical. The area near the river mouth is relatively low, mostly below 10 feet and could be flooded in a severe storm. The threat of flood deminishes upstream with the rising topography.

WATER QUALITY: Satisfactory.

BEACH QUALITY: Poor. There are no real beaches, just riverbank and fringe marsh.

SHORE EROSION SITUATION
EROSION RATE: Slight, noncritical. Erosion rates appear quite low.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: Two boat ramps, one at Williams Wharf and the other at Town Point Landing at the mouth of Put in Creek. There is also bulkheading at Williams Wharf and Willis Wharf, Mobjack, and one or two small bulkheads in other places. Many small boat piers line the creek shore.

NAVIGABILITY: Good.

POTENTIAL USE ENHANCEMENT: Fair. The area probably could be more fully developed as a residential area. The recreational aspects could be improved by the construction of more public boat ramps. The East River probably would best be used as a harbor or port for pleasure boats using Mobjack and Chesapeake Bays.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEW POINT COMFORT Quadr., 1964 and MATHEWS Quadr., 1965.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.
C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1970.

PHOTOS: Aerial-VIMS 11Sep73 MA-8 391-469.

NORTH RIVER, MATHEWS COUNTY, VIRGINIA

SEGMENT 9 (Maps 7, 8, and 9)

EXTENT: 154,000 feet (29.1 mi.) of shoreline along Mobjack Bay and the west bank of the North River to the Gloucester - Mathews County line. Approximately 55,000 feet (10 mi.) of bay or river centerline plus several thousand feet of tributary channels.

SHORELANDS TYPE
FASTLAND: Low shore.
SHORE: Fringe and embayed marsh - 220.5 acres.
CREEK: The North River is described by the Coast Pilot as wide but with many shoals. The channel has depths of 12 feet for 4 miles and 7 feet for 2 miles. Blackwater Creek has depths of 7 feet as far as Greenmansion Cove.

SHORELANDS USE
FASTLAND: Agricultural-residential use.
SHORE: Access to boats.
CREEK: Boating and water sports.

OWNERSHIP: Private.

FLOOD HAZARD: Moderate to low, noncritical. The area near the river mouth is relatively low, mostly below 10 feet and could be flooded in a severe storm. The threat of flood deminishes upstream with the rising topography.

WATER QUALITY: Satisfactory.

BEACH QUALITY: There are no beaches in this segment.

PRESENT SHORE EROSION SITUATION: Stable.
EROSION RATE: Slight, or no change.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: None.

Suggested Action: None.

OTHER SHORE STRUCTURES: There are several areas of utility bulkheading along the shore and numerous piers, fish traps.

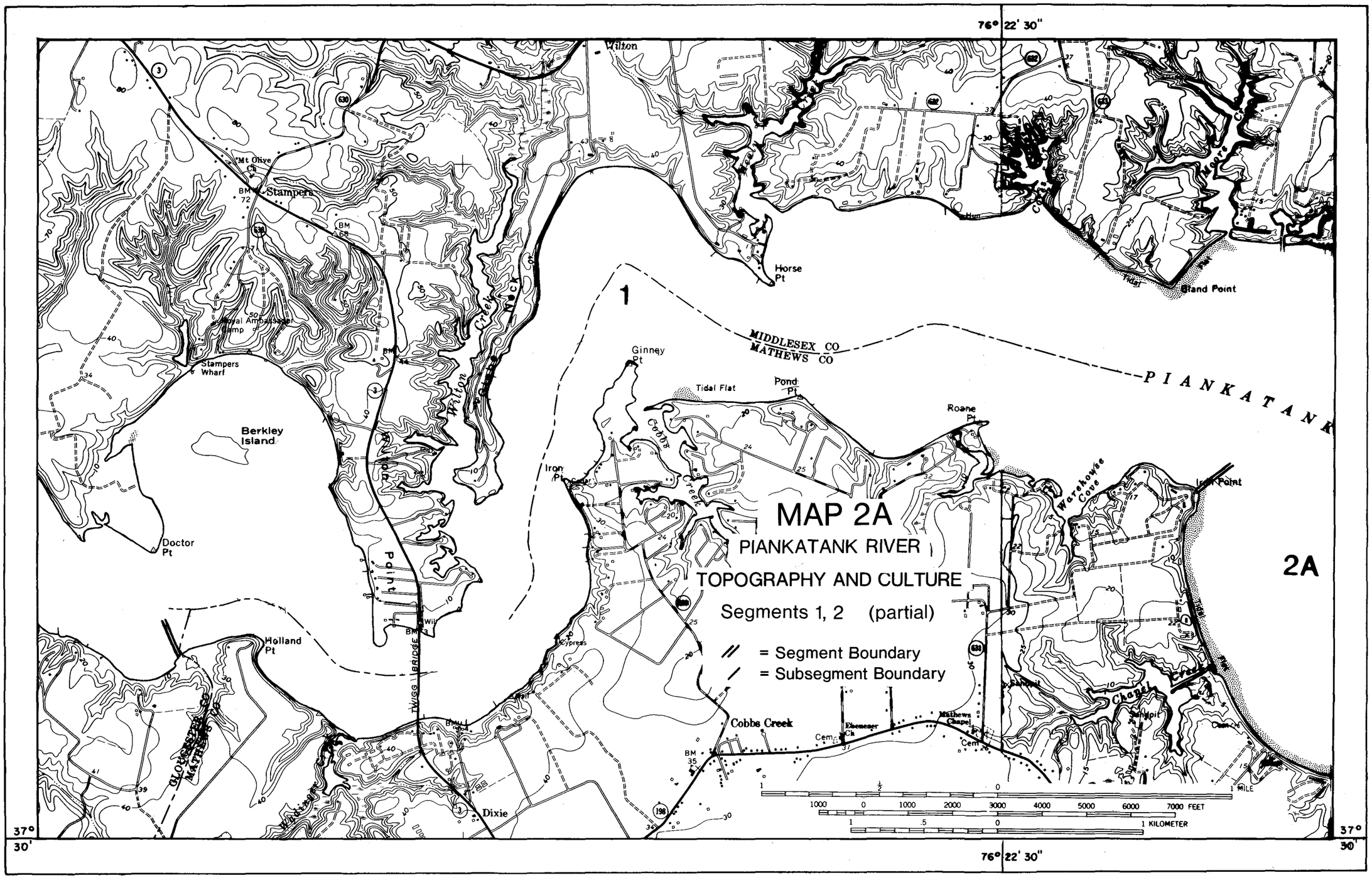
NAVIGABILITY: Good.

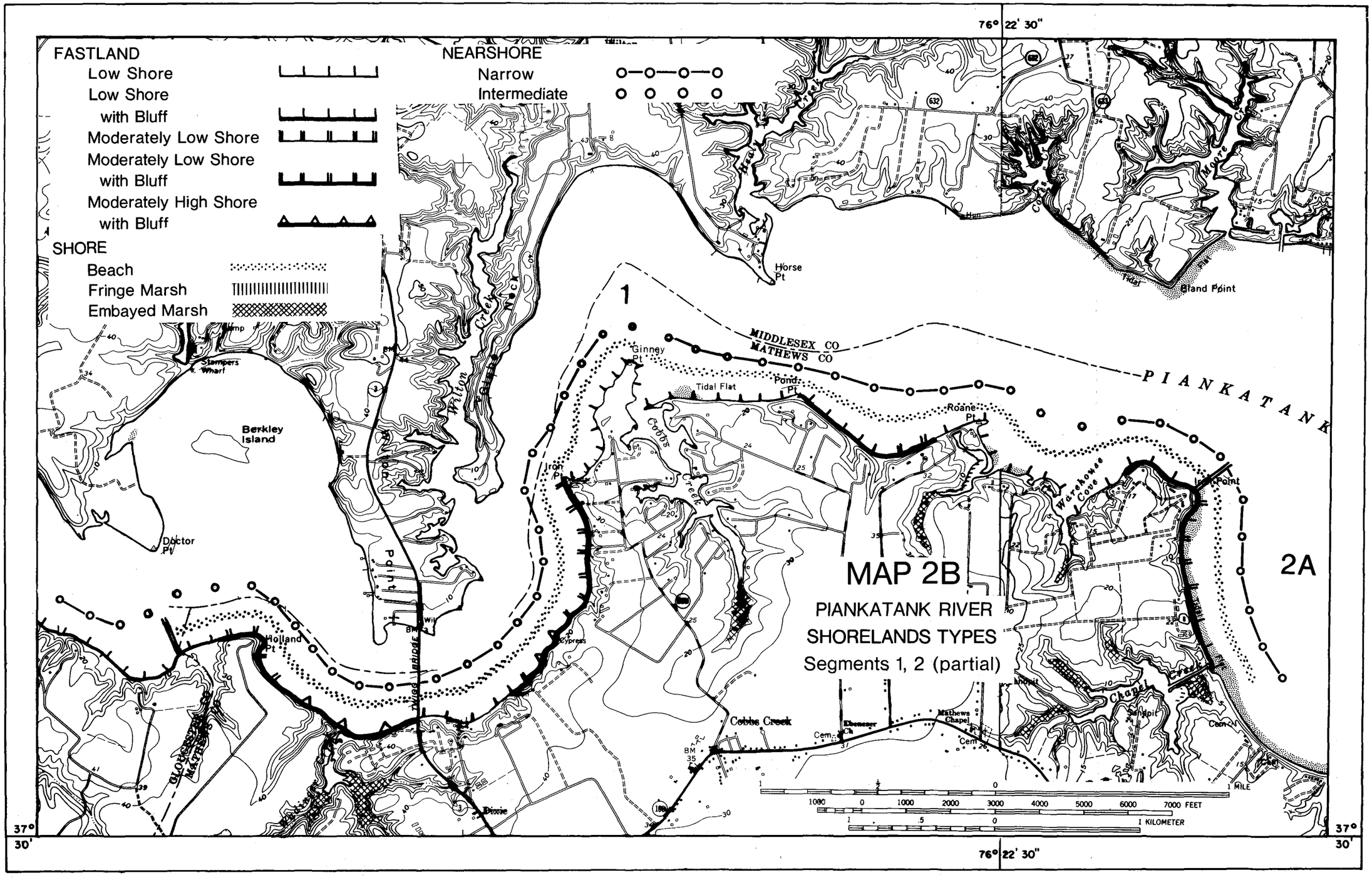
POTENTIAL USE ENHANCEMENT: Minimal. Further residential development might be possible as might be improved public access to the creeks.

MAPS: USGS, 7.5 Min.Ser. (Topo.), NEW POINT COMFORT Quadr., 1964 and MATHEWS and WARE NECK Quadrs., 1965.
C&GS, #1223, 1:80,000 scale, CHESAPEAKE BAY, Wolf Trap to Smith Point, 1973.
C&GS, #494, 1:40,000 scale, MOBJACK BAY and YORK RIVER ENTRANCE, 1970.

PHOTOS: Aerial-VIMS 11Sep73 MA-9 470-518.

4.3 Segment and Subsegment Maps


76° 22' 30"
Wilton
Mt Olive Ch
Stampers
BM 72
BM 68
Royal Ambassador Camp
Stampers Wharf
Berkley Island
Doctor Pt
Holland Pt
Horse Pt
Grand Point
1
MIDDLESEX CO
MATHEWS CO
PIANKATANK
Ginney Pt
Tidal Flat
Pond Pt
Roane Pt
Cobbs Creek
Iron Pt
Wilton Creek
Phillips Creek
TWIGG FERRY
Cypress
Cobbs Creek
Mathews Chapel
Ebenezer Ch
Cem
Warehouse Cove
Iron Point
Chapel
Schoolhouse
Dixie
MAP 2A
PIANKATANK RIVER
TOPOGRAPHY AND CULTURE
Segments 1, 2 (partial)
= Segment Boundary
= Subsegment Boundary
2A
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
37° 30'
76° 22' 30"


FASTLAND
Low Shore
Low Shore with Bluff
Moderately Low Shore
Moderately Low Shore with Bluff
Moderately High Shore with Bluff
SHORE
Beach
Fringe Marsh
Embayed Marsh
NEARSHORE
Narrow
Intermediate
76° 22' 30"
37° 30'
MAP 2B
PIANKATANK RIVER
SHORELANDS TYPES
Segments 1, 2 (partial)
1
2A
MIDDLESEX CO
MATHEWS CO
PIANKATANK
Horse Pt
Grand Point
Moore Creek
Ginney Pt
Tidal Flat
Pond Pt
Roane Pt
Cobbs Creek
Iron Pt
Warehouse Cove
Point
Stampers Wharf
Berkley Island
Doctor Pt
Holland Pt
Cypress
Dixie
Cobbs Creek
Mathews Chapel
Chapel
Cem
BM 35
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

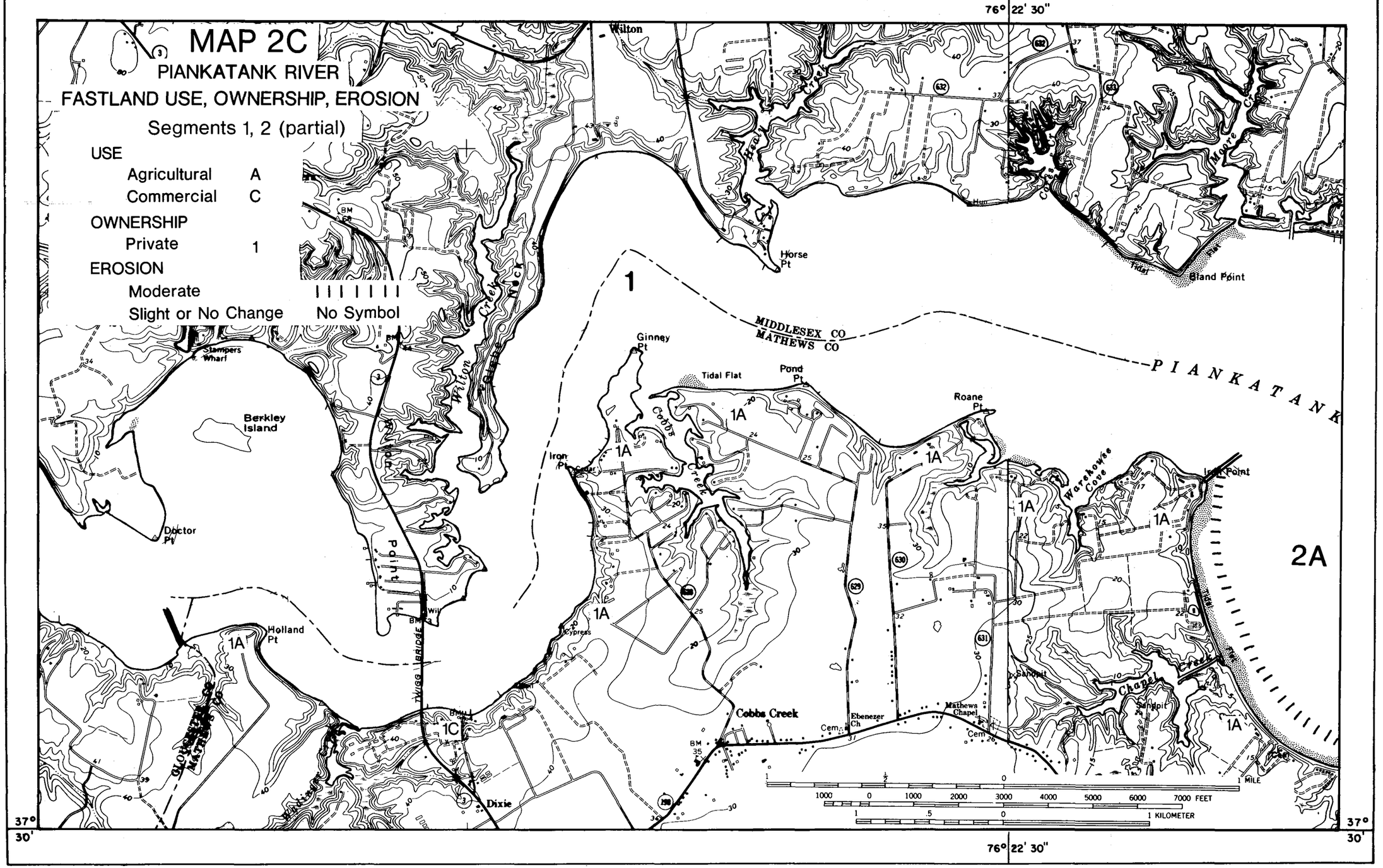
MAP 2C

PIANKATANK RIVER

FASTLAND USE, OWNERSHIP, EROSION

Segments 1, 2 (partial)

USE	
Agricultural	A
Commercial	C
OWNERSHIP	
Private	1
EROSION	
Moderate	| | | | | |
Slight or No Change	No Symbol



MAP 3A

GWYNN ISLAND

TOPOGRAPHY AND CULTURE

76° 17' 30"

37° 30'

2A

GODFREY BAY

2B

HILLS BAY

3A

3B

2C

2D

2E

3C

2F

MILFORD HAVEN

GWYNN ISLAND

Cherry Point

Burton Point

Tidal Flat

Hallieford

Queens Cove

The Narrows

Cricket Hill

Grimstead

Shiloh Ch

Gwynn

Gallis Wharf

Gwynn I Landing

Middle Grounds

Narrows Point

Mill Point

Gwynnville Point

Cockrell Point

Hickorynut Cove

Barn Creek

Edwards Creek

Milford Landing

Lakes Creek

NECK

CRAB

Robert

Sage Point

Sandy Point

Segments 2A, 2B, 2C, 2D, 2E, 2F, 3A, 3B, 3C

= Segment Boundary

= Subsegment Boundary

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

MAP 3B

GWYNN ISLAND

SHORELANDS TYPES

FASTLAND

- Low Shore
- Low Shore with Bluff
- Moderately Low Shore with Bluff

SHORE

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

NEARSHORE

- Narrow
- Intermediate

Segments 2A, 2B, 2C, 2D, 2E, 2F, 3A, 3B, 3C

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

76° 17' 30"

37° 30'

2A GODFREY BAY

2B HILLS BAY

2C

2D

2E

2F

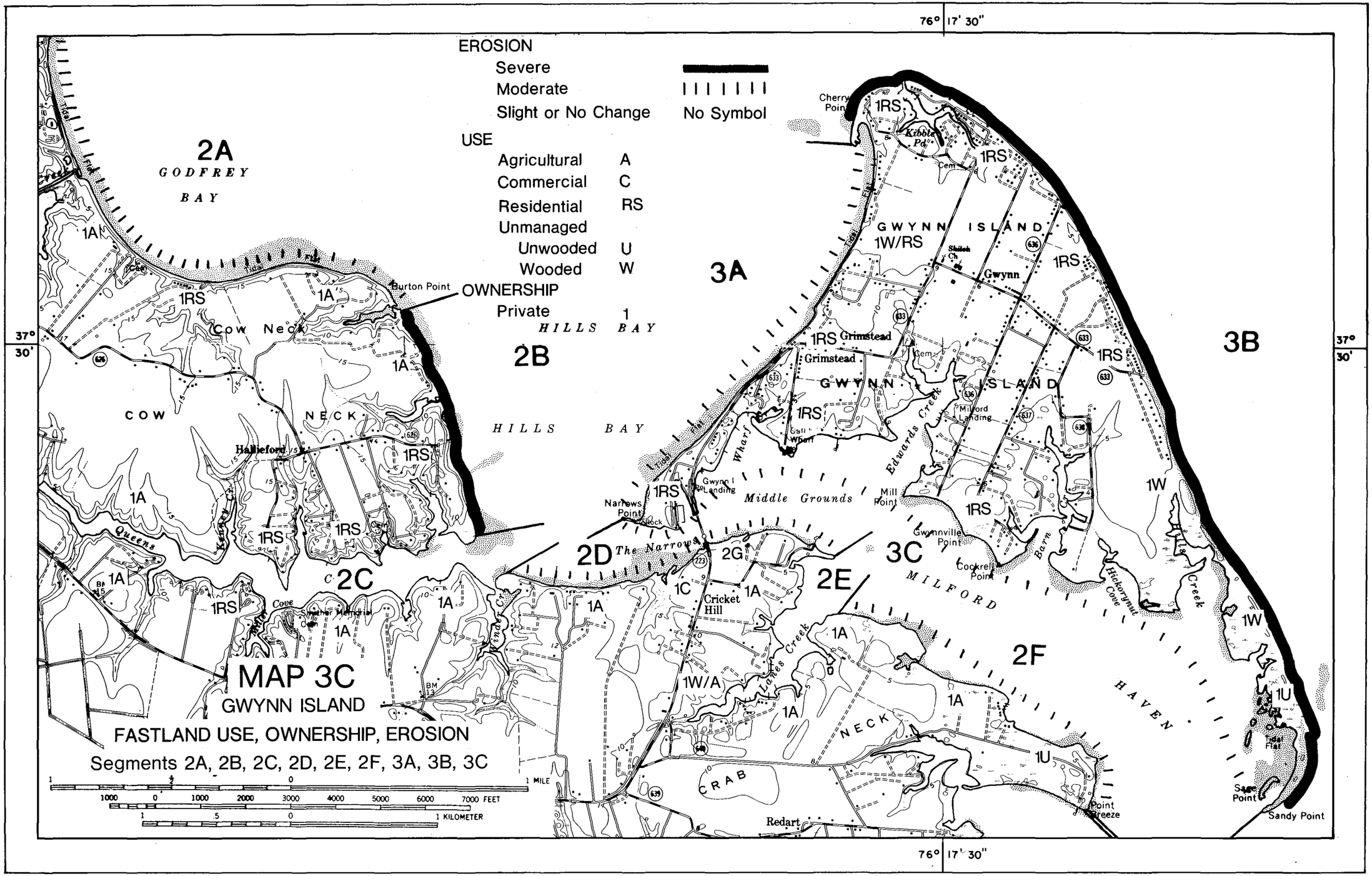
3A

3B

3C MILFORD HAVEN

GWYNN ISLAND

Cherry Point
Kibbets Pd
Cem
Shiloh Ch
Gwynn
Grimstead
Grimstead Cem
Milford Landing
Gallis Wharf
Edwards Creek
Gwynn Landing
Middle Grounds
Mill Point
Gwynnville Point
Cockrell Point
Narrows Point
Rock
Cricket Hill
Burton Point
Queens Creek
Summer Memorial Cem
BM 15
BM 13
Redart
Point Breeze
Sage Point
Sandy Point
NECK
CRAB


76° 17' 30"
37° 30'
EROSION
Severe
Moderate
Slight or No Change
No Symbol
USE
Agricultural A
Commercial C
Residential RS
Unmanaged
Unwooded U
Wooded W
OWNERSHIP
Private 1
2A
GODFREY
BAY
2B
HILLS BAY
3A
3B
COW NECK
GWYNN ISLAND
MILFORD NECK
CRAB HAVEN
Burton Point
Cherry Point
Kibble Pd
Cem
Gwynn
Grimstead
Milford Landing
Gwynn I Landing
Middle Grounds
Mill Point
Narrows Point
Rock
Gwynnville Point
Cockrell Point
Hickorynut Cove
Barn Creek
Edwards Creek
Lucas Wharf
Lakes Creek
Cricket Hill
Hallieford
Queens
Cherry
Cove
Weather Memorial
Redart
Point Breeze
Sandy Point
2C
2D
The Narrows
2E
2F
2G
3C
1RS
1A
1W
1W/A
1U
1C
MAP 3C
GWYNN ISLAND
FASTLAND USE, OWNERSHIP, EROSION
Segments 2A, 2B, 2C, 2D, 2E, 2F, 3A, 3B, 3C
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

MAP 4A

STUTTS CREEK — WHITES CREEK
TOPOGRAPHY AND CULTURE

Segment 4

// = Segment Boundary

/ = Subsegment Boundary

76° 15'

37° 27' 30"

4

5

HAVEN

NECK

CRAB

Hudgins

Mathews Ch

Cem

BM 13

BM 14

Redart

Point Breeze

Sage Point

Tidal Flat

Sandy Point

The Hole in the Wall

oLight

Stutts Creek

Pine Hall

Fanneys Point

Radio Towers

Mathews Raceway

BM 15

Billups Creek

Fitchetts

LILLEYS NECK

Whites Creek

Stoakes Creek

Black Creek

Ribbon Island

Lee-Jackson Sch

Mathews

Hunter Sch

Westville Ch

BM 8

Salem Ch

Diggs

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

MAP 4B

STUTTS CREEK — WHITES CREEK

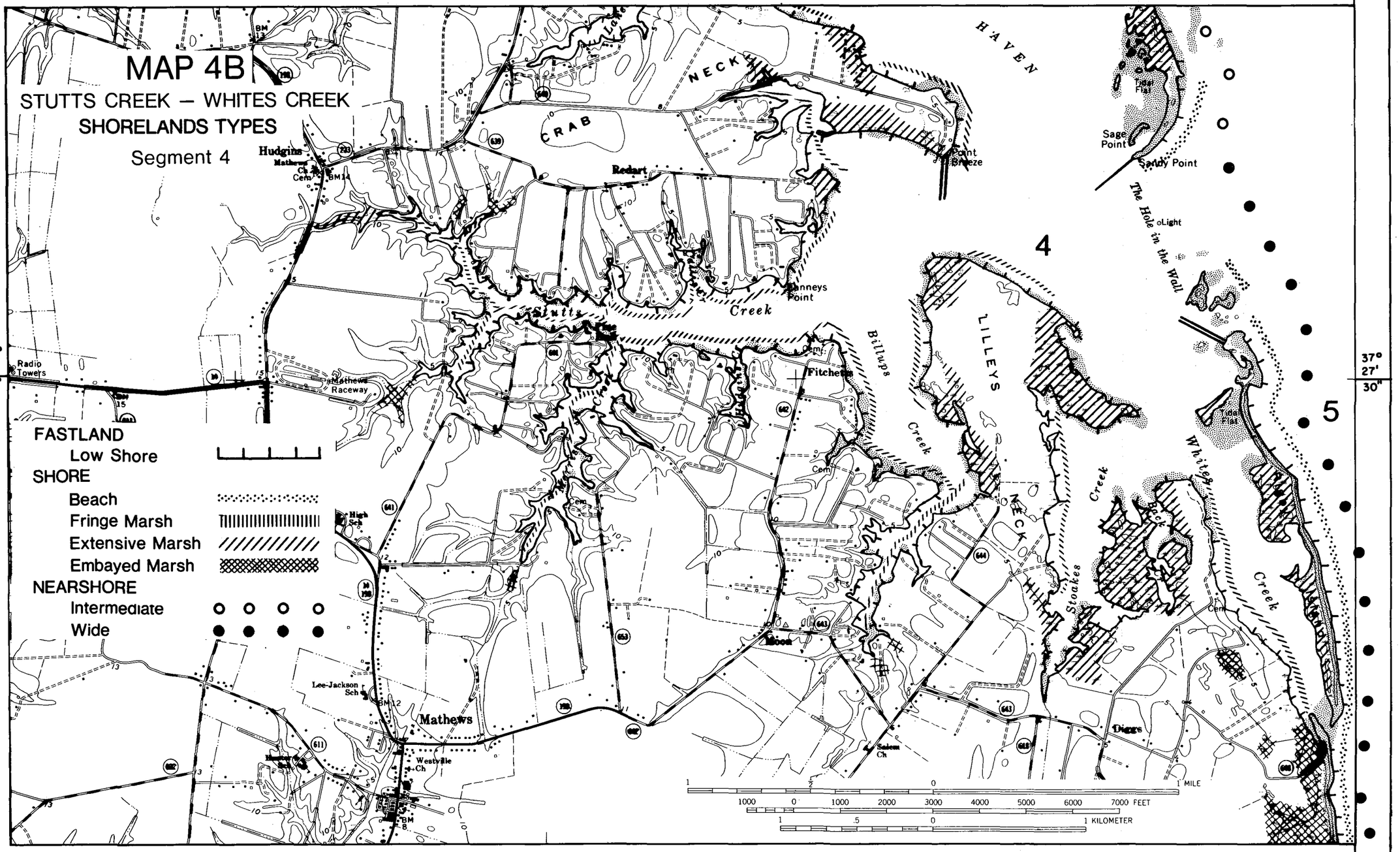
SHORELANDS TYPES

Segment 4

FASTLAND
- Low Shore

SHORE
- Beach
- Fringe Marsh
- Extensive Marsh
- Embayed Marsh

NEARSHORE
- Intermediate
- Wide



MAP 4C

STUTTS CREEK — WHITES CREEK

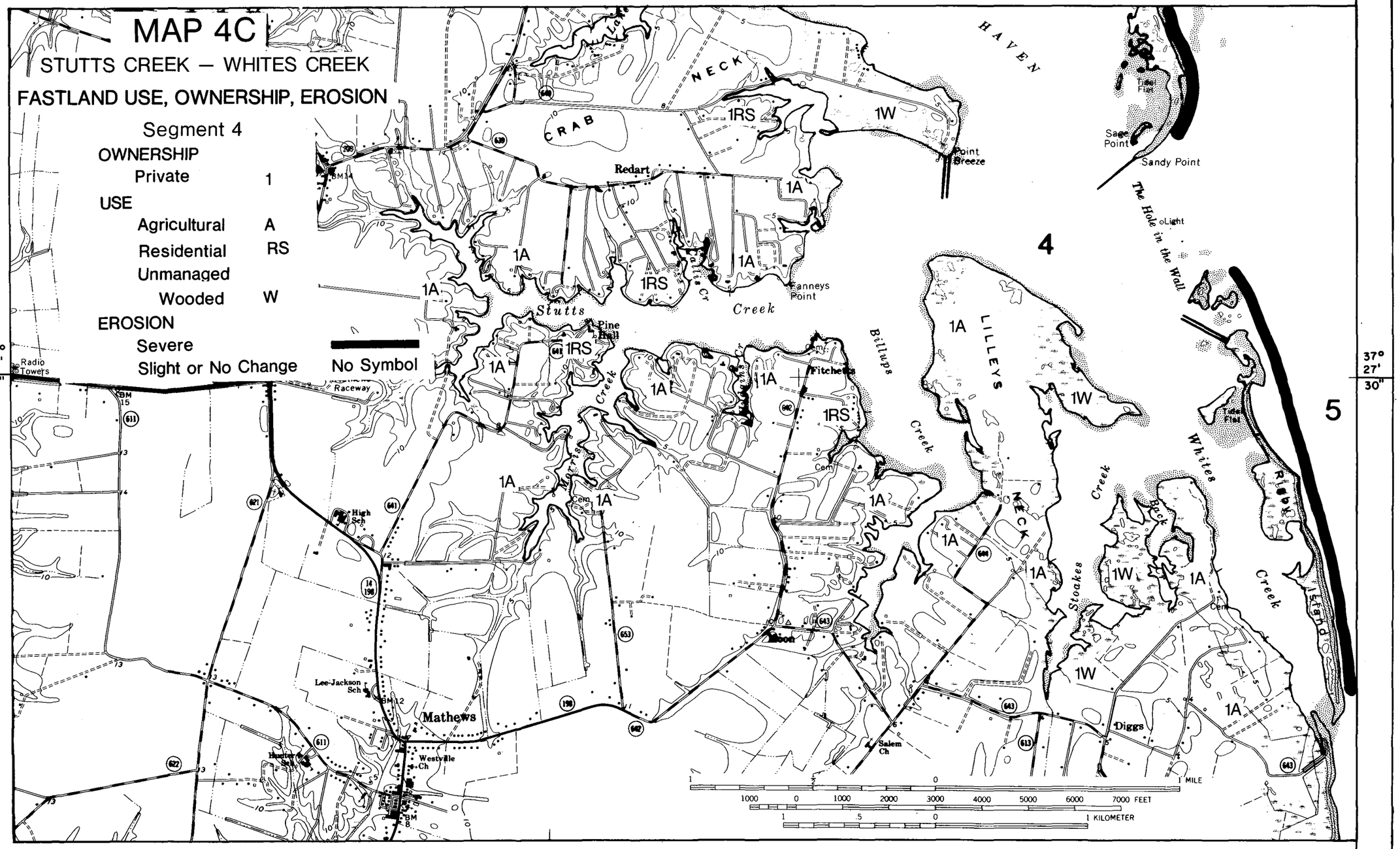
FASTLAND USE, OWNERSHIP, EROSION

Segment 4

OWNERSHIP
- Private 1

USE
- Agricultural A
- Residential RS
- Unmanaged
  - Wooded W

EROSION
- Severe
- Slight or No Change — No Symbol



MAP 5A

BETHEL BEACH

TOPOGRAPHY AND CULTURE

Segment 5

// = Segment Boundary

/ = Subsegment Boundary

1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

76° 15'

37° 22' 30"

Garden Creek

Bethel Beach

Laban

Bethel Ch

Onemo

Peniel Ch

Sarah

Public Landing

Tidal Flat

WINTER HARBOR

POTATO NECK

St Matthews Ch

Peary

Horn Harbor

Light

Beach Point

Mill Point

New Point Ch

Grave

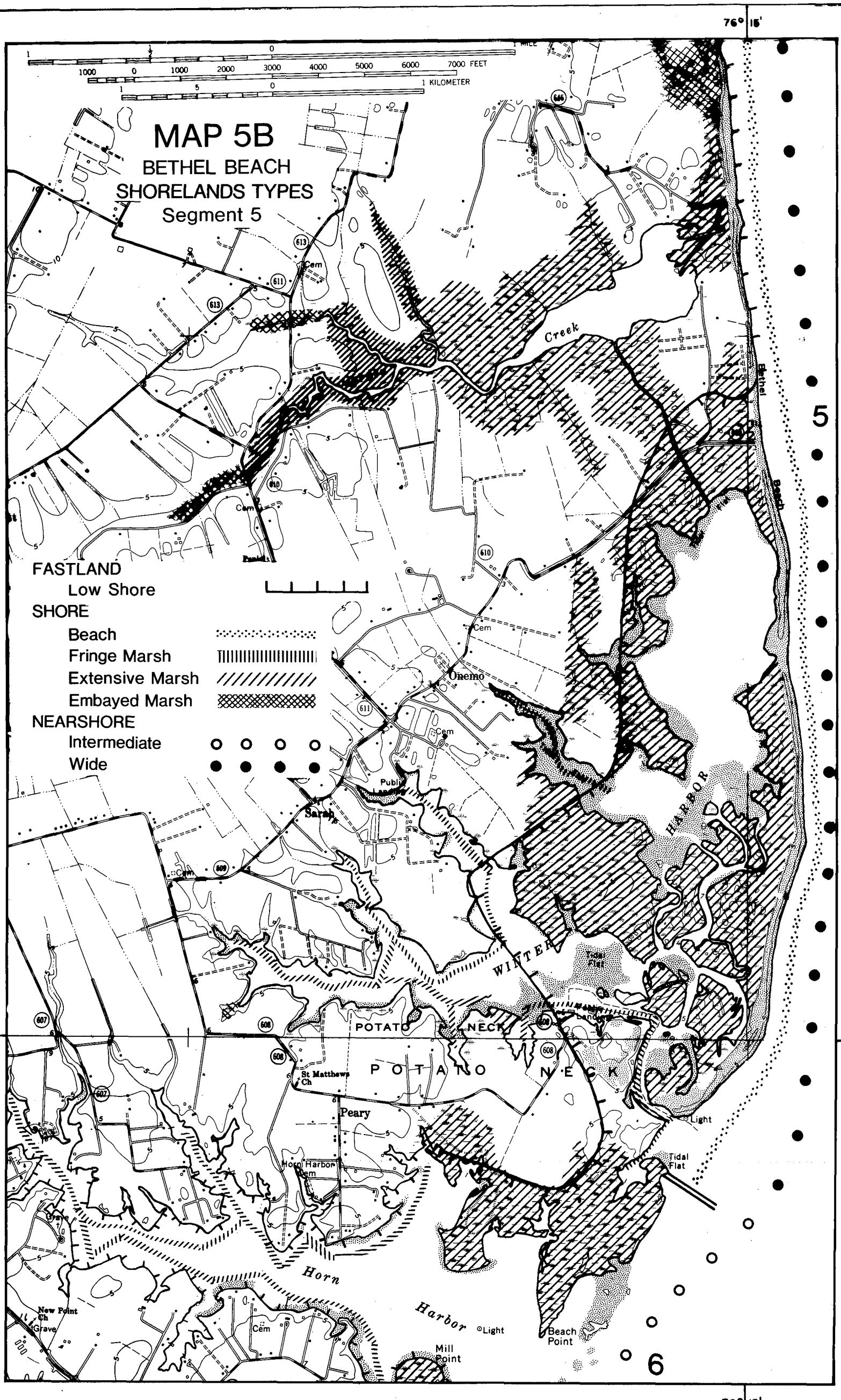
Horn Harbor

5

6

MAP 5B

BETHEL BEACH
SHORELANDS TYPES
Segment 5



MAP 5C

BETHEL BEACH

FASTLAND USE, OWNERSHIP, EROSION

Segment 5

76° 15'

37° 22' 30"

USE

Agricultural	A
Recreational	RC
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W

OWNERSHIP

Private	1

EROSION

Severe	
Slight or No Change	No Symbol

1A 1RC 1A 1RC 1W 1W Creek 1W 1RC 1A/RS 1W 1W 1A 1RC 1W 1W 1RS 1A 1U 1A/RS 1A 1W 1U 1A/RS 1W 1U 1W 1W 1RC 1U

Tal Cem Garden Onemo Laban Bethel Ch Public Landing Sarah Harbor WINTER HARBOR Tidal Flat POTATO NECK St Matthews Ch Peary Horn Harbor Light Mill Point Beach Point New Point Ch Grave

5

6

75

76° 17' 30"

37° 20'

6

7

Horn Harbor

Beach Point

Mill Point

Smith Creek

Doctors Creek

Tidal Flats

Light

Cem

Grave

New Point Ch

New Point Bch

Shadow

Pepper Creek

Horn Harbor Nursing Home

New Point

Boulogne Ch

Motorun

Dyer Creek

Bayou

Tidal Flat

Dutchman Point

Harper Creek

Deep Creek

New Point Comfort Lighthouse

MAP 6A

NEW POINT COMFORT
TOPOGRAPHY AND CULTURE

Segments 6, 7 (partial)

// = Segment Boundary

/ = Subsegment Boundary

1 MILE

7000 FEET

1 KILOMETER

76° 17' 30"

37° 20'

Susan
Antioch Ch
Cem
St Paul's Ch
Grave
New Point Ch
Grave
New Point Sch
Shadow
Pepper Creek
Horn Harbor
Light
Beach Point
Mill Point
Tidal Flats
Doctors Creek
Cems
Horn Harbor Nursing Home
New Point
Beulah Ch
Grave
Motorun
Bayou
Dyer Creek
Dutchman Point
Light
Bayside
Harper Creek
Deep Creek
New Point Comfort
Lighthouse

6

7

MAP 6B

NEW POINT COMFORT

SHORELANDS TYPES

Segments 6, 7 (partial)

FASTLAND
- Low Shore

SHORE
- Beach
- Fringe Marsh
- Extensive Marsh
- Embayed Marsh

NEARSHORE
- Intermediate
- Wide

1 0 1 MILE

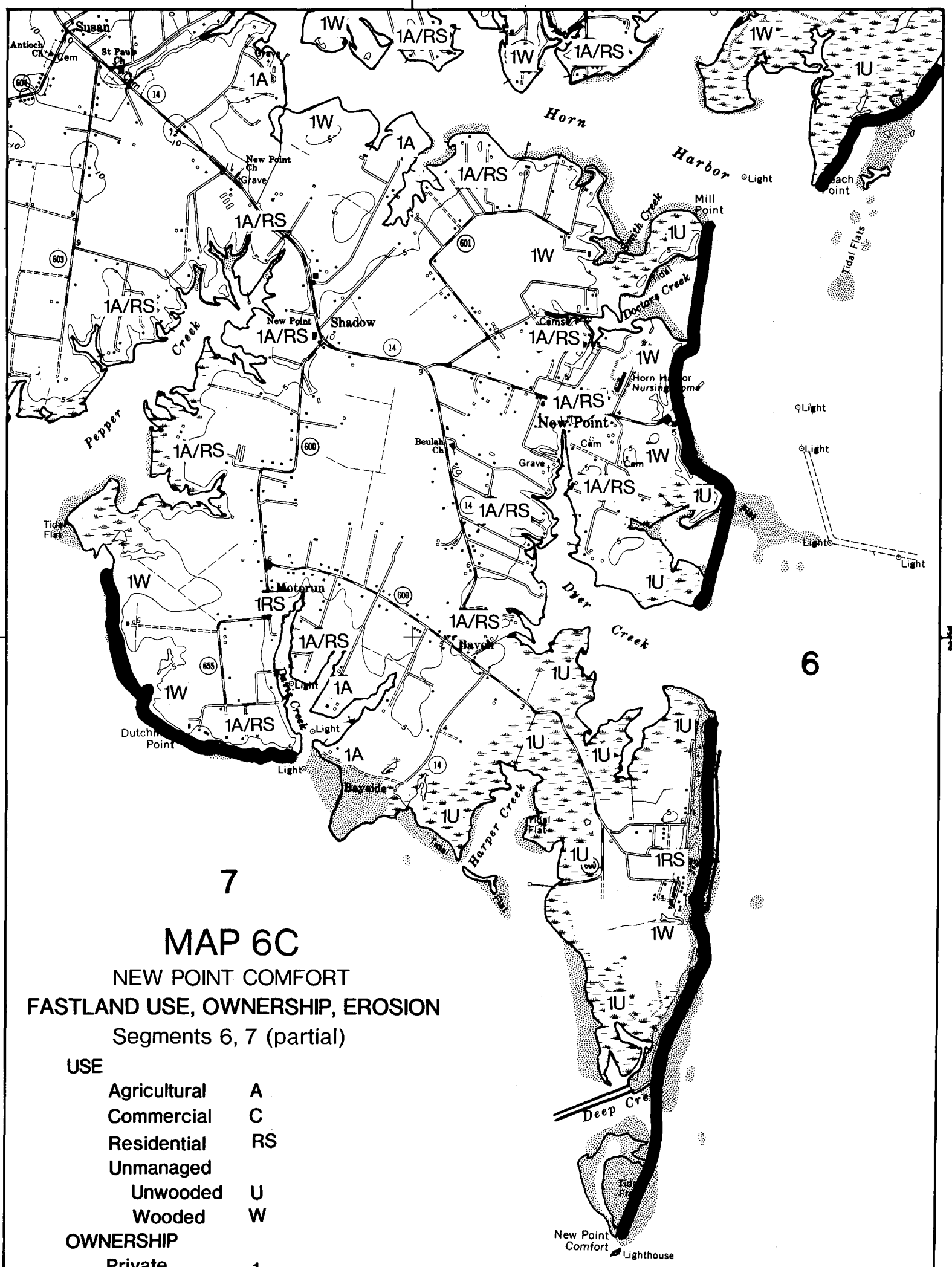
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

76° 17' 30"

76° 17' 30"

37° 20'



MAP 6C

NEW POINT COMFORT

FASTLAND USE, OWNERSHIP, EROSION

Segments 6, 7 (partial)

USE

Agricultural	A
Commercial	C
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W

OWNERSHIP

Private	1

EROSION

Severe	
Severe, Critical	
Slight or No Change	No Symbol

1 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

76° 17' 30"

76° 22' 30"

37° 22' 30"

MAP 7A

MOUTH OF EAST RIVER

TOPOGRAPHY AND CULTURE

Segments 7, 8, 9 (partial)

// = Segment Boundary

/ = Subsegment Boundary

9

8

7

Miles Store

Miles Cr

Williams Wharf

Todds Point

Williams

Wayland Cem

Bohannon

Raines Cr

WHITES NECK

Weston Creek

Thomas Cr

Chestnut Point

Port Haywood

Tabbs Creek

Oak Grove Ch

Emmanuel Ch

Godsey Creek

Sharp Point

NORTH RIVER

Ware Point

Cem

Standpipe

Mobjack

Whites Neck

Whites Cr

Point Light

Winter Point

EAST RIVER

Thomas

Tidal Flat

Diggs Wharf

West Landing Cr

Armistead

Antioch Ch

Cem

Bay Shore Point

MATHEWS CO

GLOUCESTER CO

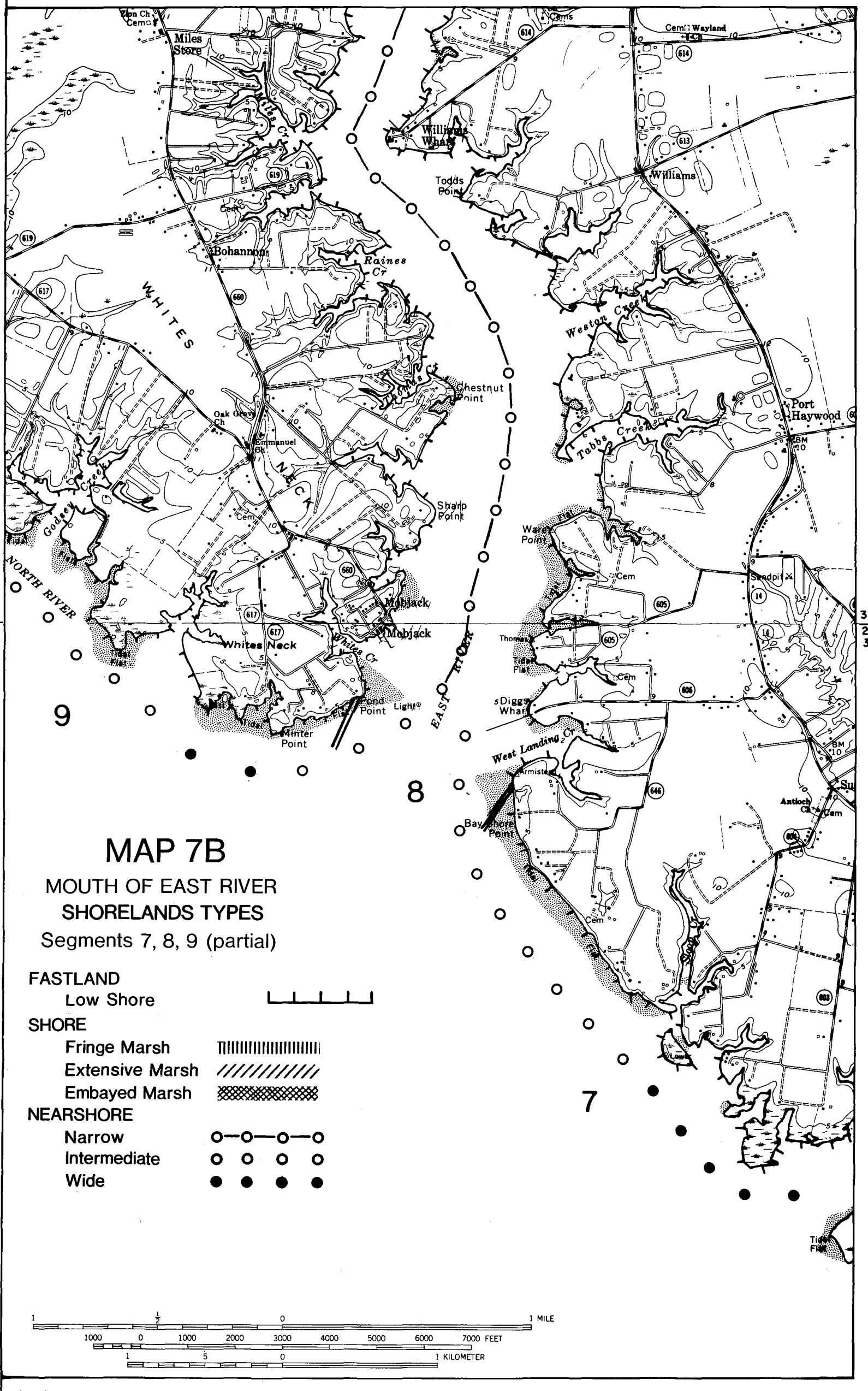
1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

76° 22' 30"

76° 22' 30"



MAP 7B

MOUTH OF EAST RIVER

SHORELANDS TYPES

Segments 7, 8, 9 (partial)

FASTLAND

- Low Shore

SHORE

- Fringe Marsh
- Extensive Marsh
- Embayed Marsh

NEARSHORE

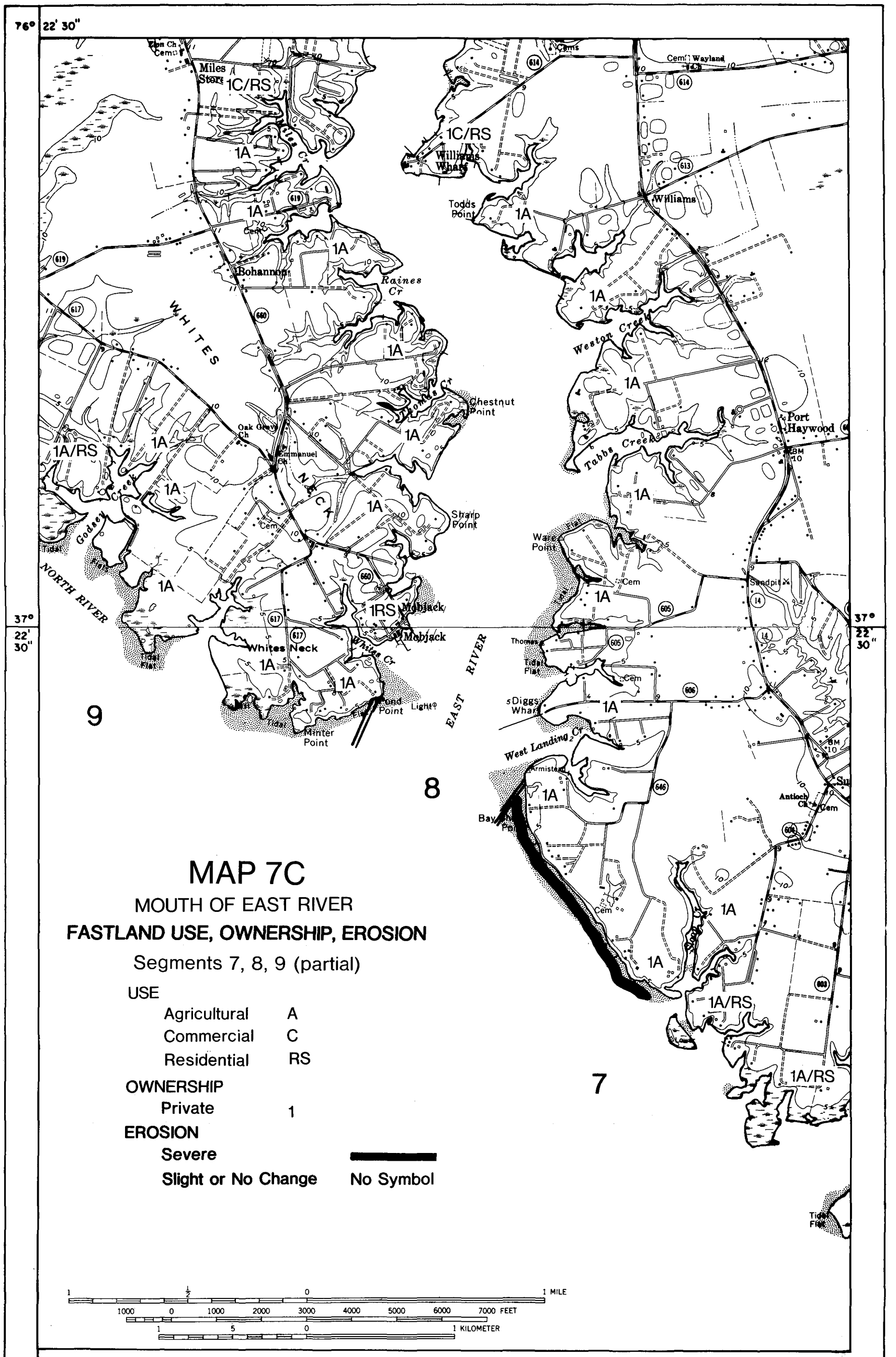
- Narrow
- Intermediate
- Wide

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

76° 22' 30"


76° 22' 30"
37° 22' 30"
Miles Store
1C/RS
1A
Williams Wharf
Todds Point
Williams
Bohannon
Raines Cr
WHITES
Weston Creek
Thomas Cr
Chestnut Point
Port Haywood
Oak Grove Ch
Emmanuel Ch
1A/RS
Godsey Creek
NECK
Sharp Point
Tidal Flat
Cem
Ware Point
Sandpit
NORTH RIVER
1RS
Mobjack
Whites Neck
Whites Cr
Thomas
Diggs Wharf
EAST RIVER
West Landing Cr
Armistead
Bay Point
Antioch Ch
9
8
7
MAP 7C
MOUTH OF EAST RIVER
FASTLAND USE, OWNERSHIP, EROSION
Segments 7, 8, 9 (partial)
USE
Agricultural A
Commercial C
Residential RS
OWNERSHIP
Private 1
EROSION
Severe
Slight or No Change No Symbol
1 ½ 0 1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 5 0 1 KILOMETER
76° 22' 30"

MAP 8A

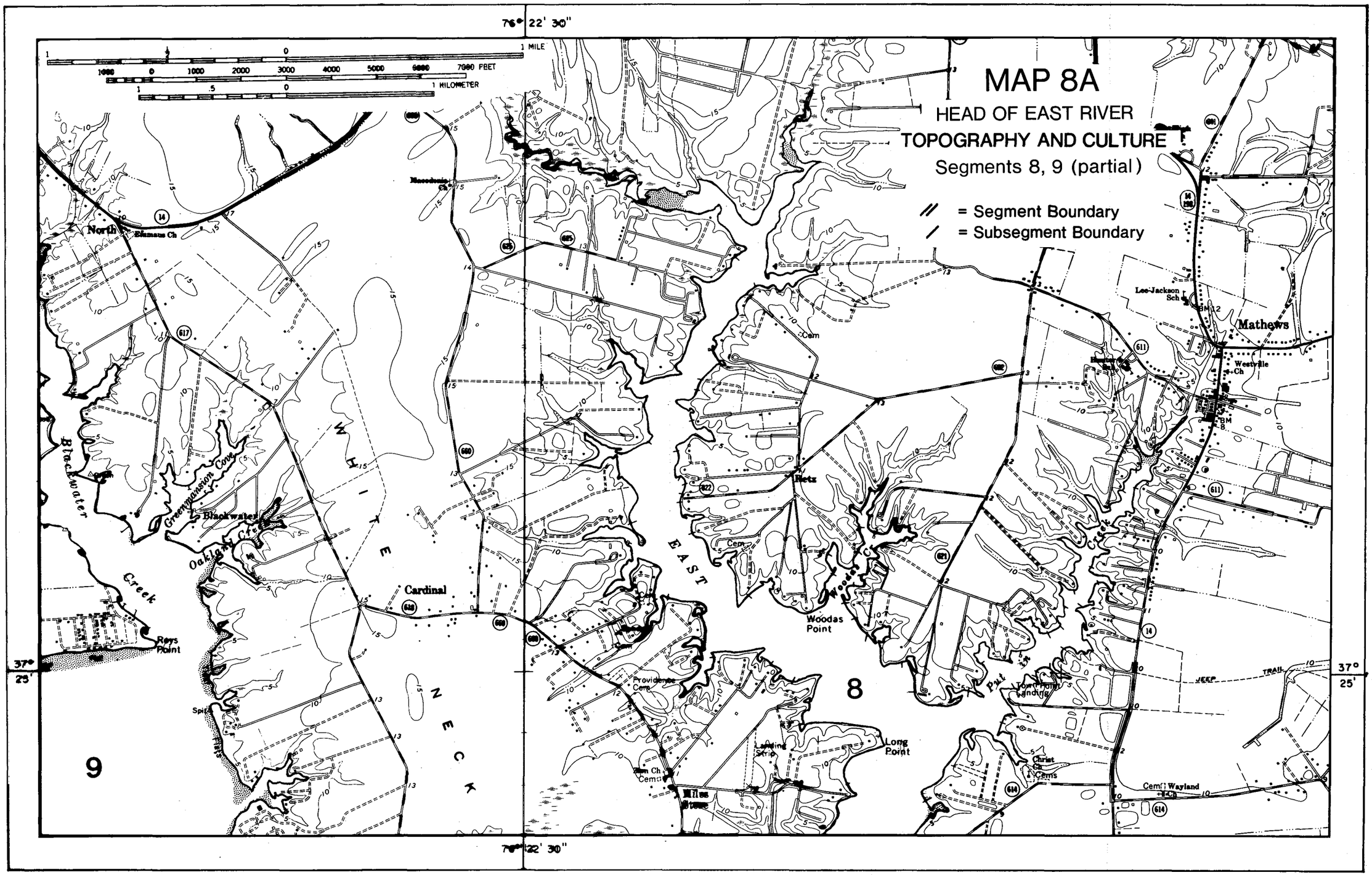
HEAD OF EAST RIVER

TOPOGRAPHY AND CULTURE

Segments 8, 9 (partial)

// = Segment Boundary

/ = Subsegment Boundary



MAP 8B

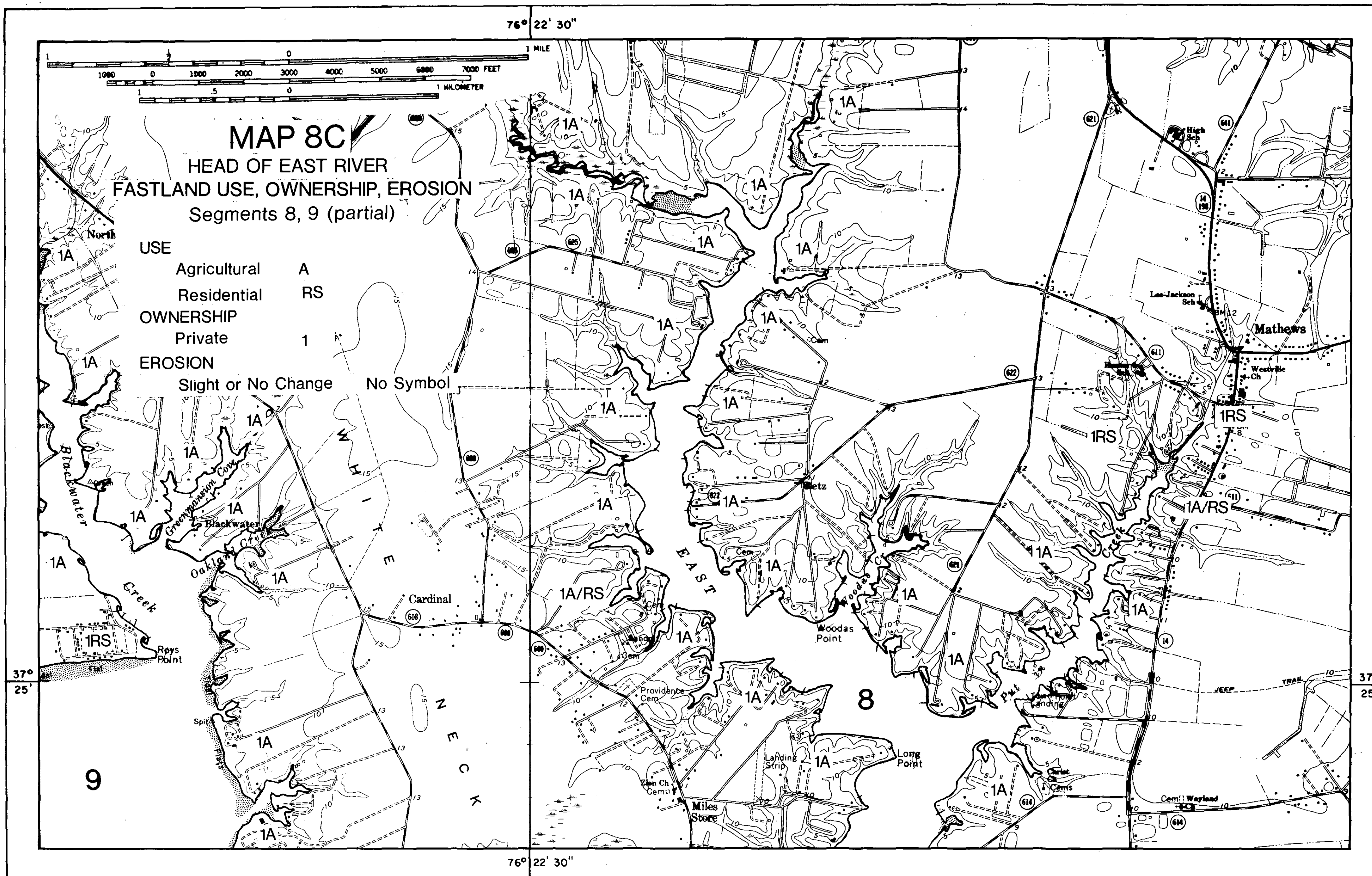
HEAD OF EAST RIVER
SHORELANDS TYPES
Segments 8, 9 (partial)

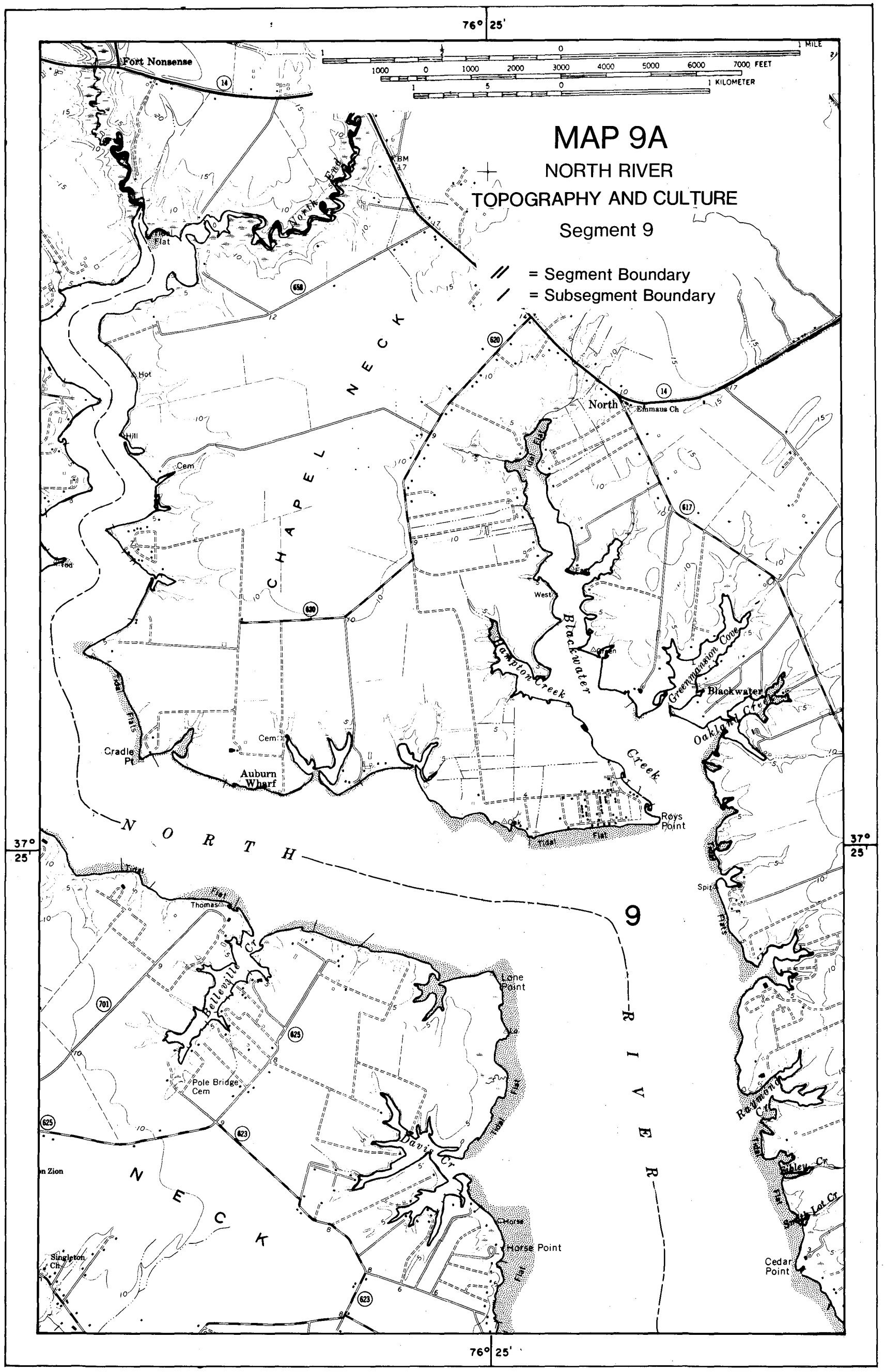
76° 22' 30"

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

FASTLAND
Low Shore
SHORE
Fringe Marsh
Embayed Marsh
NEARSHORE
Narrow

North
Zion Ch
Macedonia
Ch
Cem
Mathews
Westville
Ch
BM
8
Blackwater
Creek
Rays
Point
Cardinal
Providence
Cem
Wooday
Point
Landing
Strip
Zion Ch
Cem
Miles
Store
Wayland
Ch
Cem
JEEP
TRAIL
Landing
WHITE
NECK
9
8
37°
25'
76° 22' 30"


MAP 8C
HEAD OF EAST RIVER
FASTLAND USE, OWNERSHIP, EROSION
Segments 8, 9 (partial)
USE
Agricultural A
Residential RS
OWNERSHIP
Private 1
EROSION
Slight or No Change No Symbol
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
76° 22' 30"
37° 25'
WHITE NECK
EAST
Blackwater Creek
Greenmansion Cove
Oakland Creek
Blackwater
Cardinal
Roys Point
Spit
Providence Cem
Zion Ch Cems
Miles Store
Landing Strip
Long Point
Woodas Point
Betz
Mathews
Lee-Jackson Sch
Westville Ch
Christ Ch Cems
Wayland
9
8
1A
1RS
1A/RS


76° 25'
1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
MAP 9A
NORTH RIVER
TOPOGRAPHY AND CULTURE
Segment 9
= Segment Boundary
= Subsegment Boundary
Fort Nonsense
Flat
Hot
Hill
Cem
Cradle Pt
Auburn Wharf
Cem
Thomas
Belleville Cr
Pole Bridge Cem
Davis Cr
Singleton Ch
Horse Point
Lone Point
North
Emmaus Ch
Blackwater
Greenmansion Cove
Oakland Cr
Hampton Creek
Creek
Roys Point
Spit
Raynham Cr
Cedar Point
CHAPEL NECK
NECK
NORTH RIVER
9
37° 25'
76° 25'

MAP 9B

NORTH RIVER
SHORELANDS TYPES
Segment 9

76° 25'

37° 25'

1 MILE
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER

CHAPEL NECK

NORTH RIVER

9

Fort Nonsense
Hot
Cem
Auburn Wharf
North
Emmaus Ch
West
Blackwater
Creek
Lane Point
Davis Cr
Horse Point
Cedar Point
Singleton Ch
Thomas
Bellesville Cr
Boys Point

FASTLAND
Low Shore
SHORE
Fringe Marsh
Embayed Marsh
NEARSHORE
Narrow
Intermediate

MAP 9C

NORTH RIVER

EASTLAND USE, OWNERSHIP, EROSION

Segment 9

USE

Agricultural	A
Residential	RS

OWNERSHIP

Private	1

EROSION

Slight or No Change	No Symbol