1978

Shoreline Situation Report Lancaster County

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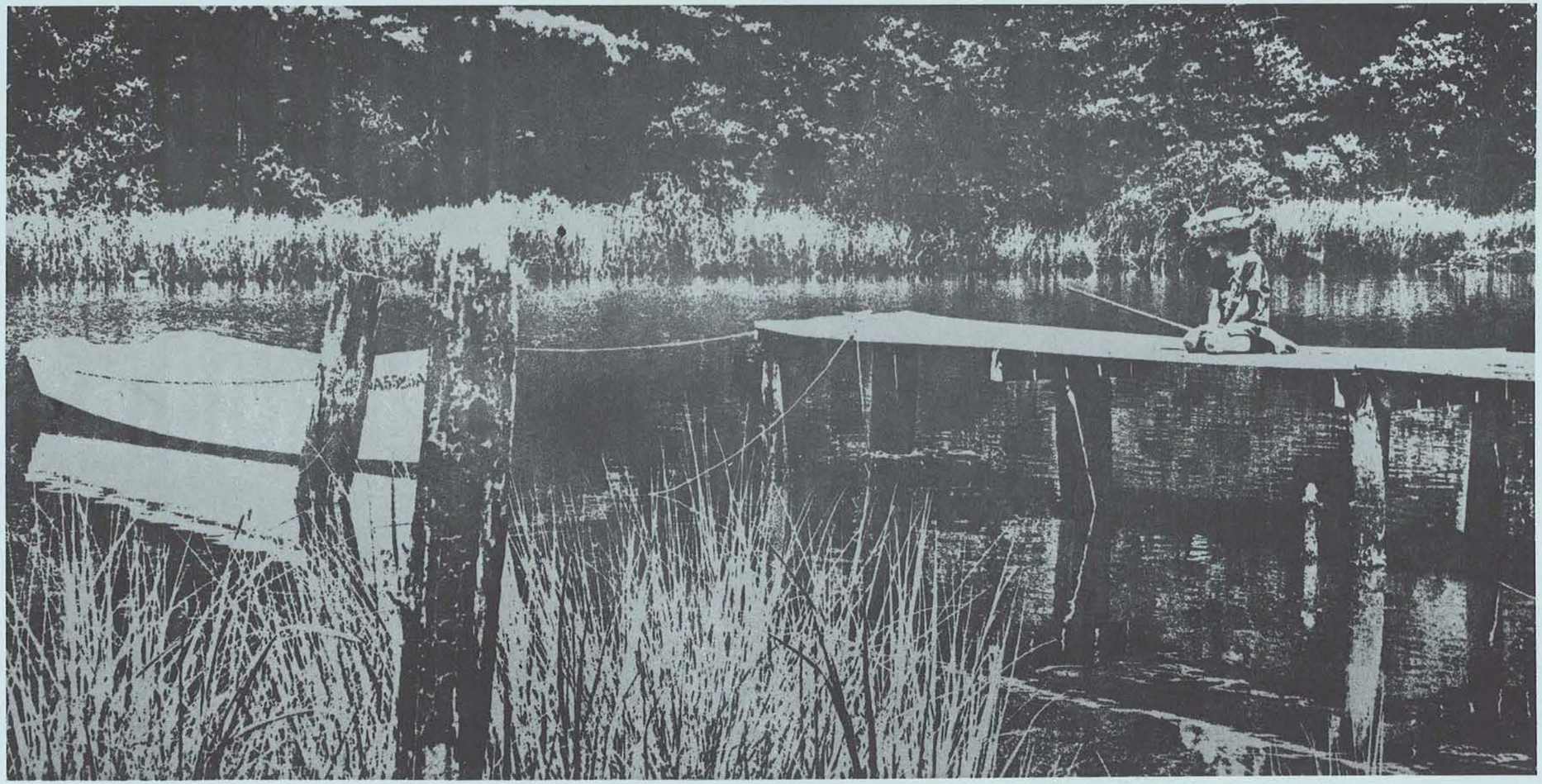
LANCASTER COUNTY



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Special Report In Applied Marine Science and Ocean Engineering Number 160 of the

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Gloucester Point, Virginia 23062

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LANCASTER COUNTY

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TABLE OF CONTENTS

LIST OF ILLUSTRATIONS

CHAPTER 1
Introduction

CHAPTER 1

INTRODUCTION

1.1 PURPOSES AND GOALS

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

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

The major man-induced uses of the shorelands are:

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

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

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

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

1.2 ACKNOWLEDGEMENTS

This report has been prepared and published with funds provided to the Commonwealth by the Office of Coastal Zone Management, National Oceanic and Atmospheric Administration, grant number 04-7-158-44041. The Shoreline Situation Report series was originally developed in the Wetlands/Edges Program of the Chesapeake Research Consortium, Inc., as supported by the Research Applied to National Needs (RANN) program of the National Science Foundation. The completion of this report would have been impossible without the expert services of Beth Marshall, who typed several drafts of the manuscript, Bill Jenkins and Ken Thornberry, who prepared the photographs, and Sam White, who piloted the aircraft on the many photo acquisition and reconnaissance flights. Also we thank the numerous other persons who, through their direct aid, criticisms, and suggestions, have assisted our work.

CHAPTER 2
Approach Used and Elements Considered

CHAPTER 2

APPROACH USED AND ELEMENTS CONSIDERED

2.1 APPROACH TO THE PROBLEM

In the preparation of this report the authors utilized existing information wherever possible. For example, for such elements as water quality characteristics, zoning regulations, or flood hazard, we reviewed relevant reports by local, state, or federal agencies. Much of the desired information, particularly with respect to erosional characteristics, 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 unanswered. In some cases we took additional photographs along with the field visits to document the effectiveness of shoreline defenses.

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

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

2.2 CHARACTERISTICS OF THE SHORELANDS INCLUDED IN THE STUDY

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

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

a) Shorelands Physiographic Classification

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

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

Definitions:

Shore Zone

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

The physiographic character of the marshes has also been separated into three types (see Figure 2). Fringe marsh is that which is less than 400 feet in width and which runs in a band parallel to the shore. Extensive marsh is that which has extensive acreage projecting into an 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 average slope of the land within 400 feet (122 m) of the fastland - shore boundary. The general classification is:

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

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

Nearshore Zone

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

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

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

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

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

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

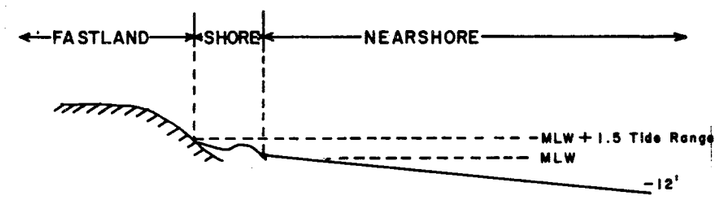


Figure 1

A profile of the three shorelands types.

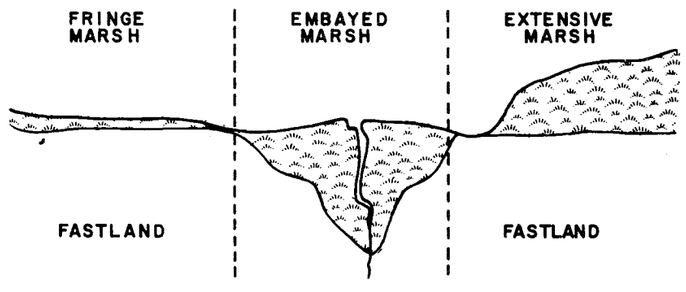


Figure 2

A plan view of the three marsh types.

b) Shorelands Use Classification

Fastland Zone

Residential

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

Commercial

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

Industrial

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

Governmental

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

Recreational and Other Public Open Spaces

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

Preserved

Includes lands preserved or regulated for

environmental reasons, such as wildlife or 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. For simplicity and convenience, managed woodlands are classified as "unmanaged, wooded" areas.

Shore Zone

Bathing
Boat launching
Bird watching
Waterfowl hunting

Nearshore Zone

Pound net fishing
Shellfishing
Sport fishing
Extraction of non-living resources
Boating
Water sports

c) Shorelands Ownership Classification

The shorelands ownership classification used has two main subdivisions, private and 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 water quality sections of this report are based upon data abstracted from Virginia State Water Control Board's publication Water Quality Standards (November, 1974) and Water Quality Inventory (305 (b) Report) (April, 1976).

Additionally, where applicable, Virginia Bureau of Shellfish Sanitation data is used to assign ratings of satisfactory, intermediate, or unsatisfactory. These 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 the shellfish standards are somewhat more stringent than most of the other water quality standards, they are included because of the economic and ecological impacts of shellfish ground closures. Special care should be taken not to endanger the water quality in existing "satisfactory" areas.

e) Zoning

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

f) Shore Erosion and Shoreline Defenses

The following ratings are used for shore erosion:

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

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

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

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

g) Limitations to Shore Use and Potential or Alternate Shore Uses

In this section we point out specific factors which may impose significant limits on the type or extent of shoreline development. This may result in a restatement of other factors from elsewhere in the report, e.g., flood hazard or erosion, or this may be a discussion of some other factor pertaining to the particular area.

Also we have placed particular attention on the recreational potential of the shore zone. The possible development of artificial beach, erosion protection, etc., influence the evaluation of an area's potential. Similarly, potential alternate shore uses are occasionally noted.

h) Distribution of Marshes

The acreage and physiographic type of the marshes in each subsegment is listed. These estimates of acreages were obtained from topographic maps and should be considered only as approximations. Detailed county inventories of the wetlands are being conducted by the Virginia Institute of Marine Science under the authorization of the Virginia Wetlands Act of 1972 (Code of Virginia 62.1-13.4). These surveys include detailed acreages of the grass species composition within individual marsh systems. In Shoreline Situation Reports of counties that have had marsh inventories, the marsh number is indicated, thus allowing the user of the Shoreline Situation Report to key back to the formal marsh inventory for additional data. The independent material in this report is provided to indicate the physiographic type of marsh land and to serve as a rough guide to marsh distribution, pending a formal inventory. Additional information on wetlands characteristics may be found in Coastal Wetlands of Virginia: Interim Report No. 3, by G.M. Silberhorn, G.M. Dawes, and T.A. Barnard, Jr., SRAMSOE No. 46, 1974, and in other VIMS publications.

i) Flood Hazard Levels

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

j) Shellfish Leases and Public Grounds

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

k) Beach Quality

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

CHAPTER 3
Present Shorelands Situation

CHAPTER 3

PRESENT SHORELINE SITUATION OF LANCASTER COUNTY

3.1 THE SHORELANDS OF LANCASTER COUNTY

Lancaster County is situated on the southern tip of Virginia's Northern Neck at the mouth of the Rappahannock River. The county is bounded by Richmond and Northumberland Counties on the north, the Rappahannock River on the west and south, and the Chesapeake Bay on the east. In addition to the Rappahannock River and Chesapeake Bay, there are numerous smaller rivers, creeks, and bays, most notably the Corrotoman River and Fleets Bay, included within Lancaster's 147 square miles. Kilmarnock, Irvington, and White Stone are the major population centers serving this predominately rural area. According to the Lancaster County Tidal Marsh Survey (G.M. Silberhorn, 1973, Special Report Number 45 in Applied Marine Science and Ocean Engineering, Virginia Institute of Marine Science), the county contains at least 212 marshes of ¼ acre or larger totaling 1,190 acres. The shoreline, as measured on U.S. Geological Survey 1:24,000 scale topographic maps, is 276.9 miles long. The fastland-shore zone boundary is slightly longer, 288.9 miles.

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

Along the shoreline, all of the fastland is privately owned. Use is classified as 28% residential, 20% agricultural, 1% commercial, and less than 1% industrial. The remaining 51% is considered unmanaged, wooded (43%) or unwooded (8%), meaning that the land is not subjected to day to day human trespass. With a slight variation, the distribution of shorelands uses appears to reflect the entire county's land use. The variation is a greater residential use along the shore with a parallel decrease in the local percentage of agricultural and unmanaged land. The shore areas classified as commercial or industrial are generally marinas, boat yards, or other water oriented businesses.

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

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

3.2 SHORE EROSION SITUATION

Shoreline erosion is a problem of generally moderate concern to the citizens of Lancaster County. According to Byrne and Anderson (1977, Shoreline Erosion in Tidewater Virginia, Special Report Number 111 in Applied Marine Science and Ocean Engineering, Virginia Institute of Marine Science, 102 pages), the average historical erosion rate along the county's shoreline is 0.7 feet per year. Byrne's and Anderson's report is for 168 miles of Lancaster's shore and utilizes 86 to 97 years of data. As might be expected, there is a considerable difference between the erosion regimes along the Chesapeake and along the rivers. The average rate of shoreline retreat along the Bay was 1.7 feet per year whereas, along the rivers, the rate was 0.6 feet per year. Normalizing the data to a 100-year period, 792 acres were eroded from the 43 miles of Bay shore and 561 acres from the 125 miles of river shore. In terms of smaller shoreline reaches, the greatest average erosion rates were 7.9 feet per year between Windmill and North Points, and 6.6 feet per year between Dymer and Indian Creeks. Along the Corrotoman and Rappahannock Rivers, average erosion rates of individual reaches ranged down from 5.1 feet per year.

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

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

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

should be encouraged. Also, foot traffic along the bluff faces should be discouraged.

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

3.3 SHORE USE LIMITATIONS

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

Most other shore use limitations are social, in the form of zoning or subdivision ordinances.

FIGURE 8

FIGURE 8. Concrete bag groins north of Rogue Point, Subsegment 5B. These structures have been effective in trapping good buffer beaches.

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

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

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

FIGURE 12. Morattico - Curletts Point, Subsegment 7B. The riprap appears to be effective. The concrete culverts have been placed parallel to the shoreline, like a bulkhead. The structure's distance from the fastland indicates that it is not very effective. Riprap has been placed underneath the pier to act like a groin.

FIGURE 9

FIGURE 10

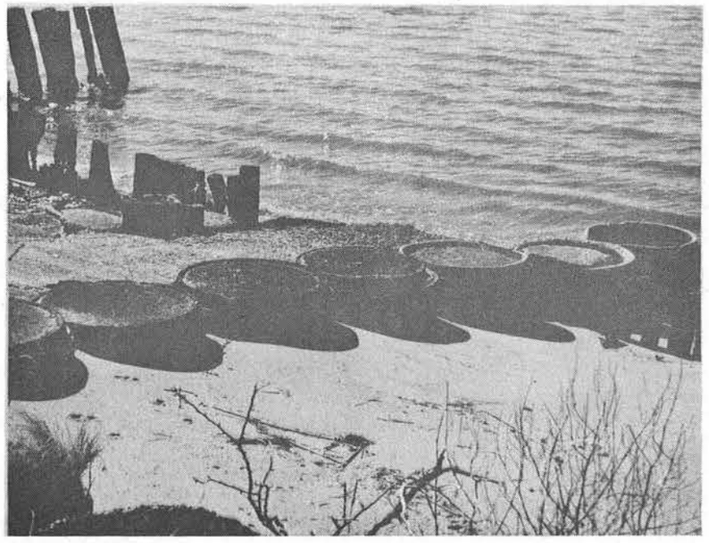


FIGURE 11

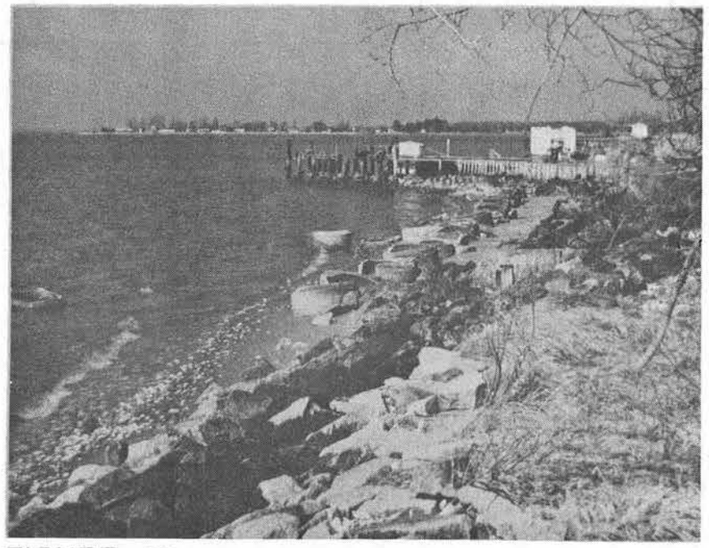


FIGURE 12

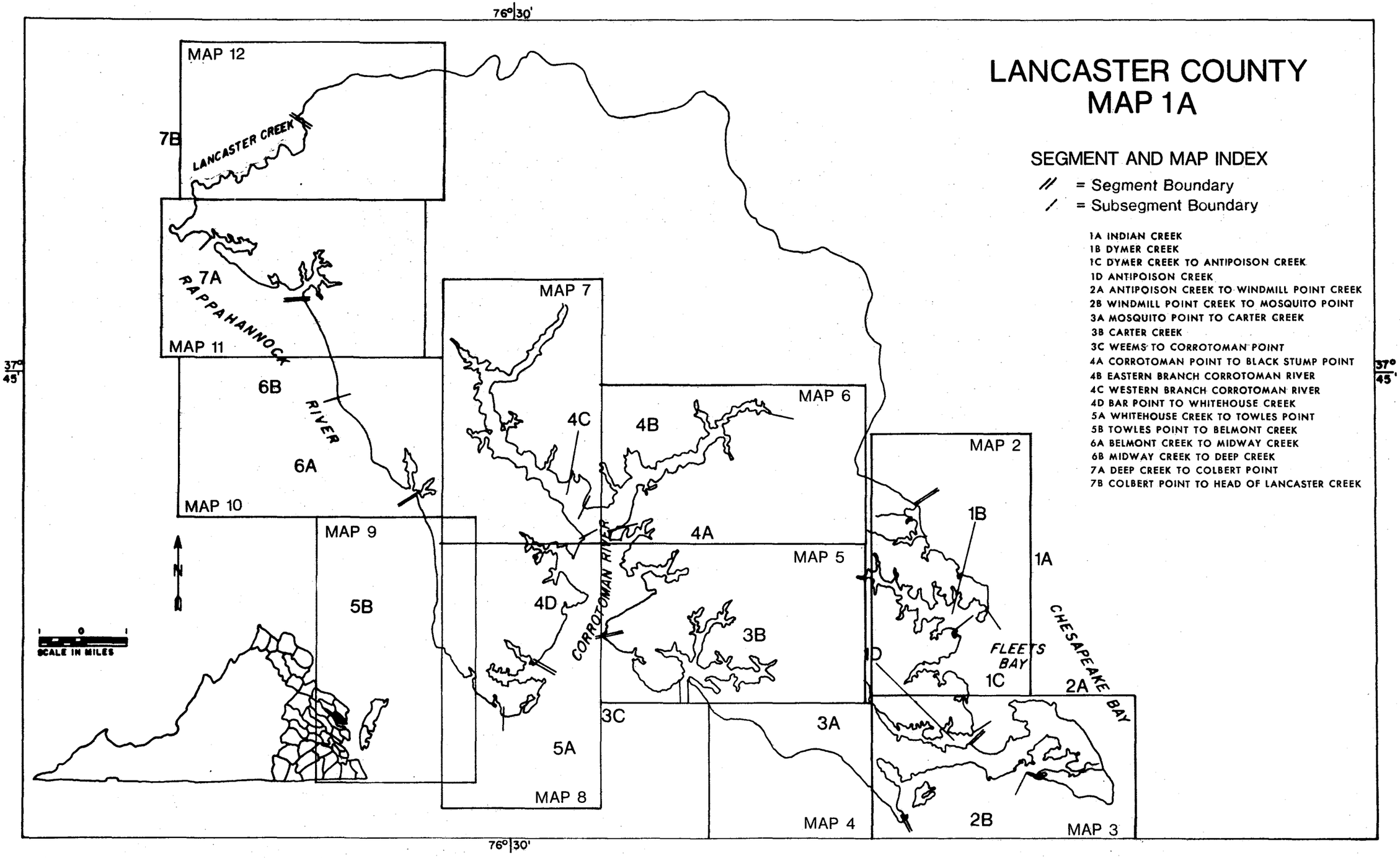
LANCASTER COUNTY
MAP 1A

SEGMENT AND MAP INDEX

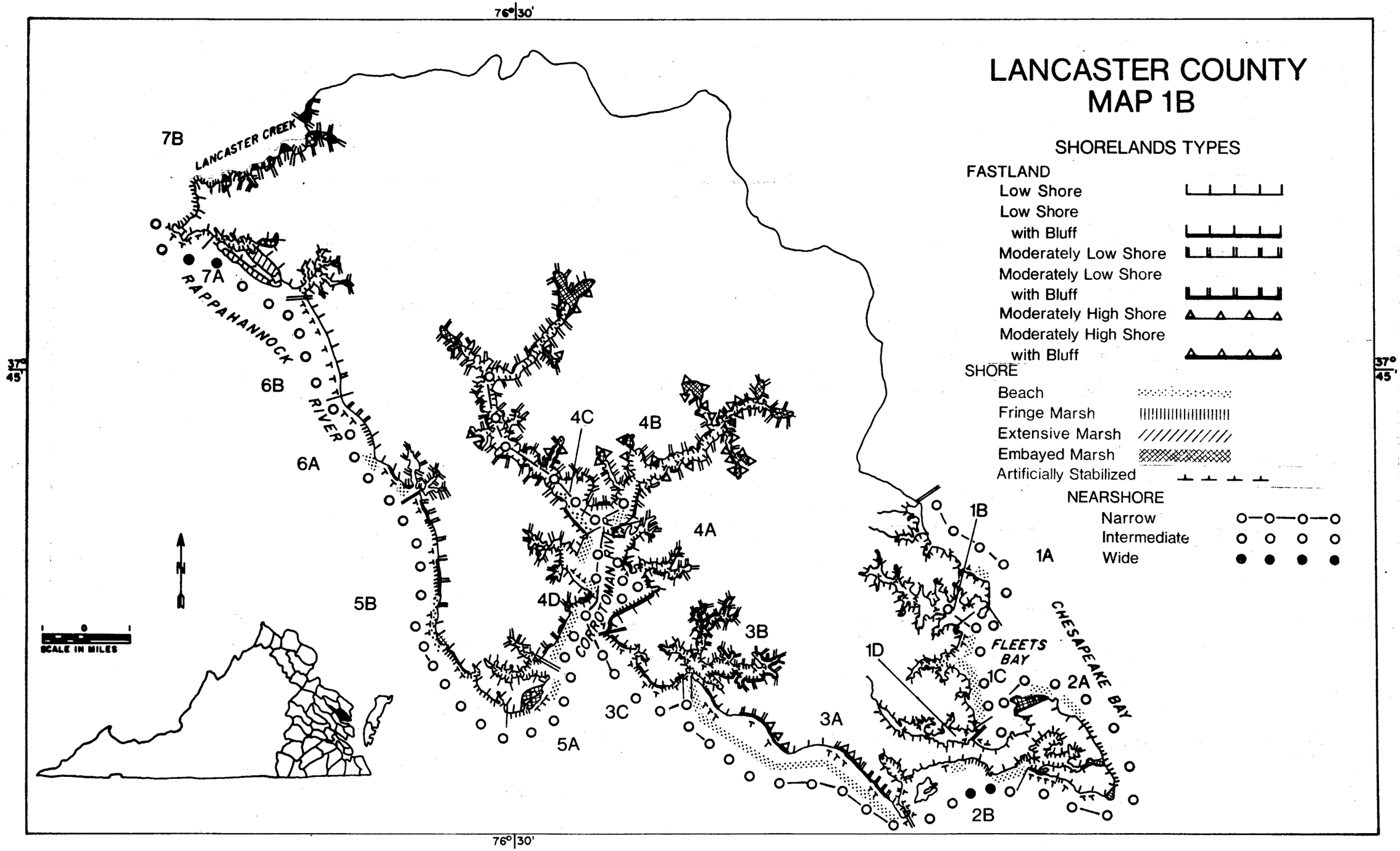
// = Segment Boundary

/ = Subsegment Boundary

1A INDIAN CREEK
1B DYMER CREEK
1C DYMER CREEK TO ANTIPOISON CREEK
1D ANTIPOISON CREEK
2A ANTIPOISON CREEK TO WINDMILL POINT CREEK
2B WINDMILL POINT CREEK TO MOSQUITO POINT
3A MOSQUITO POINT TO CARTER CREEK
3B CARTER CREEK
3C WEEMS TO CORROTOMAN POINT
4A CORROTOMAN POINT TO BLACK STUMP POINT
4B EASTERN BRANCH CORROTOMAN RIVER
4C WESTERN BRANCH CORROTOMAN RIVER
4D BAR POINT TO WHITEHOUSE CREEK
5A WHITEHOUSE CREEK TO TOWLES POINT
5B TOWLES POINT TO BELMONT CREEK
6A BELMONT CREEK TO MIDWAY CREEK
6B MIDWAY CREEK TO DEEP CREEK
7A DEEP CREEK TO COLBERT POINT
7B COLBERT POINT TO HEAD OF LANCASTER CREEK



LANCASTER COUNTY
MAP 1B



SHORELANDS TYPES

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

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

NEARSHORE
- Narrow
- Intermediate
- Wide

LANCASTER COUNTY
MAP 1C

SHORELINE EROSION PROTECTIVE STRUCTURES

EROSION

Severe	▬▬▬
Severe, Critical	▬▬▬
Moderate	| | | | | | |
Slight or No Change	No Symbol
Accretional	+ + + +

SHORELINE PROTECTIVE STRUCTURES

Bulkhead	B
Riprap	R

76°30'

37°45'

LANCASTER CREEK

RAPPAHANNOCK RIVER

CORROTOMAN RIVER

FLEETS BAY

CHESAPEAKE BAY

7B 7A 6B 6A 5B 5A 4C 4B 4A 4D 3C 3B 3A 1B 1A 1D 1C 2A 2B

N

SCALE IN MILES 0

LANCASTER COUNTY
MAP 1D

FASTLAND USE, OWNERSHIP

USE	
Agricultural	A
Commercial	C
Industrial	I
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W
OWNERSHIP	
Private	1

76°|30'

37°|45'

7B
LANCASTER CREEK
7A
RAPPAHANNOCK
RIVER
6B
6A
5B
5A
4C
4B
4A
4D
CORROTOMAN RIVER
3C
3B
3A
1B
1A
1D
1C
2A
2B
FLEETS BAY
CHESAPEAKE BAY
IRS/A
N
0
SCALE IN MILES

LANCASTER COUNTY
MAP 1E

Boat Ramp
Marina

76°30'

37°45'

7B
LANCASTER CREEK
7A
RAPPAHANNOCK
RIVER
6B
6A
5B
4C
4B
4A
4D
CORROTOMAN RIVER
5A
3C
3B
3A
1B
1A
1D
1C
FLEETS BAY
CHESAPEAKE BAY
2A
2B

N

0
SCALE IN MILES

LANCASTER COUNTY
MAP 1F

WASTE DISCHARGES ●

SHELLFISH AREAS

Leased Ground

Condemnation Areas

Public Areas — No Symbol

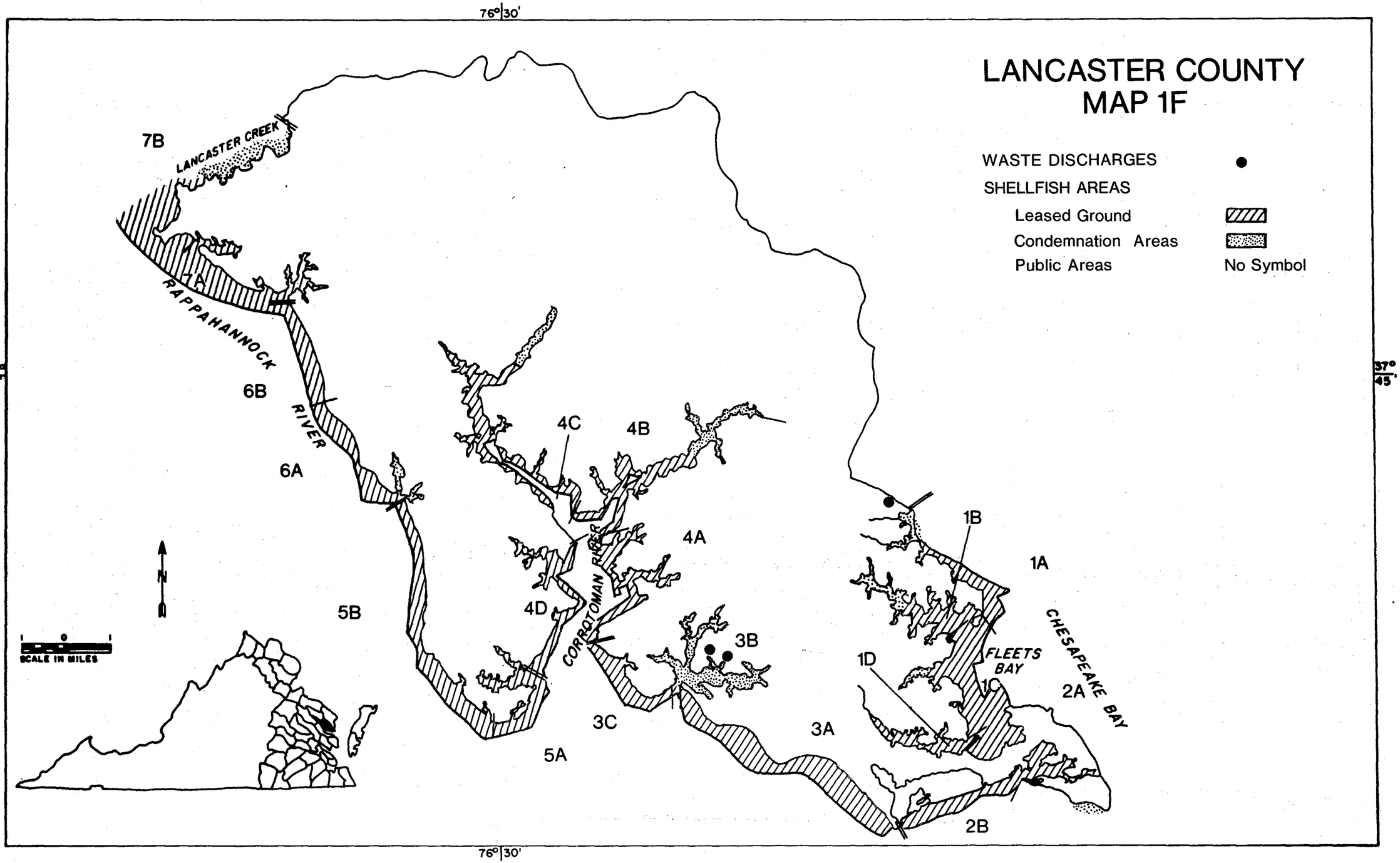


TABLE 1. SUMMARY OF LANCASTER COUNTY SHORELANDS PHYSIOGRAPHY, FASTLAND USE AND OWNERSHIP (STATUTE MILES)

Physiographic, use, and ownership classification / Subsegment	SHORELANDS PHYSIOGRAPHY														FASTLAND USE						OWNERSHIP	TOTAL MILES	
	FASTLAND							SHORE					NEARSHORE											
	ARTIFICIAL FILL	LOW SHORE	LOW SHORE WITH BLUFF	MODERATELY LOW SHORE	MODERATELY LOW SHORE WITH BLUFF	MODERATELY HIGH SHORE	MODERATELY HIGH SHORE WITH BLUFF	ARTIFICIALLY STABILIZED	BEACH	FRINGE MARSH	EMBAYED MARSH	EXTENSIVE MARSH	NARROW	INTERMEDIATE	WIDE	AGRICULTURAL	COMMERCIAL	INDUSTRIAL	RESIDENTIAL	UNMANAGED, WOODED	UNMANAGED, UNWOODED	PRIVATE	SHORE	FASTLAND
1A	0.1	10.8	0.2					0.3	0.7	10.1	0.1		2.6	0.5		5.4		0.4	2.5	2.6	0.2	11.1	11.1	11.1
1B		19.6	0.1					0.8	0.8	18.4	0.1		3.4		0.2	13.2		0.4	2.9	2.2	1.0	19.7	20.2	19.7
1C	0.1	11.7	0.5					0.7	2.5	8.6	0.2		1.1	2.3		5.3			3.3	3.7		12.3	12.0	12.3
1D		11.7							0.3	11.0		0.4				6.6	0.3		2.4	2.4		11.7	11.7	11.7
2A		10.7						1.8	2.9	6.5		5.3	0.4	7.2			0.7		2.2	3.3	4.6	10.7	16.5	10.7
2B	0.1	15.9		0.2				0.8	3.1	10.7	1.9	3.9		2.9	0.5	2.3			5.5	5.7	2.6	16.1	20.4	16.1
3A		1.6	1.0	1.7	1.6	2.5	1.3	0.8	4.8		0.7		4.2	2.0		2.0	0.1		1.4	0.4	5.8	9.7	6.2	9.7
3B	0.4	4.7	1.9	5.6	10.7			1.9	0.6	18.4	1.2		2.0				2.2		18.2	2.9		23.3	22.2	23.3
3C		1.9	1.5					0.4	0.4	2.2	0.1		1.5	0.9		0.6			1.7	1.1		3.4	3.1	3.4
4A		7.8	2.1	5.8				0.4	0.2	11.9	1.7		1.4	1.5		1.5			5.0	9.2		15.7	14.3	15.7
4B		0.6		16.6	3.0	6.8	1.0	0.3	0.7	18.0	5.7		2.7			2.7	0.1		5.4	19.7		28.0	24.7	28.0
4C		1.6	1.0	24.2	5.7	2.0	1.1	0.1	2.2	21.7	8.5		10.0			3.9			3.3	28.4		35.7	32.6	35.7
4D	0.1	6.5	0.2	7.3	0.4			0.7	2.4	10.8	0.3		2.6	0.9		0.4			9.0	5.0		14.5	14.2	14.5
5A		10.7		1.1				0.4	0.3	8.8	1.9		1.3			0.8			2.4	6.2	2.3	11.7	11.4	11.7
5B		6.7	0.6	6.5	1.6			1.2	1.2	9.4	1.8		0.9	4.9		1.8			3.5	8.4	1.7	15.4	13.6	15.4
6A	0.5	3.0	0.4	7.7	0.9			0.9	1.5	5.8	0.7		1.9	1.6		1.9	0.2		4.4	5.4	0.4	12.4	9.0	12.4
6B		4.2		1.1				1.4	0.6	1.9	1.2		0.8	1.6		0.9			2.2	2.2		5.3	5.0	5.3
7A		17.6		1.3				0.4	0.1	12.5	1.7	2.5		2.2	0.4	6.3	0.1		1.2	7.1	4.2	18.9	17.3	18.9
7B		6.3		6.9				0.7	0.4	4.3	5.8	0.2		0.2	0.8	2.6			4.1	6.6		13.3	11.4	13.3
TOTAL	1.3	153.6	9.5	86.0	23.9	11.3	3.4	14.0	25.7	191.0	33.6	12.3	36.8	28.7	1.9	58.2	3.7	0.8	80.6	122.5	22.8	288.9	276.9	288.9
% of FASTLAND	0%	53%	3%	30%	8%	4%	1%									20%	1%	0%	28%	43%	8%	100%		100%
% of SHORELINE								5%	9%	69%	12%	4%	13%	10%	1%								100%	

CHAPTER 4

4.1 Table of Subsegment Summaries

4.2 Segment and Subsegment Descriptions

4.3 Segment and Subsegment Maps

TABLE 2. SHORELINE SITUATION REPORT SUBSEGMENT SUMMARY FOR LANCASTER COUNTY, VIRGINIA

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
1A INDIAN CREEK 11.1 miles (11.1 miles of fastland)	FASTLAND: Artificial fill 1%, low shore 97%, and low shore with bluff 2%. SHORE: Artificially stabilized 2%, beach 6%, fringe marsh 91%, and embayed marsh 1%. NEARSHORE: Narrow 24% and intermediate 5%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 48%, industrial 3%, residential 23%, unmanaged, wooded 24%, and unmanaged, unwooded 2%. SHORE: Some commercial use at Kilmarnock Wharf, but mostly unused. NEARSHORE: Some commercial shipping, sport boating, and fishing.	High, noncritical. Most of the shoreline has elevations of 5 feet or less and would be flooded during periods of abnormally high water.	The upper portion of the creek does not meet the 305(b)(1)(B) criteria due to past discharges of domestic sewage from the Town of Kilmarnock. The lower portion of the creek meets 305(b)(1)(B) criteria and shellfish sanitation standards.	Good. Most of the beaches are fairly wide and clean in this subsegment.	Slight or no change for the Indian Creek portion. High, noncritical for the section of land between Indian and Dymer Creeks.	Low. Due to the rural nature of the area there seems to be little demand for public recreational facilities.
1B DYMER CREEK AND GROG ISLAND 30.0 miles (20.2 miles of fastland)	FASTLAND: Low shore 99% and low shore with bluff 1%. SHORE: Artificially stabilized 4%, beach 4%, fringe marsh 91%, and embayed marsh 1%. NEARSHORE: Narrow 17% and wide 1%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 67%, industrial 2%, residential 15%, unmanaged, wooded 11%, and unmanaged, unwooded 5%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport boating, fishing, and some shellfishing.	High, critical. The majority of the shoreline has elevations of 5 feet or less, with many structures located along it. These homes would probably be inundated during periods of abnormally high water.	The upper portion of Dymer Creek is closed to the taking of shellfish due to the discharge of domestic waste from the Town of Kilmarnock in the past.	Poor to good. Grog Island has a wide, clean beach. The remainder of the subsegment has only narrow, strip beaches.	Severe, noncritical. Dymer Creek to Indian Creek, including Grog Island, has an average historical erosion rate of 6.6 feet per year. There are numerous areas of effective artificial stabilization in the subsegment.	Low. The county zoning ordinance prohibits commercial or industrial use of the subsegment. As this area is still basically rural there seems little demand for public recreational facilities in the near future.
1C TABBS CREEK 12.0 miles (12.3 miles of fastland)	FASTLAND: Artificial fill 1%, low shore 96%, and low shore with bluff 3%. SHORE: Artificially stabilized 6%, beach 20%, fringe marsh 72%, and embayed marsh 2%. NEARSHORE: Narrow 9% and intermediate 20%. The remainder of the subsegment is located along creeks which are too narrow and shallow for classification.	FASTLAND: Agricultural 43%, residential 27%, and unmanaged, wooded 30%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport boating, fishing, and some shellfishing.	High, noncritical for most of the subsegment. High, critical for some structures built below the 5-foot contour along the Bay-fronting shoreline.	The headwaters of Tabbs Creek are closed to the taking of shellfish. The remainder of the subsegment has good water quality.	Fair. The majority of the subsegment has narrow, strip beaches. The groins have trapped nice fillets of sand.	Slight or no change to severe, noncritical. The average historical erosion rate for the Bay-fronting shoreline has been 5.6 to 6.0 feet per year. An area north of the mouth of Tabbs Creek has been accreting at a rate of 1.6 feet per year. In some areas of the subsegment groins have been used with bulkhead, and have trapped sizeable fillets of sand. All structures appear to be effective.	Low. There seems to be little demand for further or alternate development of this subsegment.
1D ANTIPOISON CREEK 11.7 miles (11.7 miles of fastland)	FASTLAND: Entirely low shore. SHORE: Artificially stabilized 3%, beach 3%, and fringe marsh 94%. NEARSHORE: Antipoison Creek has average depths of 6 to 8 feet.	FASTLAND: Agricultural 56%, commercial 3%, residential 21%, and unmanaged, wooded 20%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Fishing, shellfishing, boating, and other water sports.	High, critical. Many dwellings are located below 5-foot elevations and would be inundated during periods of abnormally high water.	Satisfactory. Antipoison Creek meets both the State Water Control Board's 305(b)(1)(B) criteria, and the Bureau of Shellfish Sanitation standards.	Poor. There are only narrow, strip beaches along the north bank of the creek mouth.	Slight or no change for the entire subsegment. There are approximately 2,000 feet of artificially stabilized shoreline in the subsegment. Most structures appear to be for cosmetic purposes rather than for erosion control.	Low. The rural-agricultural nature of the subsegment seems best suited for the area, and any residential development would be at the expense of the agricultural lands. There seems little demand for public recreational facilities at the present time.
2A FLEETS ISLAND 16.5 miles (10.7 miles of fastland)	FASTLAND: Entirely low shore. SHORE: Artificially stabilized 11%, beach 18%, fringe marsh 39%, and embayed marsh 32%. NEARSHORE: Narrow 4% and intermediate 43%. The remainder of the nearshore zone is located along Oyster Creek which is too narrow and shallow for classification.	FASTLAND: Commercial 6%, residential 21%, unmanaged, wooded 31%, and unmanaged, unwooded 42%. SHORE: Private recreational and commercial use. NEARSHORE: Sport boating, fishing, and shellfishing.	High, critical. Numerous structures have been built below 5-foot elevations and would be inundated during periods of abnormally high water.	Satisfactory for the entire subsegment with the exception of the Windmill Point Marina area. The problem here stems from boating activities at the marina, but the implementation of a sewage treatment plant should reduce the pollution.	Poor to good. Around Windmill Point to Windmill Point Creek there is an excellent sand beach.	Slight or no change to severe, noncritical. The average historical rate of erosion from North Point to the Windmill Point Marina is 2.9 to 7.9 feet per year. There are numerous shore protective structures, most of which appear to be effective.	Low. Although several areas of this subsegment have the potential of becoming public recreational areas, there seems little pressure for such facilities at the present.
2B WINDMILL POINT CREEK TO MOSQUITO POINT 20.4 miles (16.1 miles of fastland)	FASTLAND: Artificial fill < 1%, low shore 98%, and moderately low shore 1%. SHORE: Artificially stabilized 4%, beach 15%, fringe marsh 53%, embayed marsh 9%, and extensive marsh 19%. NEARSHORE: Intermediate 14% and wide 2%. The remainder of the subsegment is located in creeks which are too narrow and shallow for classification.	FASTLAND: Agricultural 15%, residential 35%, unmanaged, wooded 35%, and unmanaged, unwooded 16%. Commercial use comprises less than 1% of the shorelands use. SHORE: Private recreational use. NEARSHORE: Commercial and sport fishing, boating, and other water related activities.	High, critical and noncritical. Several structures in the subsegment, especially along Windmill Point and Little Oyster Creeks, would be flooded during periods of abnormally high water.	Satisfactory. The entire subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor to good. There are several good beaches at Deep Hole Point and Mosquito Point. The remainder of the subsegment has narrow, strip beaches.	Slight or no change to moderate, noncritical. Between Mosquito Point and Mosquito Creek the average historical rate of retreat has been 2.7 feet per year. The shoreline between Mosquito and Windmill Creeks has been accreting at an average rate of 1.5 feet per year. There are several areas of effective artificial stabilization in this subsegment, except for one groin field at the mouth of Mosquito Creek, which is being flanked.	Low. This area is mostly used for isolated residences and farms. Little alternate shore use seems probable for the near future.

TABLE 2. (Cont'd).

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
3A MOSQUITO POINT TO CRAB POINT 6.2 miles (9.7 miles of fastland)	FASTLAND: Low shore 17%, low shore with bluff 11%, moderately low shore 17%, moderately low shore with bluff 16%, moderately high shore 26%, and moderately high shore with bluff 14%. SHORE: Artificially stabilized 12%, beach 77%, and embayed marsh 10%. NEARSHORE: Narrow 68% and intermediate 32%.	FASTLAND: Agricultural 21%, commercial 1%, residential 14%, unmanaged, wooded 4%, and unmanaged, unwooded 60%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Commercial and sport boating, fishing, shellfishing, and other water related activities.	Low, noncritical for most of the subsegment. High, critical at White Stone Beach, where structures have been built very close to the shoreline.	Satisfactory. The entire subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Good. Almost the entire subsegment is fronted by a wide, clean beach.	Slight or no change to moderate, noncritical. The average historical erosion rate for most of the subsegment has been 1.5 to 1.7 feet per year. This subsegment has several areas of protective structures, especially groin fields. Most of the groins are effective, although some are being flanked.	Low. Some residential development seems probable for some sections of the shoreline. There seems little demand for public recreational facilities at the present time.
3B CARTER CREEK 22.2 miles (23.3 miles of fastland)	FASTLAND: Artificial fill 2%, low shore 20%, low shore with bluff 8%, moderately low shore 24%, and moderately low shore with bluff 46%. SHORE: Artificially stabilized 9%, beach 3%, fringe marsh 83%, and embayed marsh 5%. NEARSHORE: Narrow 9%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Commercial 9%, residential 78%, and unmanaged, wooded 13%. SHORE: Some private recreational use and commercial use. NEARSHORE: Commercial and sport boating, fishing, and other water related activities.	Low, noncritical for most of the subsegment. High, critical for structures near the mouth of the creek which have been built below 5-foot elevations.	Unsatisfactory. Carter Creek has been degraded by several point and non-point pollution sources. It is currently closed to the taking of shellfish.	Poor. There are only narrow, strip beaches at the mouth of Carter Creek.	Slight or no change to moderate, noncritical. The Weems area is experiencing an average historical erosion rate of 1.1 feet per year. There are many sections of bulkhead along the creek, mainly for retaining fill or for cosmetic purposes.	Low. Most of the area is already intensely used. There is a section of wooded land at the head of Church Prong which could be used for public recreational facilities. However, this portion of the creek is very shallow, limiting water related activities.
3C MOUTH OF CORROTOMAN RIVER 3.1 miles (3.4 miles of fastland)	FASTLAND: Low shore 56% and low shore with bluff 44%. SHORE: Artificially stabilized 13%, beach 14%, fringe marsh 70%, and embayed marsh 3%. NEARSHORE: Narrow 50% and intermediate 28%. The remainder of the subsegment is located along creeks which are too narrow and shallow for classification.	FASTLAND: Agricultural 18%, residential 49%, and unmanaged, wooded 33%. SHORE: Mostly private recreational and agricultural use. NEARSHORE: Sport boating, fishing, and other water related activities.	Low, noncritical. The majority of the subsegment has elevations of at least 10 feet and is not subject to flooding.	Satisfactory. This subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. There is a narrow, strip beach at Corrotoman Point.	Slight or no change to moderate, noncritical. The river-fronting portions of the subsegment are experiencing an average historical erosion rate of 1.2 to 1.6 feet per year. There are approximately 2,000 feet of artificially stabilized shoreline in the subsegment. The bulkhead at Orchard Point is being flanked and three groin fields are now ineffective. The remaining structures appear to be effective.	Low. This subsegment is basically rural in nature and public recreational facilities seem unnecessary at the present time.
4A CORROTOMAN RIVER 14.3 miles (15.7 miles of fastland)	FASTLAND: Low shore 49%, low shore with bluff 14%, and moderately low shore 37%. SHORE: Artificially stabilized 3%, beach 2%, fringe marsh 83%, and embayed marsh 12%. NEARSHORE: Narrow 10% and intermediate 11%. The remainder of the shoreline is located in creeks which are too narrow and shallow for classification.	FASTLAND: Agricultural 9%, residential 32%, and unmanaged, wooded 59%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport boating, fishing, and other water related activities.	Low, noncritical for the majority of the shoreline. High, critical for the road on the northern side of the mouth of Taylor Creek.	Satisfactory. This subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. There are only narrow, strip beaches in this subsegment.	Slight or no change to severe, noncritical. The shoreline between Taylor and Moran Creeks had an average historical erosion rate of 5.1 feet per year. This area has now been artificially stabilized and is no longer susceptible to erosion.	Low. Due to the rural nature of the area there seems little demand for public recreational facilities at the present time. Any residential development should take care to maintain the good water quality of the area.
4B CORROTOMAN RIVER 24.7 miles (28.0 miles of fastland)	FASTLAND: Low shore 2%, moderately low shore 59%, moderately low shore with bluff 11%, moderately high shore 25%, and moderately high shore with bluff 3%. SHORE: Artificially stabilized 1%, beach 3%, fringe marsh 73%, and embayed marsh 23%. NEARSHORE: Narrow 11%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 10%, commercial < 1%, residential 19%, and unmanaged, wooded 70%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport boating, fishing, shellfishing, and other water related activities.	Low, noncritical. The majority of the shoreline has elevations of at least 10 feet and is not susceptible to flooding. A few isolated structures may be inundated during the 100-year storm.	Satisfactory. This subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. There are only isolated beaches in this subsegment.	Slight or no change for the entire subsegment with the exception of Black Stump Point, which has a moderate average erosion rate of 1.7 feet per year. There are approximately 1,500 feet of artificially stabilized shoreline in this subsegment, most of which appears to be for cosmetic purposes rather than erosion control.	Low. Due to the rural nature of the area there seems little demand for public recreational facilities. Some residential build-up may occur, but care should be taken to maintain the good water quality.
4C CORROTOMAN RIVER 32.6 miles (35.7 miles of fastland)	FASTLAND: Low shore 4%, low shore with bluff 3%, moderately low shore 68%, moderately low shore with bluff 16%, moderately high shore 6%, and moderately high shore with bluff 3%. SHORE: Artificially stabilized < 1%, beach 7%, fringe marsh 67%, and embayed marsh 26%. NEARSHORE: Narrow 31%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 11%, residential 9%, and unmanaged, wooded 80%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport boating, fishing, and other water related activities.	Low, noncritical for the majority of the subsegment. Only the marsh areas are susceptible to flooding.	Satisfactory for the entire subsegment with the exception of the headwaters of the River, which is closed to the taking of shellfish.	Fair to poor. Bar Point has a fairly wide, clean beach. The remainder of the subsegment has only narrow, strip beaches.	Slight or no change to moderate, noncritical. The shoreline from Ottoman Wharf to Bar Point is eroding at an average historical rate of 1.0 feet per year. The remainder of the subsegment appears to be stable. There are approximately 700 feet of effective bulkhead in the subsegment.	Low. Some private residential growth may continue along the shoreline, although it appears the area will remain basically rural. Some public launching ramps would be of benefit to the boating community.

TABLE 2. (Cont'd)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
4D CORROTOMAN RIVER 14.2 miles (14.5 miles of fastland)	FASTLAND: Artificial fill < 1%, low shore 45%, low shore with bluff 1%, moderately low shore 50%, and moderately low shore with bluff 3%. SHORE: Artificially stabilized 5%, beach 17%, fringe marsh 77%, and embayed marsh 2%. NEARSHORE: Narrow 18% and intermediate 6%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 3%, residential 62%, and unmanaged, wooded 35%. SHORE: Some private recreational use. NEARSHORE: Sport boating and fishing.	Low, noncritical. The majority of the shoreline has elevations of at least 10 feet and is not subject to flooding.	Satisfactory. The subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. Most of the subsegment has only narrow, strip beaches.	Slight or no change to moderate, noncritical. There are a few areas where the average historical erosion rate is 1.7 to 1.9 feet per year.	Low. There seems to be little demand for public recreational facilities in this area as it is still rural. Any further development should take precautions to maintain the good water quality of the area.
5A WHITEHOUSE CREEK 11.4 miles (11.7 miles of fastland)	FASTLAND: Low shore 91% and moderately low shore 9%. SHORE: Artificially stabilized 4%, beach 2%, fringe marsh 77%, and embayed marsh 17%. NEARSHORE: Narrow 11%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 6%, residential 21%, unmanaged, wooded 53%, and unmanaged, unwooded 20%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport and commercial boating, fishing, and shellfishing.	High, noncritical. Most of the shoreline has elevations of below 5 feet and is highly susceptible to flooding.	Satisfactory. The entire subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. There are only a few pocket beaches in the subsegment.	Slight or no change to moderate, noncritical. The shoreline from the mouth of Whitehouse Creek to Towles Point has an average historical erosion rate of 1.5 feet per year. There are six groins near the mouth of Whitehouse Creek, which are now being flanked. In Whitehouse Creek there are several sections of bulkhead, mainly used for retaining fill.	Low. There seems little demand for public recreational facilities in this area as it is still basically rural and undeveloped.
5B TOWLES POINT TO BELMONT CREEK 13.6 miles (15.4 miles of fastland)	FASTLAND: Low shore 43%, low shore with bluff 4%, moderately low shore 42%, and moderately low shore with bluff 11%. SHORE: Artificially stabilized 9%, beach 9%, fringe marsh 69%, and embayed marsh 13%. NEARSHORE: Narrow 6% and intermediate 36%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 11%, residential 23%, unmanaged, wooded 55%, and unmanaged, unwooded 11%. SHORE: Private recreational use. NEARSHORE: Commercial and sport boating, fishing, shellfishing, and other water related activities.	High, critical for the Beach Creek area. The remainder of the subsegment is low to high, noncritical.	Satisfactory for the entire subsegment with the exception of Wyatt Creek, which is closed to the taking of shellfish.	Poor to good. The only areas of relatively good beach are along Beach Creek, and between Paynes and Belmont Creeks.	Moderate, noncritical (1.9 to 2.8 feet per year) with the exception of some structures along Beach Creek.	Low. Due to the rural nature of the area there seems little demand for public recreational facilities.
6A ROCKY NECK 9.0 miles (12.4 miles of fastland)	FASTLAND: Artificial fill 4%, low shore 24%, low shore with bluff 3%, moderately low shore 62%, and moderately low shore with bluff 7%. SHORE: Artificially stabilized 11%, beach 17%, fringe marsh 64%, and embayed marsh 9%. NEARSHORE: Narrow 21% and intermediate 18%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 15%, commercial 2%, residential 35%, unmanaged, wooded 44%, and unmanaged, unwooded 3%. SHORE: Private recreational use. NEARSHORE: Commercial and sport boating, fishing, and shellfishing.	Low, noncritical. The majority of the shoreline has elevations of at least 5 to 10 feet and is not subject to flooding.	Satisfactory for the entire subsegment with the exception of Greenvale and Belmont Creeks which are closed to the taking of shellfish.	Good to poor. Between Belmont and Greenvale Creeks a marsh has been artificially filled (from creek dredging operations) creating a very large sand beach.	Slight or no change to moderate, noncritical. The shoreline along the Rappahannock River is eroding at an average historical rate of 1.4 to 1.7 feet per year, with the exception of the two sandspits which are accreting. There are approximately 3,000 feet of wooden bulkhead and several groin fields in the subsegment.	Low. Fifty percent of the subsegment is already used for residential or agricultural purposes. The remaining shoreline is basically rural eliminating the need for public recreational facilities.
6B MIDWAY CREEK TO DEEP CREEK 5.0 miles (5.3 miles of fastland)	FASTLAND: Low shore 79% and moderately low shore 21%. SHORE: Artificially stabilized 28%, beach 12%, fringe marsh 37%, and embayed marsh 24%. NEARSHORE: Narrow 14% and intermediate 32%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 17%, residential 41%, and unmanaged, wooded 42%. SHORE: Private recreational use. NEARSHORE: Sport and commercial boating, fishing, and shellfishing.	Moderate, critical. Several structures are built right on the shoreline and could be inundated during periods of abnormally high water.	Satisfactory. The entire subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Fair. Most of the shoreline is fronted by thin, strip beaches.	Slight or no change to moderate, noncritical. The average historical erosion rate is 1.3 to 2.9 feet per year for the unprotected areas. There are three areas of accretion; the sandspit at the mouth of Deep Creek (0.9 feet per year), the mouth of the creek southeast of Deep Creek (2.1 feet per year), and around Midway Creek (1.6 feet per year). There are numerous effective protective structures in the shoreline.	Low. Commercial or industrial development is not permitted along this portion of the Rappahannock River, and there seems little demand for public recreational facilities.
7A BELLE ISLE 17.3 miles (22.0 miles of fastland)	FASTLAND: Low shore 93% and moderately low shore 7%. SHORE: Artificially stabilized 2%, beach < 1%, fringe marsh 72%, embayed marsh 10%, and extensive marsh 15%. NEARSHORE: Intermediate 13% and wide 3%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 33%, commercial < 1%, residential 6%, unmanaged, wooded 38%, and unmanaged, unwooded 22%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Sport and commercial boating, fishing, and shellfishing.	High, noncritical for most of the subsegment. High, critical for one house on Mulberry Creek and one on Belle Isle.	Satisfactory. The entire subsegment meets both the State Water Control Board's 305(b)(1)(B) criteria and the Bureau of Shellfish Sanitation standards.	Poor. There is only a small section of beach on Belle Isle.	Slight or no change to moderate, noncritical. The river-fronting portion of Belle Isle has an average historical erosion rate of 2.5 feet per year. There are several areas of effective bulkhead along Mulberry and Deep Creeks. There is an effective groin field at the south end of Belle Isle.	Low. The county zoning ordinance prohibits commercial or industrial use of the subsegment. Some residential development may continue, but care should be taken to maintain the good water quality and the marsh lands.

TABLE 2 (cont'd)

SUBSEGMENT	SHORELANDS TYPE	SHORELANDS USE	FLOOD HAZARD	WATER QUALITY	BEACH QUALITY	SHORE EROSION SITUATION	ALTERNATE SHORE USE
7B LANCASTER CREEK 11.4 miles (13.3 miles of fastland)	FASTLAND: Low shore 48% and moderately low shore 52%. SHORE: Artificially stabilized 6%, beach 3%, fringe marsh 38%, embayed marsh 51%, and extensive marsh 2%. NEARSHORE: Intermediate 2% and wide 7%. The remainder of the nearshore zone is too narrow and shallow for classification.	FASTLAND: Agricultural 20%, residential 30% and unmanaged, wooded 50%. SHORE: Some private recreational use, but mostly unused. NEARSHORE: Commercial and sport boating, fishing, and shellfishing.	Low, noncritical for the entire subsegment except for the Morattico area, which has high flood potential.	The entire subsegment meets the State Water Control Board's 305(b)(1)(B) criteria, and all but the upper portions of Lancaster Creek meet the Bureau of Shellfish Sanitation standards.	Poor to fair. There are several strip beaches around the mouth of Mulberry Creek.	Slight or no change to severe, noncritical. The Morattico area has experienced an average historical erosion rate of 3.1 to 4.4 feet per year, however, most of this area has now been artificially stabilized.	Low. Due to the rural nature of the area there seems to be little demand for public recreational facilities.

SUBSEGMENT 1A

INDIAN CREEK

Map 2

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

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

SHORELANDS USE
FASTLAND: Agricultural 48% (5.4 mi.), industrial 3% (0.4 mi.), residential 23% (2.5 mi.), unmanaged, wooded 24% (2.6 mi.), and unmanaged, unwooded 2% (0.2 mi.).
SHORE: Some commercial use at Kilmarnock Wharf, but mostly unused.
NEARSHORE: Some commercial shipping, sport boating and fishing.

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

OWNERSHIP: Private.

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

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the Indian Creek shoreline. High, noncritical (6.6 feet per year) for the part of the shoreline between Indian and Dymer Creeks that borders on the Chesapeake Bay.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are several areas with protective structures. Near the head of Indian Creek there are two sites of bulkhead and a section each of bulkhead and rubble riprap at Kilmarnock Wharf. Near the mouth of the creek there are several areas of bulkhead and groins. All the structures appear to be effective.

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

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

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

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

PHOTOS: Aerial-VIMS 1Feb77 LN-1A/1009-1040.

SUBSEGMENT 1B

DYMER CREEK

Map 2

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

SHORELANDS TYPE
FASTLAND: Low shore 99% (19.6 mi.) and low shore with bluff 1% (0.1 mi.).
SHORE: Artificially stabilized 4% (0.8 mi.), beach 4% (0.8 mi.), fringe marsh 91% (18.4 mi.), and embayed marsh 1% (0.1 mi.).
NEARSHORE: Narrow 17% and wide 1%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

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

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

WATER QUALITY: In the past, the upper portion of Dymer Creek did not meet 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards.

This was due to the discharge of domestic waste from the Town of Kilmarnock. The Sewage Treatment Plant, installed in April 1975, has eliminated most of these problems. Although this upper region is still closed to the taking of shellfish, it, along with the rest of the creek, does meet 305(b)(1)(B) criteria.

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

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

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

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

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

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

PHOTOS: Aerial-VIMS 1Feb77 LN-1B/896-1008.

SUBSEGMENT 1C

TABBS CREEK

Maps 2 and 3

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

SHORELANDS TYPE
FASTLAND: Artificial fill 1% (0.1 mi.), low shore 96% (11.7 mi.), and low shore with bluff 3% (0.5 mi.).
SHORE: Artificially stabilized 6% (0.7 mi.), beach 20% (2.5 mi.), fringe marsh 72% (8.6 mi.), and embayed marsh 2% (0.2 mi.).
NEARSHORE: Narrow 9% and intermediate 20%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

ZONING: Residential.

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

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

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

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

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

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

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

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

PHOTOS: Aerial-VIMS 1Feb77 LN-1C/805; 824-887;
27Apr76 LN-1C/806-823; 888-894.

SUBSEGMENT 1D

ANTIPOISON CREEK

Map 3

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

SHORELANDS TYPE
FASTLAND: Entirely low shore.
SHORE: Artificially stabilized 3% (0.4 mi.), beach 3% (0.3 mi.), and fringe marsh 94% (11.0 mi.).
NEARSHORE: Antipoison Creek has average depths of 6 to 8 feet.

SHORELANDS USE
FASTLAND: Agricultural 56% (6.6 mi.), commercial 3% (0.3 mi.), residential 21% (2.4 mi.), and unmanaged, wooded 20% (2.4 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Fishing, shellfishing, boating, and other water sports.

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

OWNERSHIP: Private.

ZONING: Residential and commercial.

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

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

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

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

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

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

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

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

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

PHOTOS: Aerial-VIMS 1Feb77 LN-1D/720-804.

SUBSEGMENT 2A

FLEETS ISLAND

Map 3

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

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

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

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

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. From North Point to the Windmill Point Marina, the shoreline has experienced an average historical erosion rate of 2.9 to 7.9 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: Between North Point and Windmill Point there is one section of wooden bulkhead which is protecting a house, and two areas of riprap. Numerous attempts have been made to protect this area with groins. However, most of the groins have been flanked. Windmill Point Marina is almost totally bulkheaded and has a jetty on either side of its entrance channel. From the marina to the end of the subsegment there are numerous wooden and riprap groins, most of which are doing an effective job of trapping sand.

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), FLEETS BAY Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964.
NOS# 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.

PHOTOS: Aerial-VIMS 23Jan76 LN-2A/661-672;
27Apr76 LN-2A/673-718;
1Feb77 LN-2A/719.

SUBSEGMENT 2B

WINDMILL POINT CREEK TO MOSQUITO POINT

Map 3

EXTENT: 107,900 feet (20.4 mi.) of shoreline from the mouth of Windmill Point Creek to Mosquito Point, including Windmill Point Creek, Little Oyster Creek and Mosquito Creek. Also included in this shoreline measurement are the Mosquito Islands which comprise 24,000 feet (4.5 mi.) of shoreline. This subsegment also contains 85,100 feet (16.1 mi.) of fastland.

SHORELANDS TYPE

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

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

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

SHORELANDS USE

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

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

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

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

OWNERSHIP: Private.

ZONING: Residential and agricultural.

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

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

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

PRESENT SHORE EROSION SITUATION

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

ENDANGERED STRUCTURES: None.

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

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), FLEETS BAY Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964.
NOS# 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.

PHOTOS: Aerial-VIMS 23Jan76 LN-2B/632-649; 655-660;
24Sep75 LN-2B/650-654.

SUBSEGMENT 3A

MOSQUITO POINT TO CRAB POINT

Maps 3, 4, and 5

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

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

SHORELANDS USE
FASTLAND: Agricultural 21% (2.0 mi.), commercial 1% (0.1 mi.), residential 14% (1.4 mi.), unmanaged, wooded 4% (0.4 mi.), and unmanaged, unwooded 60% (5.8 mi.).
SHORE: Some private recreational use, but mostly unused.
NEARSHORE: Commercial and sport boating, fishing, shellfishing, and other water related activities.

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

OWNERSHIP: Private.

ZONING: Residential and commercial.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to moderate, noncritical. The average historical erosion rate has been 1.5 to 1.7 feet per year along White Stone Beach and Cherry Point, and southeast of Crab Point.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 4,000 feet of protective structures along the shoreline in this subsegment. Between Mosquito Point and White Stone Beach, there is a groin field that has done an excellent job of trapping sand. The groins at White Stone Beach are of moderate effectiveness. Between Cherry Point and the bridge, another groin field is doing a very good job of catching sand. A concrete bulkhead at the base of the bridge is retaining fill. There are many groins in the rest of the subsegment. The first section to the north of the bridge is trapping sand, though the rest are relatively ineffective. There is a jetty at Crab Point.

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), DELTAVILLE Quadr., 1964;
USGS, 7.5 Min.Ser. (Topo.), WILTON Quadr., 1964;
USGS, 7.5 Min.Ser. (Topo.), IRVINGTON Quadr., 1968.
NOS# 12235 (534), 1:40,000 scale, RAPPAHANNOCK RIVER ENTRANCE, VA, 16th ed., 1975.

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

SUBSEGMENT 3B

CARTER CREEK

Map 5

EXTENT: 117,100 feet (22.2 mi.) of shoreline along Carter Creek, including all of its tributaries. The subsegment contains a fastland measurement of 123,100 feet (23.3 mi.).

SHORELANDS TYPE
FASTLAND: Artificial fill 2% (0.4 mi.), low shore 20% (4.7 mi.), low shore with bluff 8% (1.9 mi.), moderately low shore 24% (5.6 mi.), and moderately low shore with bluff 46% (10.7 mi.).
SHORE: Artificially stabilized 9% (1.9 mi.), beach 3% (0.6 mi.), fringe marsh 83% (18.4 mi.), and embayed marsh 5% (1.2 mi.).
NEARSHORE: Narrow 9%. The rest of the shoreline in this subsegment is located along the many tributaries to Carter Creek, which are too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

ZONING: Residential and commercial.

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

WATER QUALITY: Unsatisfactory. Carter Creek does not meet either the State Water Control Board's 305(b)(1)(B) criteria or the Bureau of Shellfish Sanitation standards. The creek has been

degraded by numerous sources including marinas and heavy boating activity, individual dwellings with faulty septic tank drain fields, two privately owned sewage treatment plants discharging into the creek, and many oyster shucking houses.

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical (1.1 feet per year) around Weems. Slight or no change for the rest of the subsegment.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are many sections of bulkhead along the creek mainly for retaining fill or for cosmetic purposes.

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

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

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

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

PHOTOS: Aerial-VIMS 5Aug76 LN-3B/484-485; 502-527;
1Feb77 LN-3B/486-501; 528-570;
17Feb77 LN-3B/571-590.

SUBSEGMENT 3C

MOUTH OF CORROTOMAN RIVER

Map 5

EXTENT: 16,400 feet (3.1 mi.) of shoreline along the Rappahannock River from Weems to Corrotoman Point. This subsegment includes 17,900 feet (3.4 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 56% (1.9 mi.) and low shore with bluff 44% (1.5 mi.).
SHORE: Artificially stabilized 13% (0.4 mi.), beach 14% (0.4 mi.), fringe marsh 70% (2.2 mi.), and embayed marsh 3% (0.1 mi.).
NEARSHORE: Narrow 50% and intermediate 28%. The rest of the shoreline is located along the creeks north of Wharton Grove Camp, which are too narrow and shallow for classification.

SHORELANDS USE
FASTLAND: Agricultural 18% (0.6 mi.), residential 49% (1.7 mi.), and unmanaged, wooded 33% (1.1 mi.).
SHORE: Mostly private recreational and agricultural use.
NEARSHORE: Sport boating, fishing, shellfishing, and other water sports.

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

OWNERSHIP: Private.

ZONING: Residential and agricultural.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the small creeks in the subsegment. Moderate, noncritical for the rest of the subsegment, with an average historical erosion rate of 1.2 to 1.6 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 2,000 feet of artificial stabilization in this subsegment, the sections of riprap and bulkhead are doing an effective job of stabilizing the shoreline. However, the section of bulkhead at Orchard Point is being flanked. There are also three ineffective groin fields in the subsegment.

OTHER SHORE STRUCTURES: Piers, some with boat houses.

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

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

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

PHOTOS: Aerial-VIMS 5Aug76 LN-3C/462-483.

SUBSEGMENT 4A

CORROTOMAN RIVER

Maps 5 and 6

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

SHORELANDS TYPE
FASTLAND: Low shore 49% (7.8 mi.), low shore with bluff 14% (2.1 mi.), and moderately low shore 37% (5.8 mi.).
SHORE: Artificially stabilized 3% (0.4 mi.), beach 2% (0.3 mi.), fringe marsh 83% (11.9 mi.), and embayed marsh 12% (1.7 mi.).
NEARSHORE: Narrow 10% and intermediate 11%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

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

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends basically S - N. Fetches at Corrotoman Point are SW - 3½ nautical miles and SE - 3½ nautical miles.

OWNERSHIP: Private.

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

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change to severe, noncritical. The area experiencing the greatest erosion has been the shoreline between Taylor and Moran Creeks, which has an average historical retreat of 5.1 feet per year. However most of this area has now been stabilized. Slight or no change for the shoreline of Taylor and Moran Creeks. The rest of the subsegment has a moderate, noncritical historical erosion rate ranging from 1.7 to 2.7 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 2,000 feet of artificially stabilized shoreline in the subsegment. Most of this is rubble riprap located between Taylor and Moran Creeks. All structures appear to be effective.

OTHER SHORE STRUCTURES: There are several piers in the subsegment, some with boat houses built on them.

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

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

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

PHOTOS: Aerial-VIMS 5Aug76 LN-4A/439-461.

SUBSEGMENT 4B

CORROTOMAN RIVER

Maps 6 and 7

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

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

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

WIND AND SEA EXPOSURE: The shoreline of the Eastern Branch trends basically SW - NE. The fetch at Black Stump Point is SSW - 5¼ nautical miles.

OWNERSHIP: Private.

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

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

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the entire subsegment except around Black Stump Point which is moderate, noncritical (1.7 feet per year).
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 1,500 feet of artificially stabilized shoreline in the subsegment. This consists mainly of wooden bulkhead used for cosmetic purposes. There are also two jetties at West Point.

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

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

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

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

PHOTOS: Aerial-VIMS 17Feb77 LN-4B/321-415;
5Aug76 LN-4B/416-438.

SUBSEGMENT 4C

CORROTOMAN RIVER

Map 7

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

SHORELANDS TYPE
FASTLAND: Low shore 4% (1.6 mi.), low shore with bluff 3% (1.0 mi.), moderately low shore 68% (24.2 mi.), moderately low shore with bluff 16% (5.7 mi.), moderately high shore 6% (2.0 mi.), and moderately high shore with bluff 3% (1.1 mi.).
SHORE: Artificially stabilized <1% (0.1 mi.), beach 7% (2.2 mi.), fringe marsh 67% (21.7 mi.), and embayed marsh 26% (8.5 mi.).
NEARSHORE: Narrow 31%. The remainder of the creek is too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for all the subsegment except moderate, noncritical from Ottoman Wharf to Bar Point which has an average historical erosion rate of 1.0 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There is approximately 700 feet of effective bulkhead along the shoreline in this subsegment.

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

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

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

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

PHOTOS: Aerial-VIMS 5Aug76 LN-4C/180-278;
17Feb77 LN-4C/279-320.

SUBSEGMENT 4D

CORROTOMAN RIVER

Maps 7 and 8

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

SHORELANDS TYPE
FASTLAND: Artificial fill <1% (0.1 mi.), low shore 45% (6.5 mi.), low shore with bluff 1% (0.2 mi.), moderately low shore 50% (7.3 mi.), and moderately low shore with bluff 3% (0.4 mi.).
SHORE: Artificially stabilized 5% (0.7 mi.), beach 17% (2.4 mi.), fringe marsh 77% (10.8 mi.), and embayed marsh 2% (0.3 mi.).
NEARSHORE: Narrow 18% and intermediate 6%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

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

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends basically N - S. Fetches at Ball Point are SSE - 4½ nautical miles and S - 4½ nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Slight or no change for the shoreline from Ball Point to just south of Town Creek. Moderate, noncritical for the rest of the subsegment. The average historical erosion rate has been 1.7 to 1.9 feet per year.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are approximately 4,000 feet of wooden bulkhead in the subsegment, most of which appears to be effective. One groin at the marsh south of Millenbeck is doing a fairly effective job of catching sand.

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

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

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

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

PHOTOS: Aerial-VIMS 5Aug76 LN-4D/145-179.

SUBSEGMENT 5A

WHITEHOUSE CREEK

Map 8

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

SHORELANDS TYPE
FASTLAND: Low shore 91% (10.7 mi.) and moderately low shore 9% (1.1 mi.).
SHORE: Artificially stabilized 4% (0.4 mi.), beach 2% (0.3 mi.), fringe marsh 77% (8.8 mi.), and embayed marsh 17% (1.9 mi.).
NEARSHORE: Narrow 11%. The rest of the shoreline is located in Whitehouse Creek which is too narrow and shallow for classification.

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

WIND AND SEA EXPOSURE: The shoreline along Whitehouse Creek trends basically E - W. The shoreline between Whitehouse Creek and Towles Point trends NE - SW. Fetches at Towles Point are SE - 2¼ nautical miles, SW - 3 nautical miles, and S - 1½ nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

PRESENT SHORE EROSION SITUATION
EROSION RATE: Moderate, noncritical (1.5 feet per year) for the area from the mouth of Whitehouse Creek to Towles Point. Slight or no change for the rest of the subsegment.
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are six groins to the south of the mouth of Whitehouse Creek. These are made of culverts, and have caught a little sand but are now being flanked. In Whitehouse Creek there are several sections of bulkhead mostly used for retaining fill.

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

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

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

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

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

SUBSEGMENT 5B

TOWLES POINT TO BELMONT CREEK

Maps 8, 9, and 10

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

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

SHORELANDS USE
FASTLAND: Agricultural 11% (1.8 mi.), residential 23% (3.5 mi.), unmanaged, wooded 55% (8.4 mi.), and unmanaged, unwooded 11% (1.7 mi.).
SHORE: Private recreation including bathing along the beaches and waterfowl hunting in the marshes.
NEARSHORE: Commercial and sport boating, fishing, shellfishing, and other water related activities.

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends first SE - NW and then S - N. Fetches at Rogue Point are S - 3 nautical miles, W - 1½ nautical miles, and NNW - 10 nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

FLOOD HAZARD: High, noncritical for the shoreline from Towles Point to Beach Creek and for the marsh areas. High, critical for around Beach Creek. Low, noncritical for the rest of the subsegment as most of it is fronted by at least 5 to 10-foot bluffs.

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

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

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

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

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

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

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

PHOTOS: Aerial-VIMS 23Jan76 LN-5B/80-121.

SUBSEGMENT 6A

ROCKY NECK

Map 10

EXTENT: 47,800 feet (9.0 mi.) of shoreline along the Rappahannock River from Belmont Creek to Midway Creek, including Belmont, Greenvale and Midway Creeks. This subsegment also contains 65,600 feet (12.4 mi.) of fastland.

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

SHORELANDS USE
FASTLAND: Agricultural 15% (1.9 mi.), commercial 2% (0.2 mi.), residential 35% (4.4 mi.), unmanaged, wooded 44% (5.4 mi.), and unmanaged, unwooded 3% (0.4 mi.).
SHORE: Private recreation including bathing along the beaches and waterfowl hunting in the marshes.
NEARSHORE: Commercial and sport fishing, boating, and shellfishing.

WIND AND SEA EXPOSURE: The shoreline trends SE - NW. Fetches at the end of Route 681 are S - 7 3/4 nautical miles, W - 1½ nautical miles, and WNW - 6½ nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

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

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968.
NOS# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

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

SUBSEGMENT 6B

MIDWAY CREEK TO DEEP CREEK

Maps 10 and 11

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

SHORELANDS TYPE
FASTLAND: Low shore 79% (4.2 mi.) and moderately low shore 21% (1.1 mi.).
SHORE: Artificially stabilized 28% (1.4 mi.), beach 12% (0.6 mi.), fringe marsh 37% (1.9 mi.), and embayed marsh 24% (1.2 mi.).
NEARSHORE: Narrow 14% and intermediate 32%. The rest of the shoreline is located in creeks which are too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

BEACH QUALITY: Fair. Most of the shoreline is fronted by thin, strip beaches. At the mouth

of the creek to the southeast of Deep Creek, there is a relatively wide, clean sand beach.

PRESENT SHORE EROSION SITUATION
EROSION RATE: Historically the average erosion rate has been slight or no change to moderate, noncritical (1.3 to 2.9 feet per year). However, only the unprotected areas now seem to be experiencing erosion. There are also three areas experiencing accretion. These are the sandspit at the mouth of Deep Creek (0.9 feet per year), the mouth of the creek southeast of Deep Creek (2.1 feet per year), and around Midway Creek (1.6 feet per year).
ENDANGERED STRUCTURES: None.
SHORE PROTECTIVE STRUCTURES: There are numerous protective structures in this subsegment, most of which are doing a good job of stabilizing the shore. Wooden bulkhead and riprap, often used in conjunction with groins, are the most common structures.

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), URBANNA Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), LIVELY Quadr., 1968.
NOS# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: Aerial-VIMS 23Jan76 LN-6B/36-51.

SUBSEGMENT 7A

BELLE ISLE

Map 11

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

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

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

WIND AND SEA EXPOSURE: The shoreline of this subsegment trends SE - NW. Fetches at Belle Isle are SE - 12 nautical miles, W - 3 nautical miles, and WNW - 6½ nautical miles.

OWNERSHIP: Private.

ZONING: Agricultural and residential.

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

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

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

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

OTHER SHORE STRUCTURES: There are a few piers along Deep Creek and Mulberry Creek.

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), LIVELY Quadr., 1968.
NOS# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

PHOTOS: Aerial-VIMS 23Jan76 LN-7A/12-35.

SUBSEGMENT 7B

LANCASTER CREEK

Maps 11 and 12

EXTENT: 60,000 feet (11.4 mi.) of shoreline from Mulberry Creek along the Rappahannock to the headwaters of Lancaster Creek. This subsegment includes 70,000 feet (13.3 mi.) of fastland.

SHORELANDS TYPE
FASTLAND: Low shore 48% (6.3 mi.) and moderately low shore 52% (6.9 mi.).
SHORE: Artificially stabilized 6% (0.7 mi.), beach 3% (0.4 mi.), fringe marsh 38% (4.3 mi.), embayed marsh 51% (5.8 mi.), and extensive marsh 2% (0.2 mi.).
NEARSHORE: Intermediate 2% and wide 7%. The rest of the shoreline is located in Lancaster Creek which is too narrow and shallow for classification.

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

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

OWNERSHIP: Private.

ZONING: Residential and agricultural.

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

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

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

PRESENT SHORE EROSION SITUATION

EROSION RATE: Slight or no change to severe, noncritical. The Morattico area has experienced an average historical erosion rate of 3.1 to 4.4 feet per year. However, most of this area has now been artificially stabilized.

ENDANGERED STRUCTURES: None.

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

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

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

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

MAPS: USGS, 7.5 Min.Ser. (Topo.), LIVELY Quadr., 1968;
USGS, 7.5 Min.Ser. (Topo.), MORATTICO Quadr., 1968.
NOS# 12237 (605-SC), 1:40,000 scale, RAPPAHANNOCK RIVER, Corrotoman River to Fredericksburg, VA, 12th ed., 1975.

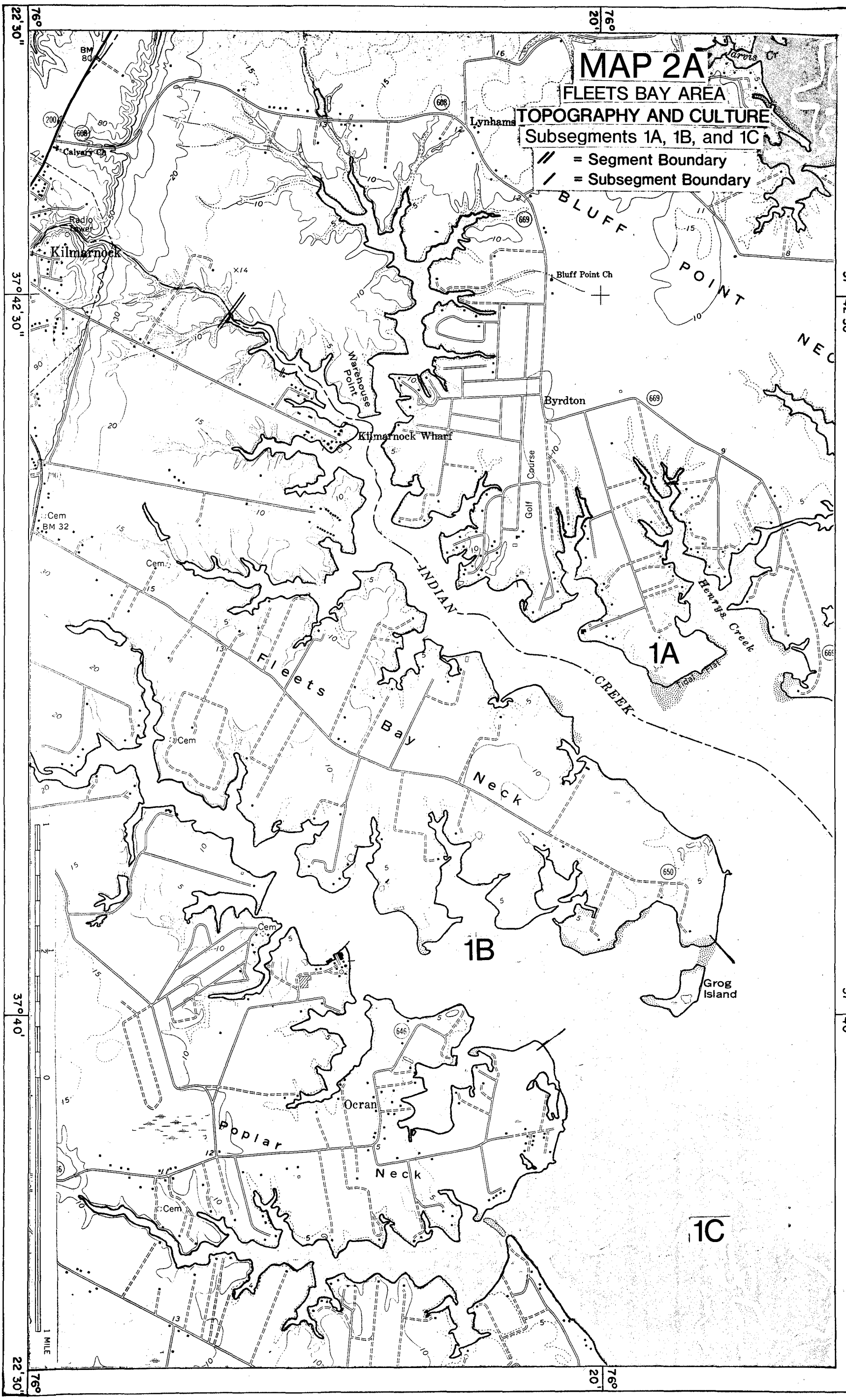
PHOTOS: Aerial-VIMS 23Jan76 LN-7B/1-11.

MAP 2A

FLEETS BAY AREA
TOPOGRAPHY AND CULTURE
Subsegments 1A, 1B, and 1C

// = Segment Boundary

/ = Subsegment Boundary



MAP 2B

FLEETS BAY AREA
SHORELANDS TYPES
Subsegments 1A, 1B, and 1C

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

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

NEARSHORE
- Narrow
- Intermediate

1A

1B

1C

Kilmarnock

Kilmarnock Wharf

Warehouse Point

Lynhams

Calvary Ch

Radio Tower

Golf Course

Henrys Creek

Tidal Flat

INDIAN CREEK

Fleets Bay Neck

Poplar Neck

Ocran

Grog Island

Cem

BM 80

BM 32

608

656

1 MILE

76° 22'30"

76° 20'

37° 42'30"

37° 40'

MAP 2C

FLEETS BAY AREA

FASTLAND USE, OWNERSHIP, EROSION

Subsegments 1A, 1B, and 1C

USE

Agricultural	A
Industrial	I
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W

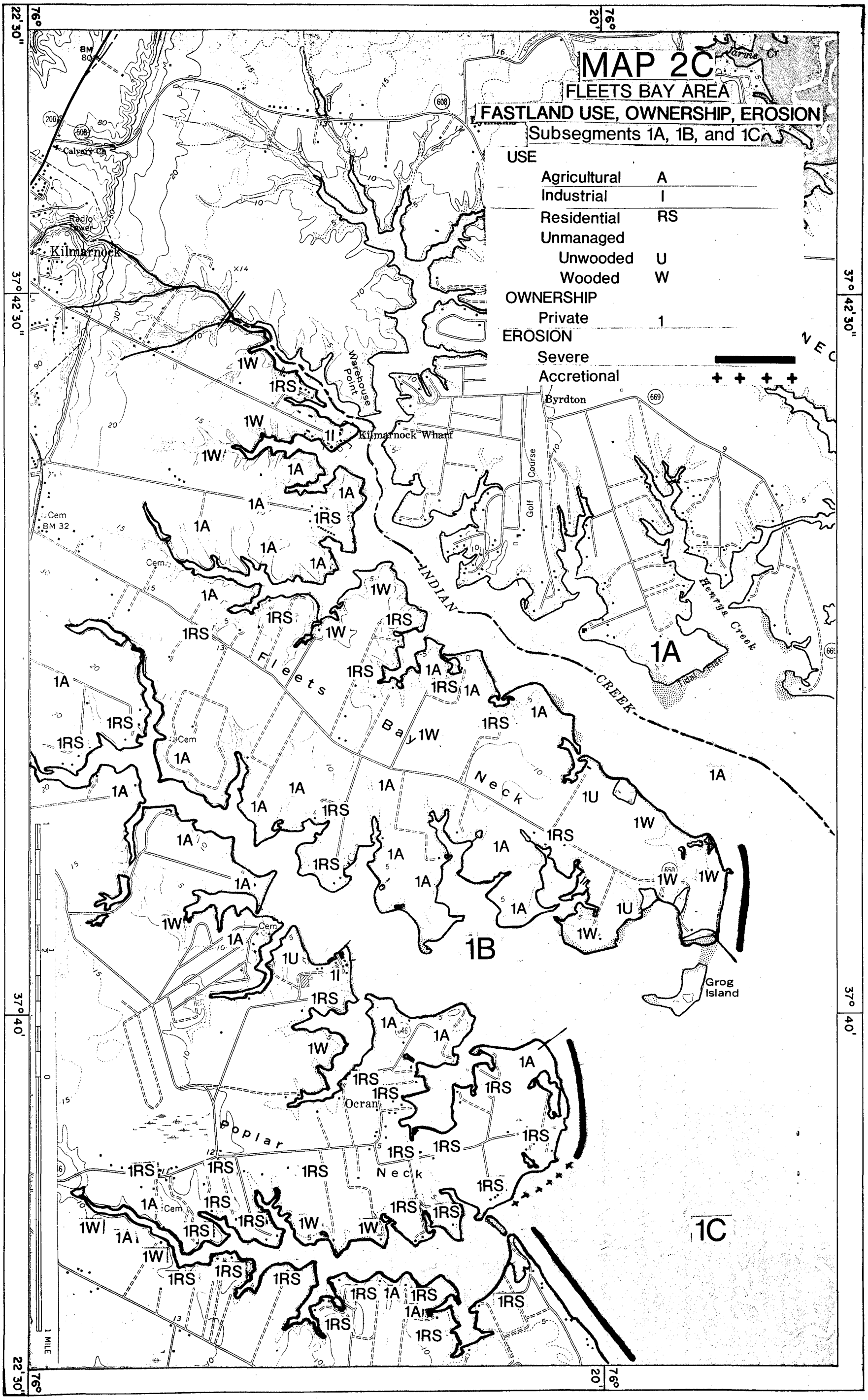
OWNERSHIP

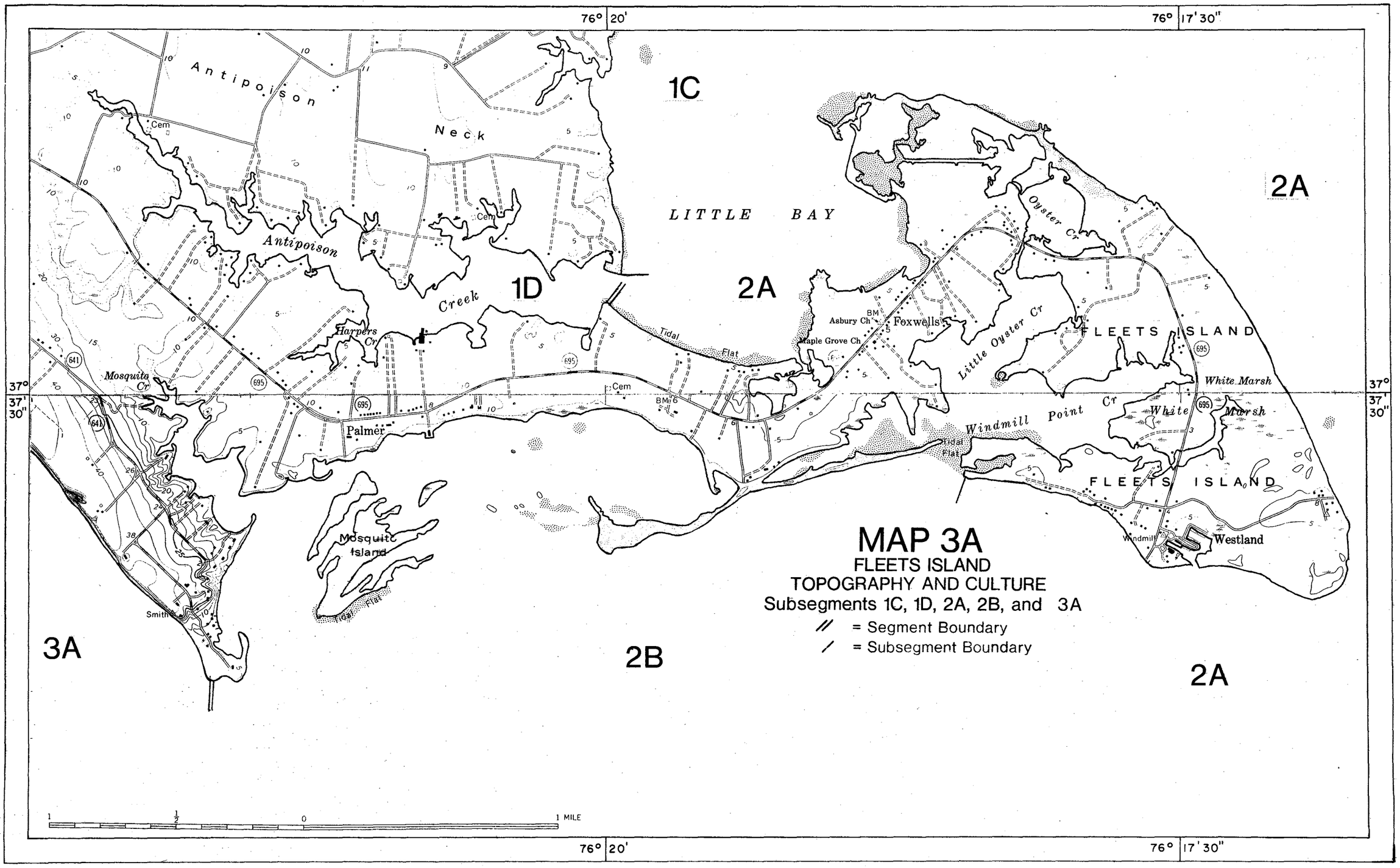
Private	1

EROSION

Severe

Accretional



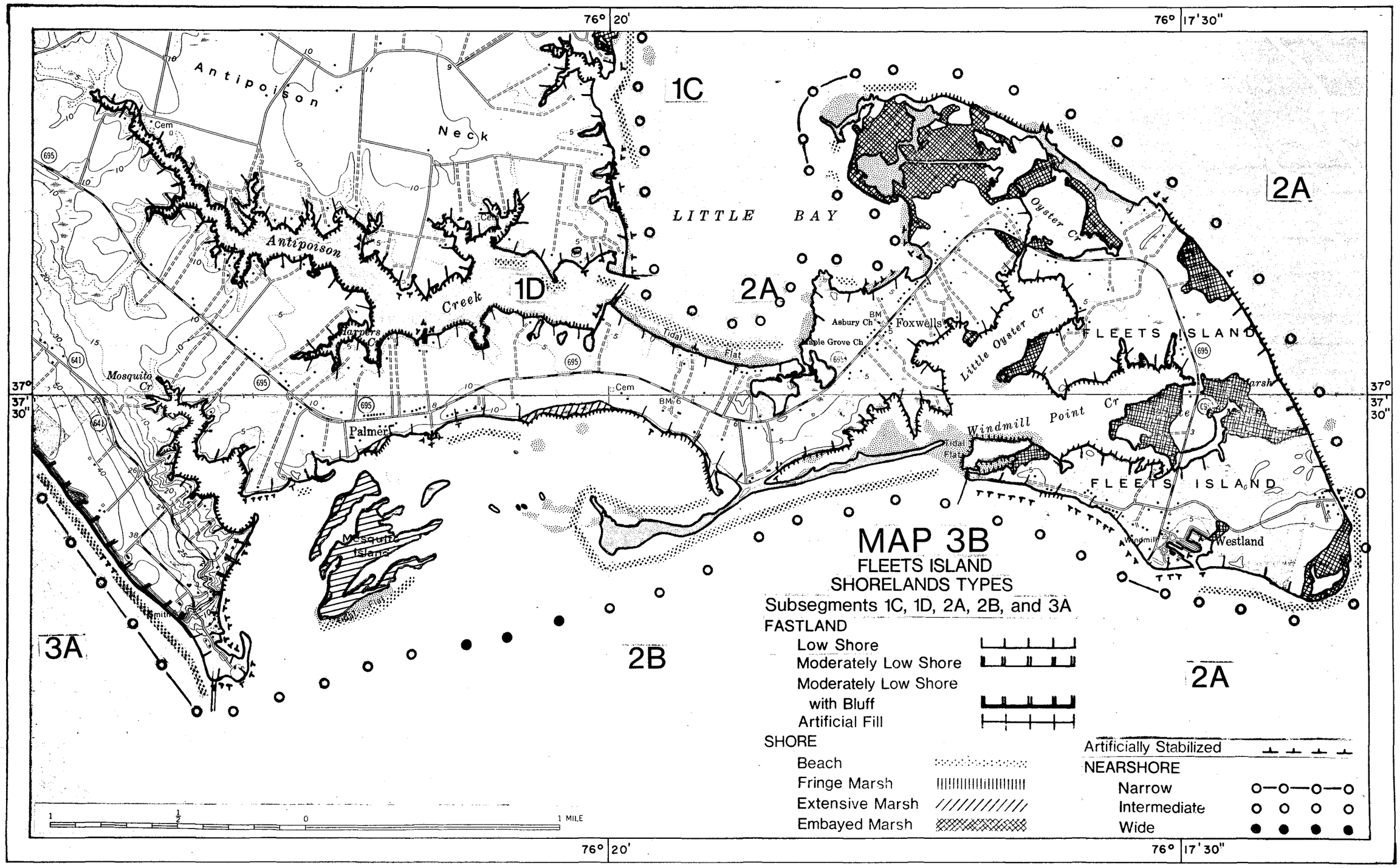


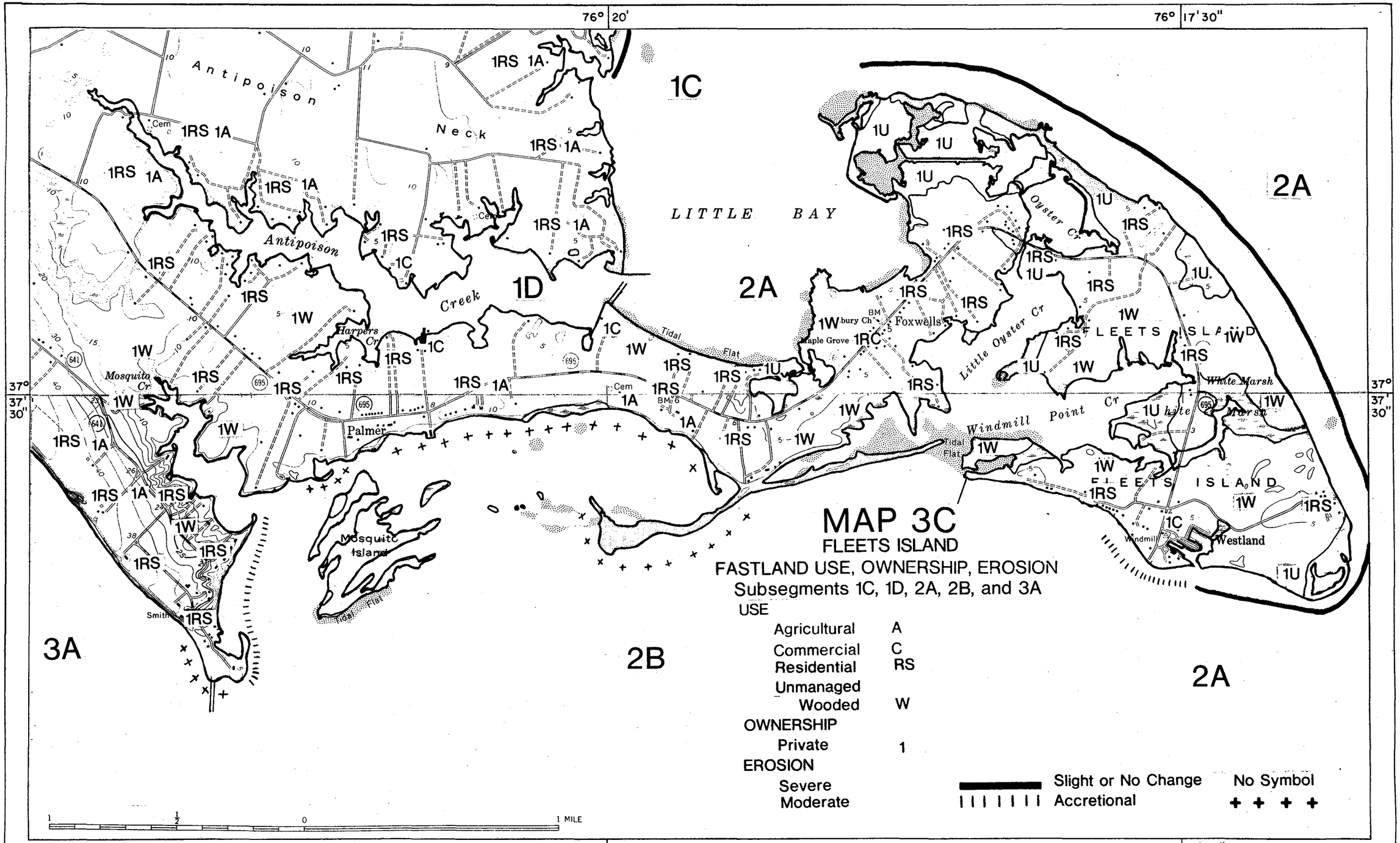
MAP 3A

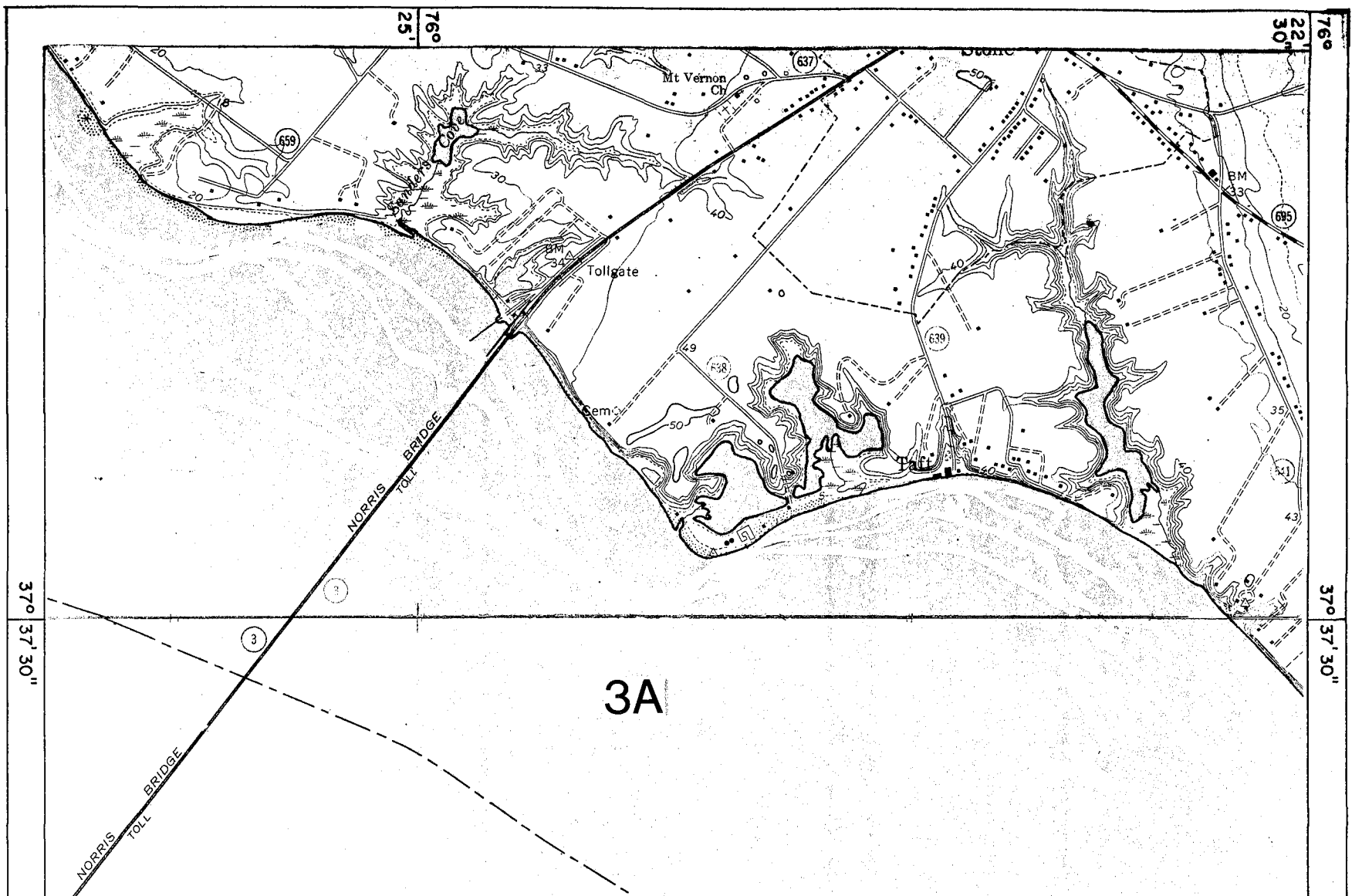
FLEETS ISLAND
TOPOGRAPHY AND CULTURE
Subsegments 1C, 1D, 2A, 2B, and 3A

// = Segment Boundary

/ = Subsegment Boundary


76° 20'
76° 17'30"
37°
37' 30"
Antipoison Neck
Antipoison Creek
Harpers Cr
Mosquito Cr
Palmer
Mosquito Islands
LITTLE BAY
Tidal Flat
Asbury Ch
Foxwells
Maple Grove Ch
Oyster Cr
Little Oyster Cr
FLEETS ISLAND
Windmill Point Cr
Marsh
Windmill
Westland
Cem
BM
1C
1D
2A
2B
3A
MAP 3B
FLEETS ISLAND
SHORELANDS TYPES
Subsegments 1C, 1D, 2A, 2B, and 3A
FASTLAND
Low Shore
Moderately Low Shore
Moderately Low Shore with Bluff
Artificial Fill
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Narrow
Intermediate
Wide
1 0 1 MILE


76° 20'
76° 17' 30"
37° 30"
37°
Antipoison Neck
LITTLE BAY
Antipoison Creek
Harpers Cr
Mosquito Cr
Palmer
Mosquito Island
Smith
Tidal Flat
Foxwells
Maple Grove
Little Oyster Cr
Oyster Cr
Windmill Point
White Marsh
FLEETS ISLAND
Windmill
Westland
1C
1D
2A
2B
3A
1RS 1A
1RS
1W
1U
1RC
1A
MAP 3C
FLEETS ISLAND
FASTLAND USE, OWNERSHIP, EROSION
Subsegments 1C, 1D, 2A, 2B, and 3A
USE
Agricultural A
Commercial C
Residential RS
Unmanaged Wooded W
OWNERSHIP
Private 1
EROSION
Severe
Moderate
Slight or No Change
Accretional
No Symbol
1 0 1 MILE



MAP 4A

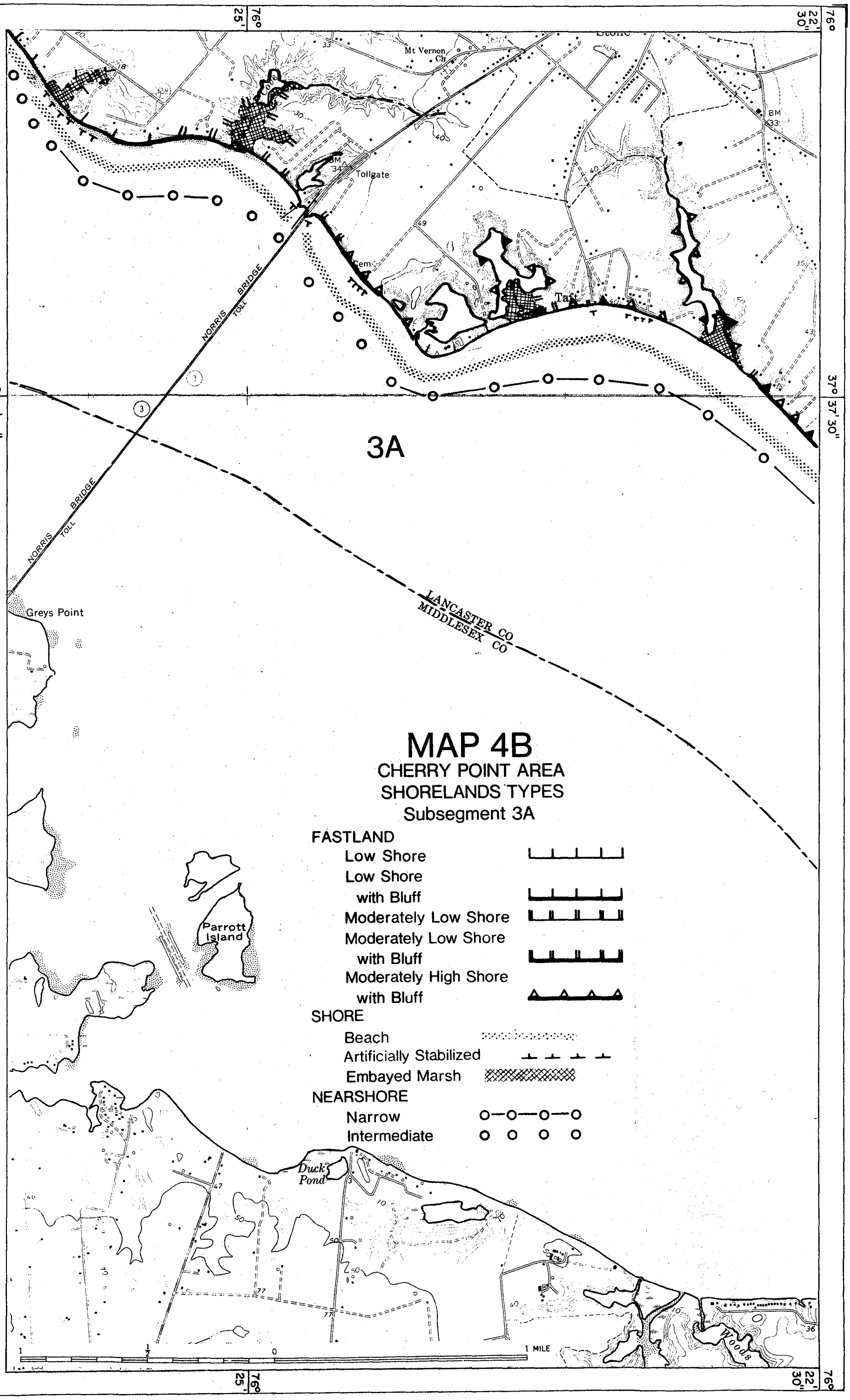
CHERRY POINT AREA
TOPOGRAPHY AND CULTURE
Subsegment 3A

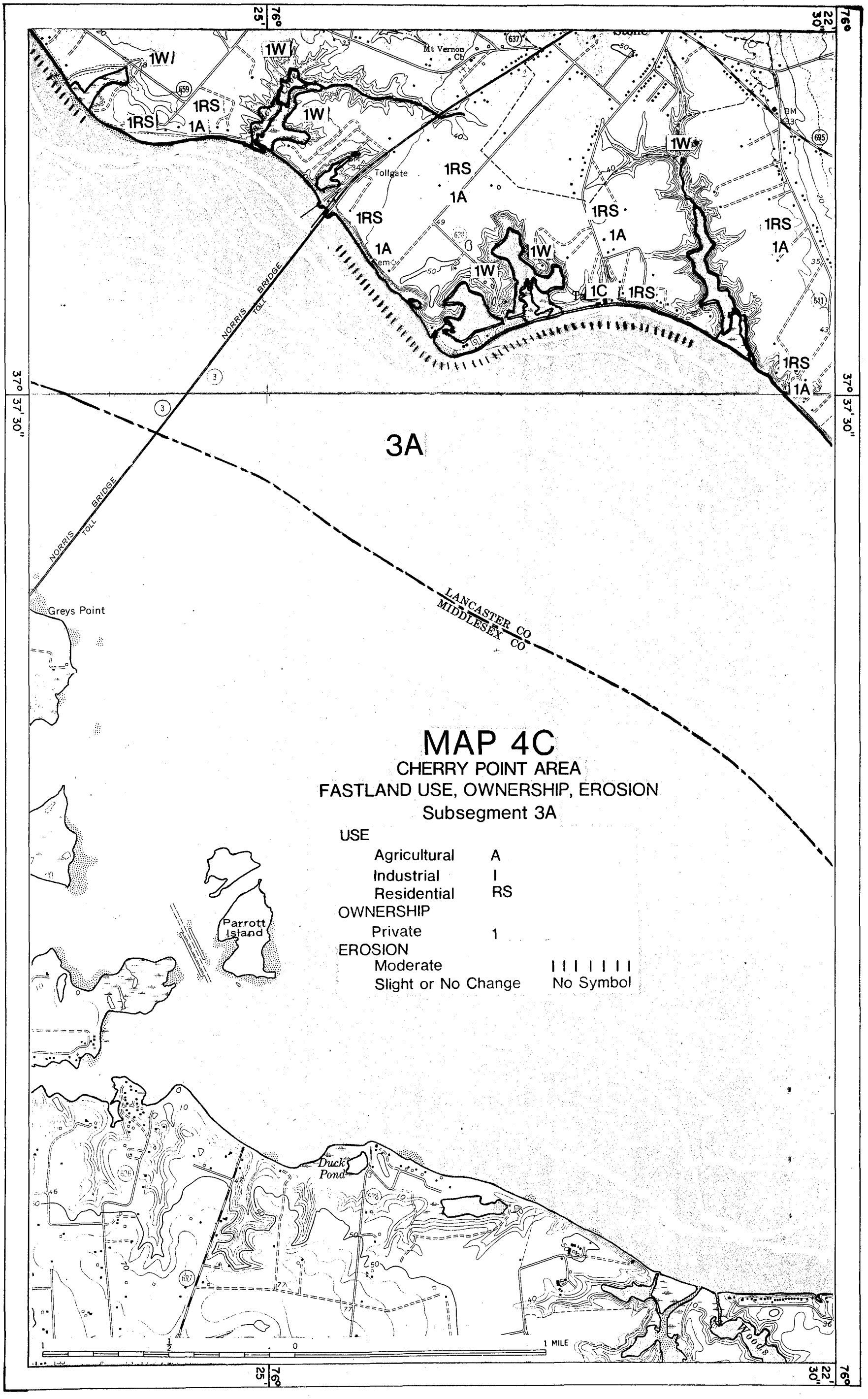
// = Segment Boundary

/ = Subsegment Boundary

MAP 4B

CHERRY POINT AREA
SHORELANDS TYPES
Subsegment 3A





MAP 4C

CHERRY POINT AREA
FASTLAND USE, OWNERSHIP, EROSION
Subsegment 3A

USE	
Agricultural	A
Industrial	I
Residential	RS
OWNERSHIP	
Private	1
EROSION	
Moderate	| | | | | | |
Slight or No Change	No Symbol

MAP 5A

CARTER CREEK

TOPOGRAPHY AND CULTURE

Subsegments 3A, 3B, 3C and 4A

// = Segment Boundary

/ = Subsegment Boundary

4A

3C

3B

3A

76° 27'30"

76° 25'

37° 40'

RIVER

Taylor Creek

Tidal Flat

Landing Strip

Claybrook Ch

BM 23

Corrotoman Point

John Neck

Golf Course

North Weems

Carter Cove

Wharton Grove Camp

Campbell Memorial Ch

BM 19

Cem

Weems

Tidal Flat

Yopps Cove

Jones Cove and Dead Creek

Galley Hook Point

Bridge Cove

West Irvington

Irvington

Chesapeake Academy

Sharon Ch

BM 48

Mt Jean Sch

Christ Church

Historic Site

Cem

BM 30

Pitmans Corner

Golf Course

Sandpits

Sandpits

Old Mill Cove

Drumon Cove

Sams Cove

Carrell Cove

James Cove

Jacks Cove

White Stone Ch

BM 43

BM 47

White

St Johns Ch

Dent Mill

1 0 1 MILE

MAP 5B

CARTER CREEK

SHORELANDS TYPES

Subsegments 3A, 3B, 3C, and 4A

FASTLAND

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

SHORE

- Beach
- Fringe Marsh
- Artificially Stabilized
- Embayed Marsh

NEARSHORE

- Narrow
- Intermediate

76° 27'30" 76° 25' 37° 40'

4A 3C 3B 3A

Taylor Creek · Carter Cove · Yopps Cove · Ford and Creek

Corrotoman · John Neck · North Weems · Weems · Irvington · Pitmans Corner · Christ Church · Golf Course · Landing Strip · Claybrook Ch · Campbell Memorial Ch · Galley Hook Point · Chesapeake Academy · White Stone · White · Sandpits · Mt Jean Sch · Sharon Ch · BM 23 · BM 30 · BM 19 · BM 43 · BM 47

1 MILE

MAP 5C

CARTER CREEK

FASTLAND USE, OWNERSHIP, EROSION

Subsegments 3A, 3B, 3C, and 4A

USE	
Agricultural	A
Commercial	C
Residential	RS
Unmanaged Wooded	W
OWNERSHIP	
Private	1
EROSION	
Severe	
Moderate	

76° 27'30"

76° 25'

37° 40'

RIVER

4A

3C

3B

3A

Taylor Creek

Carter Cove

Bones and Dead Creek

Yopps Cove

Jacks Cove

James Cove

Old Mill Cove

Dunlop Cove

Current Cove

Storms Cove

Bridge Cove

Corrotoman Point

Tiger Landing Strip

Claybrook Ch

BM 23

Golf Course

John Neck

North

Christ Church

Historic Site

Cem

BM 30

Mt Jean Sch

Sharon Ch

BM 48

Pitmans Corner

Sandpits

Irvington

West Irvington

Chesapeake Academy

White Stone Ch

BM 43

BM 47

White

Wharton Cem

Campbell Memorial Ch

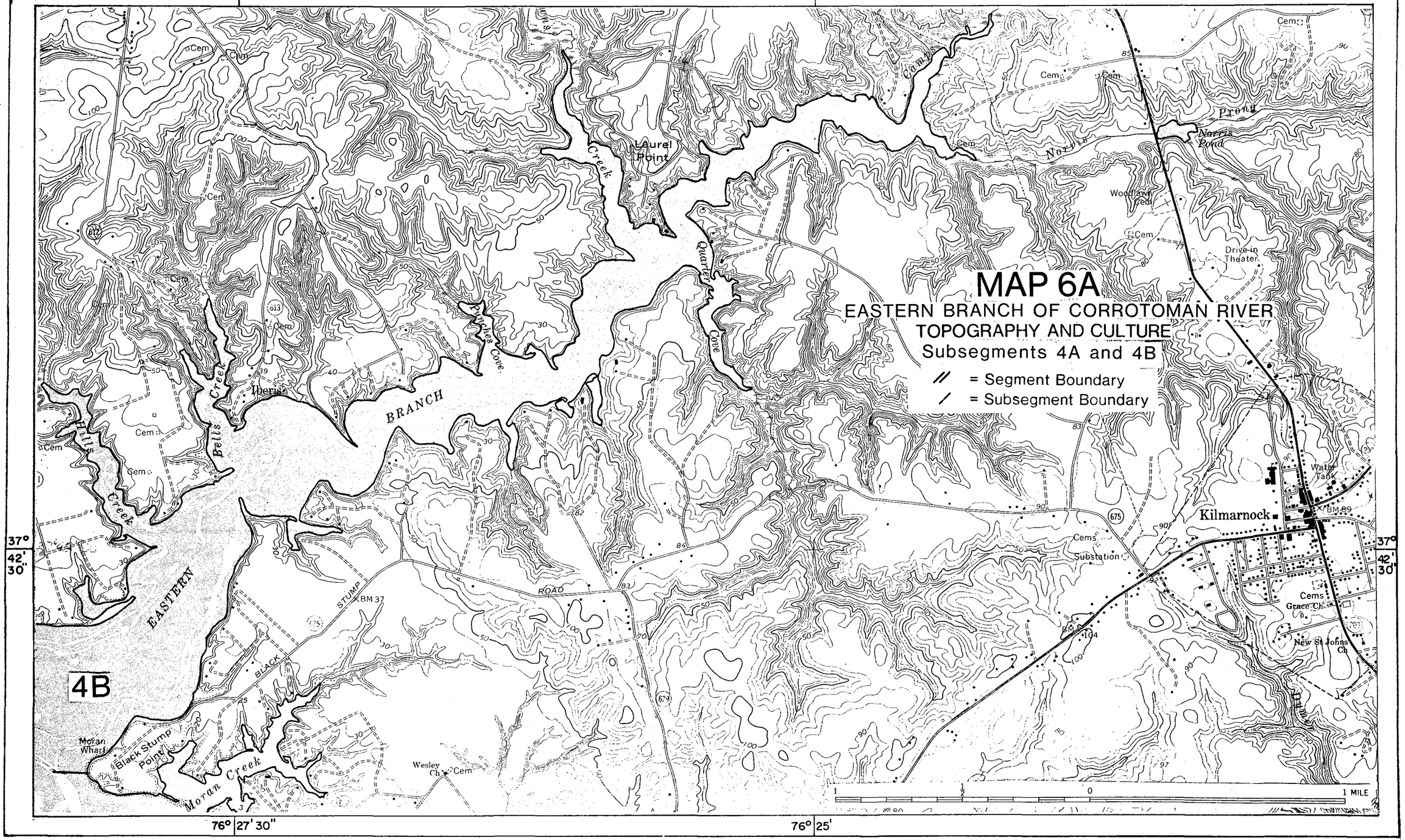
BM 19

Cem

Weems

Galley Hook Point

1 MILE


76° 27' 30"
76° 25'
37° 42' 30"
MAP 6A
EASTERN BRANCH OF CORROTOMAN RIVER
TOPOGRAPHY AND CULTURE
Subsegments 4A and 4B
// = Segment Boundary
/ = Subsegment Boundary
4B
Laurel Point
Quarter Cove
Parkers Cove
Bells Creek
Hills Creek
EASTERN BRANCH
STUMP
ROAD
BM 37
BLACK
Black Stump Point
Moran Wharf
Moran Creek
Wesley Ch
Cem
Kilmarnock
Drive-in Theater
Woodland Cem
Norris Pond
Water Tank
BM 89
Cems
Substation
Grace Ch
New St Johns Ch
1 0 1 MILE

MAP 6B

EASTERN BRANCH OF CORROTOMAN RIVER

SHORELANDS TYPES

Subsegments 4A and 4B

FASTLAND

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

SHORE

- Beach
- Fringe Marsh
- Artificially Stabilized
- Embayed Marsh

NEARSHORE

- Narrow

1 ½ 0 1 MILE

4B

76° 27' 30" 76° 25'

37° 42' 30"

MAP 6C

EASTERN BRANCH OF CORROTOMAN RIVER
FASTLAND USE, OWNERSHIP, EROSION
Subsegment 4A and 4B

USE	
Agricultural	A
Residential	RS
Unmanaged Wooded	W
OWNERSHIP	
Private	1
EROSION	
Moderate	

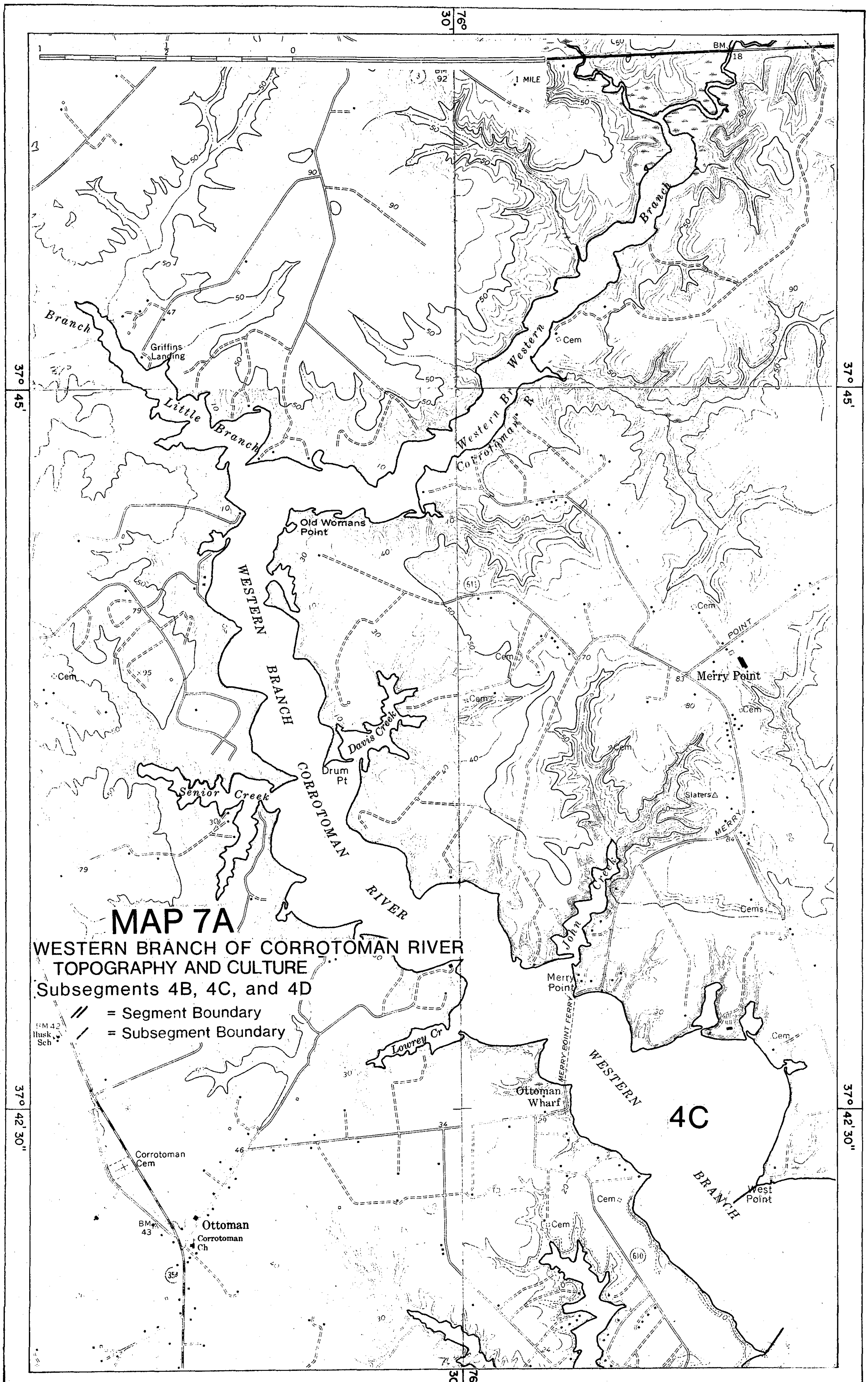
4B

76° 27' 30"

76° 25'

37° 42' 30"

1 ½ 0 1 MILE



MAP 7A
WESTERN BRANCH OF CORROTOMAN RIVER TOPOGRAPHY AND CULTURE
Subsegments 4B, 4C, and 4D

// = Segment Boundary
/ = Subsegment Boundary

MAP 7B

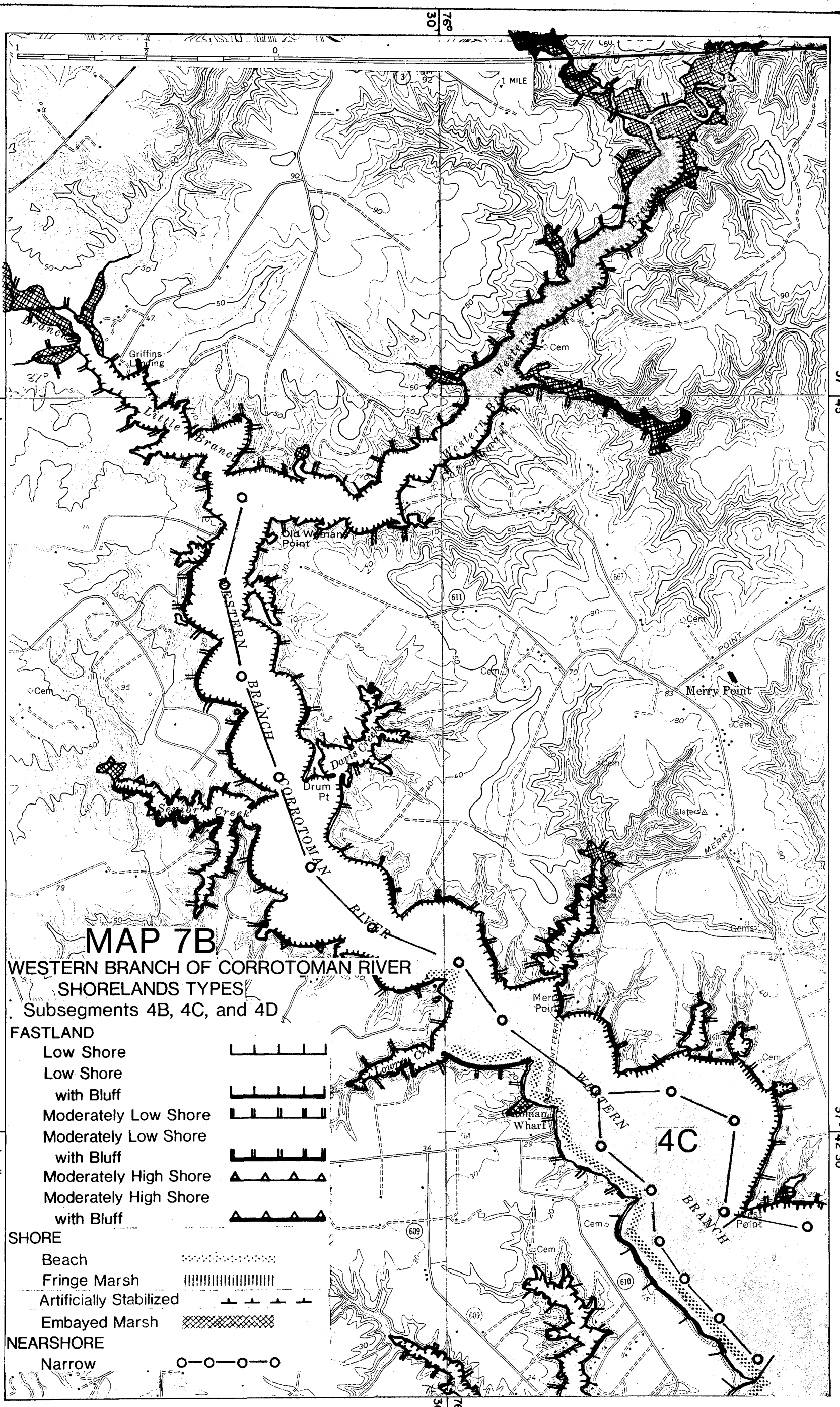
WESTERN BRANCH OF CORROTOMAN RIVER SHORELANDS TYPES

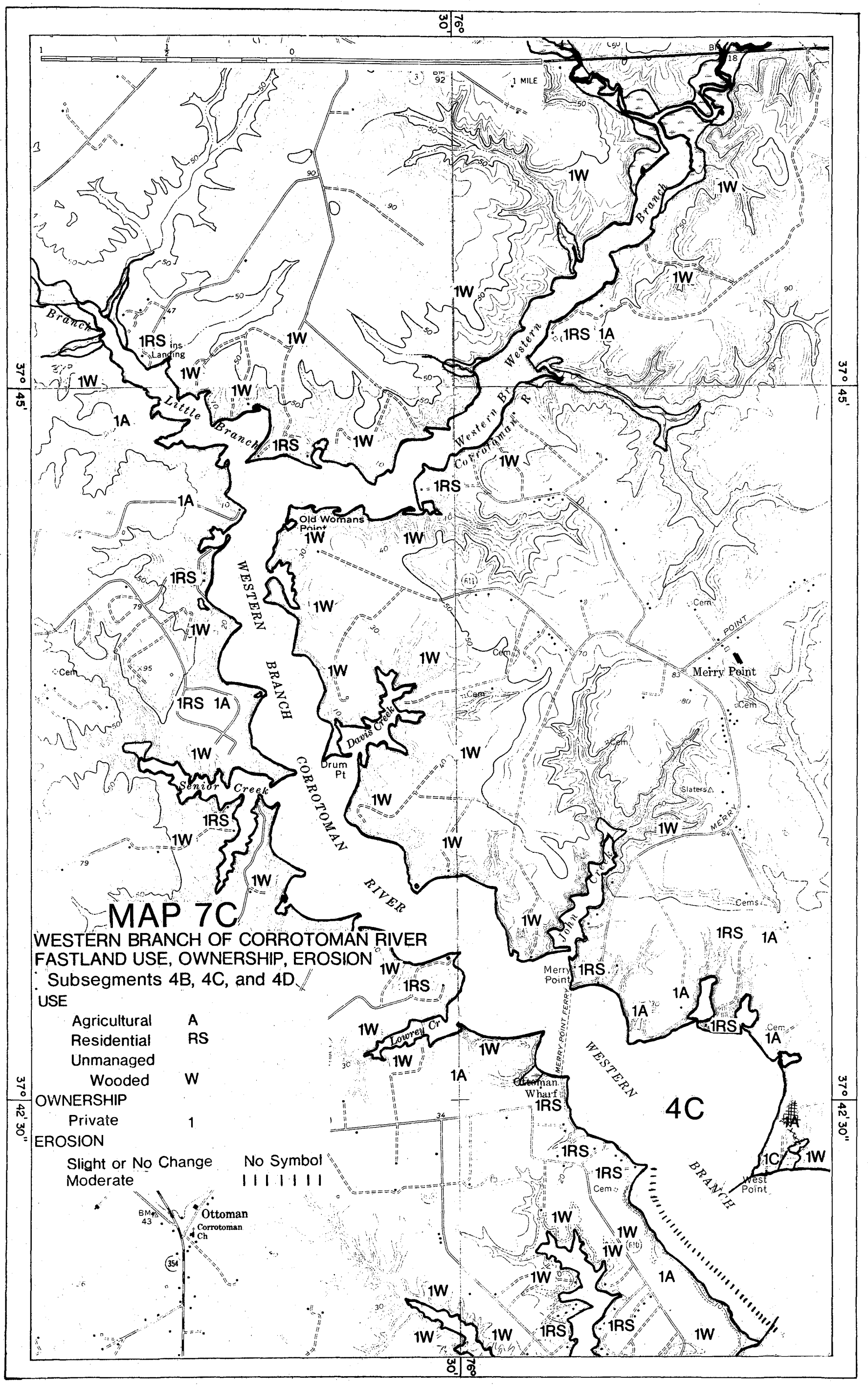
Subsegments 4B, 4C, and 4D

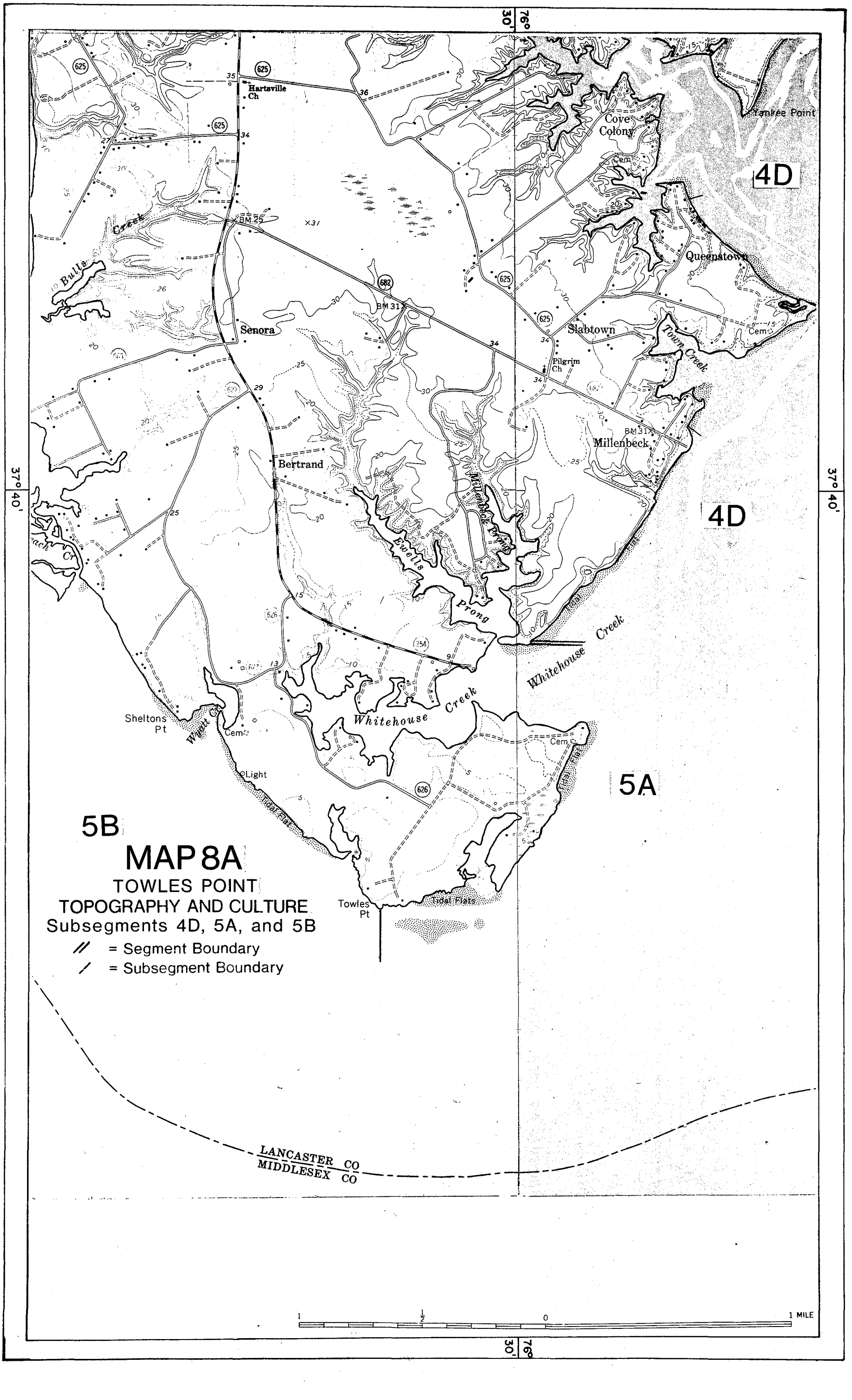
FASTLAND
- Low Shore
- Low Shore with Bluff
- Moderately Low Shore
- Moderately Low Shore with Bluff
- Moderately High Shore
- Moderately High Shore with Bluff

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

NEARSHORE
- Narrow




76° 30'
37° 45'
37° 42' 30"
1 MILE
1W
1RS
1A
1C
4C
Western Branch
Corrotoman R
Little Branch
Old Womans Point
WESTERN BRANCH
CORROTOMAN RIVER
Davis Creek
Drum Pt
Senior Creek
Merry Point
MERRY POINT FERRY
Lowrey Cr
John Cr
Ottoman Wharf
West Point
POINT
Cem
Cems
Slaters
Ottoman
Corrotoman Ch
MAP 7C
WESTERN BRANCH OF CORROTOMAN RIVER
FASTLAND USE, OWNERSHIP, EROSION
Subsegments 4B, 4C, and 4D
USE
Agricultural A
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
EROSION
Slight or No Change
Moderate
No Symbol

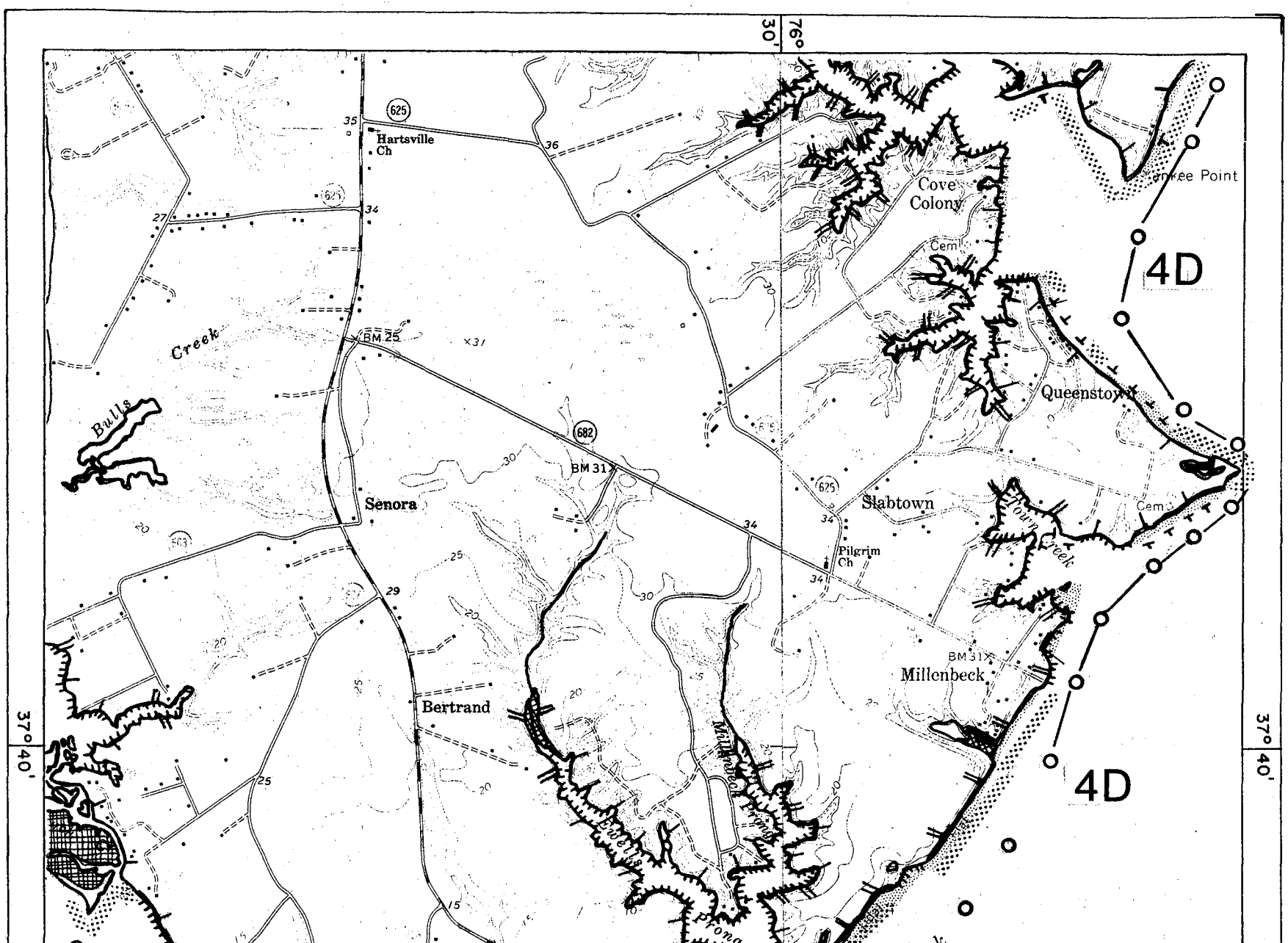


MAP 8A

TOWLES POINT
TOPOGRAPHY AND CULTURE
Subsegments 4D, 5A, and 5B

// = Segment Boundary

/ = Subsegment Boundary



MAP 8B

TOWLES POINT
SHORELANDS TYPES
Subsegments 4D, 5A, and 5B

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

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

NEARSHORE
- Narrow
- Intermediate

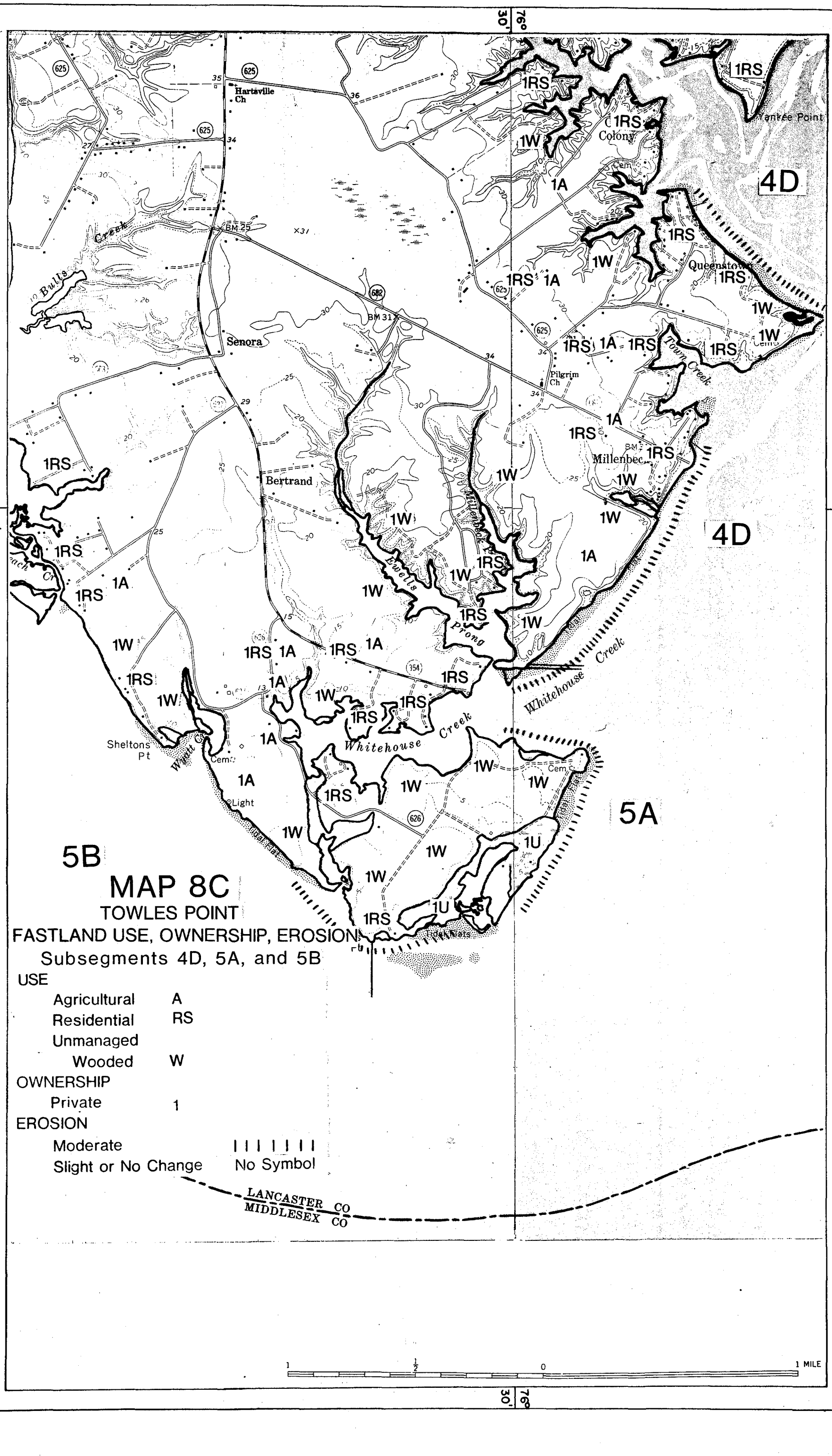
MAP 8C

TOWLES POINT

FASTLAND USE, OWNERSHIP, EROSION

Subsegments 4D, 5A, and 5B

USE	
Agricultural	A
Residential	RS
Unmanaged	
Wooded	W
OWNERSHIP	
Private	1
EROSION	
Moderate	| | | | | |
Slight or No Change	No Symbol



MAP 9A

ROGUE POINT AREA
TOPOGRAPHY AND CULTURE
Subsegment 5B

// = Segment Boundary

/ = Subsegment Boundary

5B

76° 37' 30"

37° 40'

Paynes Cr

BM 43

Creek

Bulls

Beach Cr

Rogue Pt

Sheltons Pt

Wiant Cr

Balls Pt

WT

Remlik Wharf

Cem

Bailey Pt

Creek

Rosegill Farm Landing Strip

1 MILE

MAP 9B

ROGUE POINT AREA
SHORELANDS TYPES

Subsegment 5B

5B

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

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

NEARSHORE
- Narrow
- Intermediate

37° 40'

76° 37' 30"

RIVER

Balls Pt

Remlik Wharf

Cem

Bailey Pt

Creek

Rosegill Farm Landing Strip

Rogue Pt

Sheltons Pt

1 MILE

MAP 9C

ROGUE POINT AREA

FASTLAND USE, OWNERSHIP, EROSION

Subsegment 5B

5B

USE

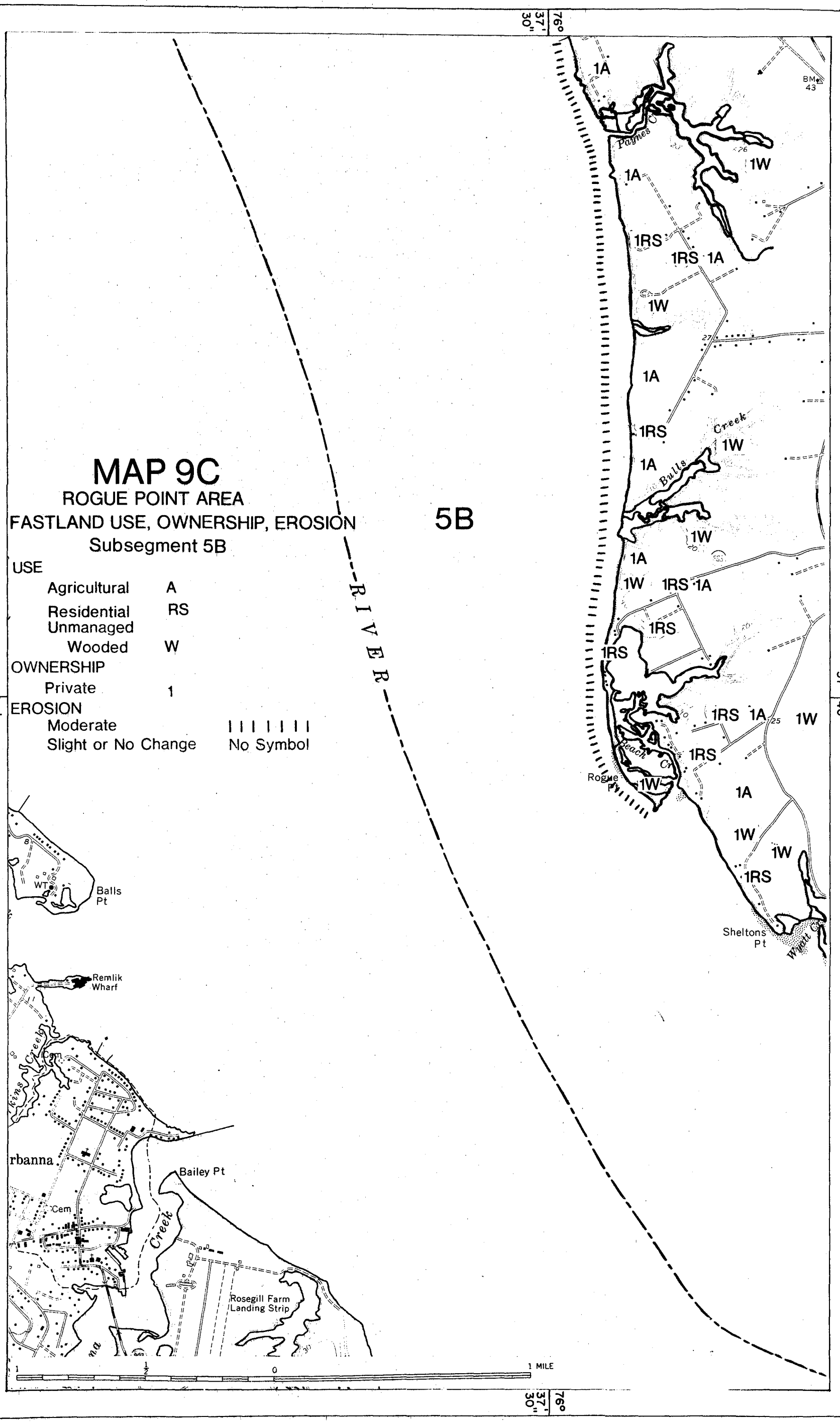
Agricultural	A
Residential	RS
Unmanaged Wooded	W

OWNERSHIP

Private	1

EROSION

Moderate	| | | | | | |
Slight or No Change	No Symbol



MAP 10A

ROCKY NECK

TOPOGRAPHY AND CULTURE

Subsegments 5B, 6A, and 6B

// = Segment Boundary

/ = Subsegment Boundary

6B

6A

5B

LANCASTER CO
MIDDLESEX CO

RAPPAHANNOCK

ROCKY NECK

76° 35'

76° 32'30

37° 45'

37° 42'30"

4179000m. N.

4178

4177

4176

4175

Mud Creek

Ross Pt

Parrotts Cr

Water View

Harry George Creek

Smoky Pt

Stove Pt

Tidal Flat

Midway Cr

St Marys White Chapel

BM 41

Sandpits

Sandpit

Monaskon

Cem

Mollusk

Greenvale Creek

New

Belmont Cr

BM 49

1 0 1 MILE

MAP 10B

ROCKY NECK

SHORELANDS TYPES

Subsegments 5B, 6A, and 6B

FASTLAND

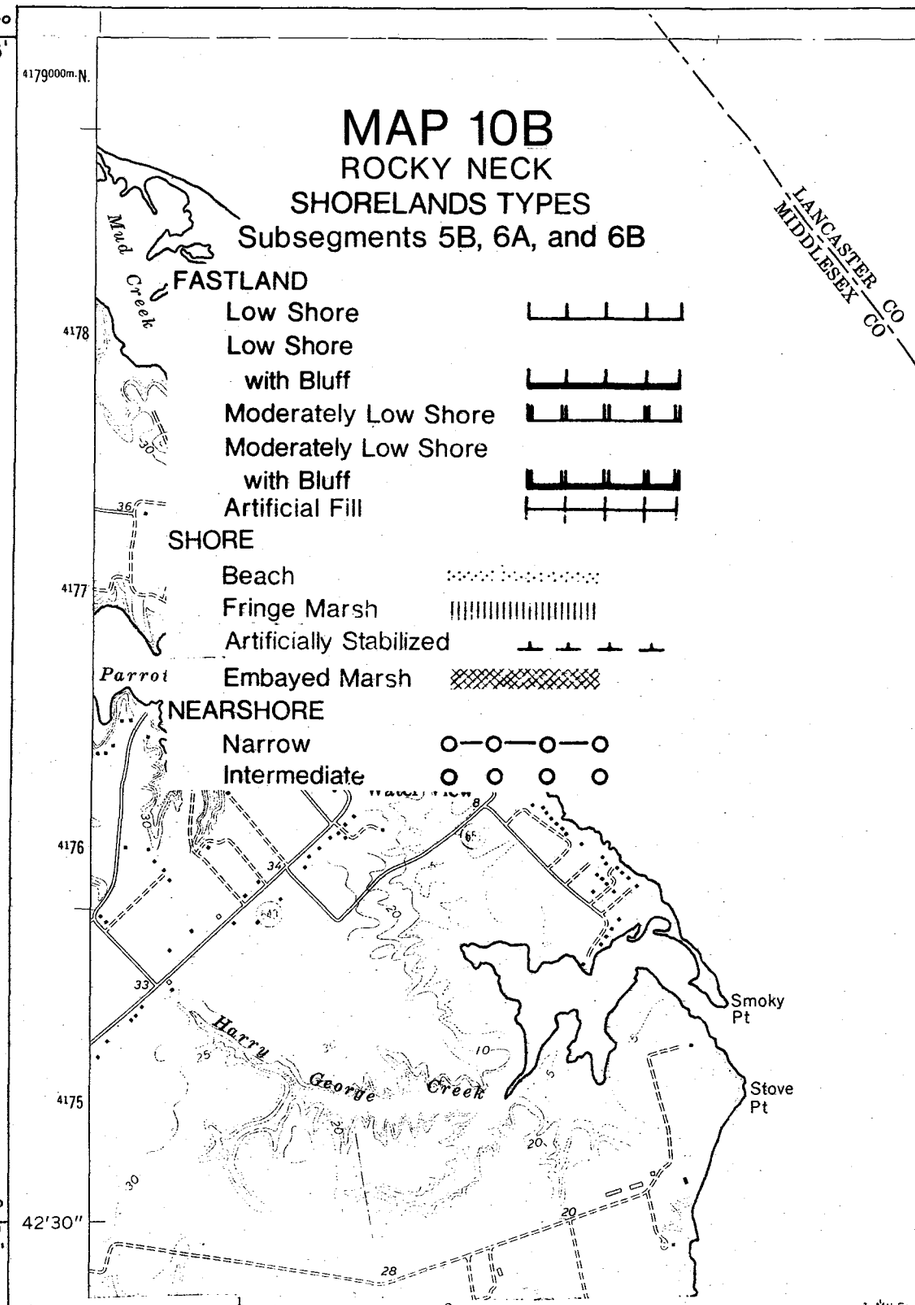
- Low Shore
- Low Shore with Bluff
- Moderately Low Shore
- Moderately Low Shore with Bluff
- Artificial Fill

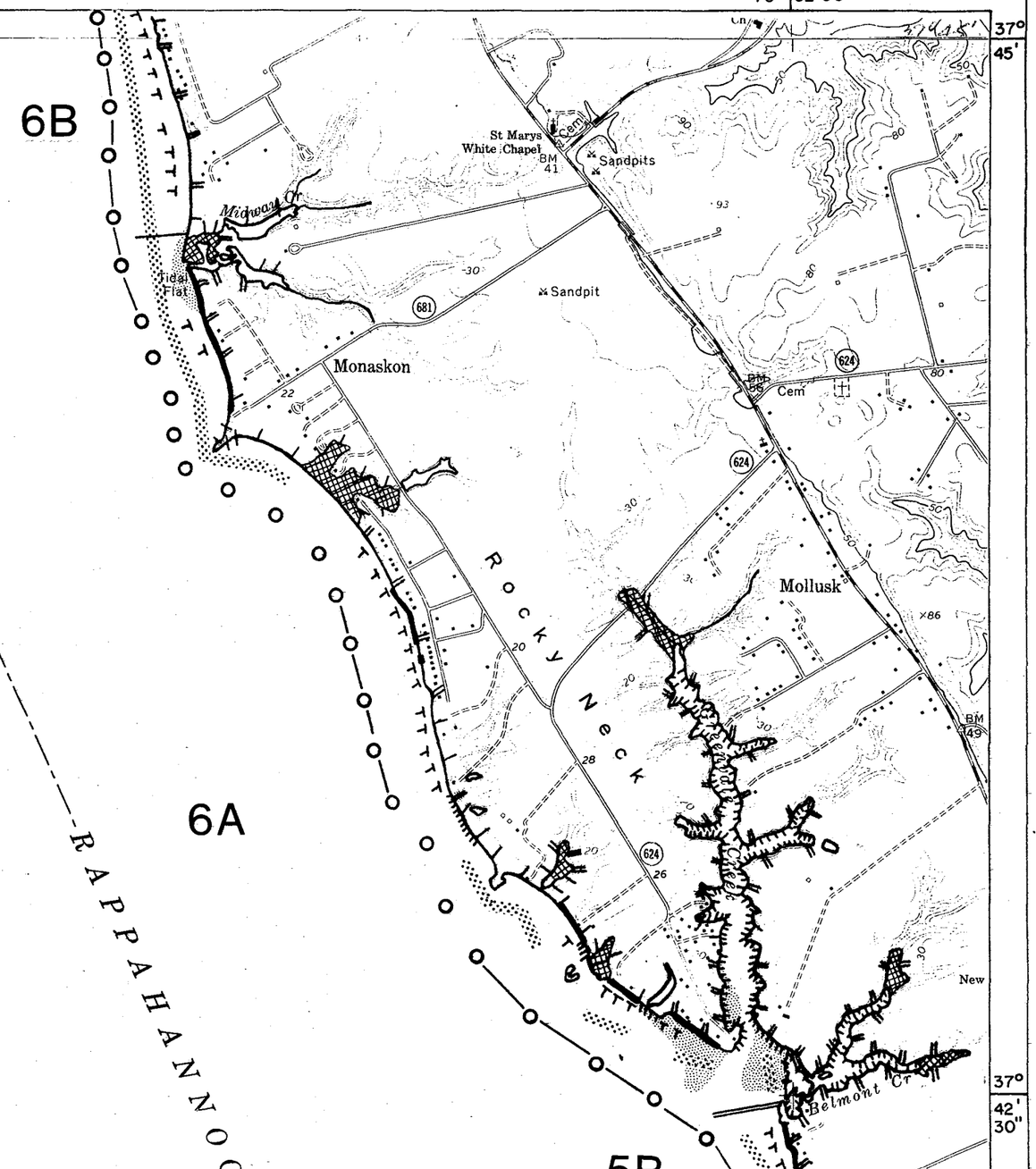
SHORE

- Beach
- Fringe Marsh
- Artificially Stabilized
- Embayed Marsh

NEARSHORE

- Narrow
- Intermediate





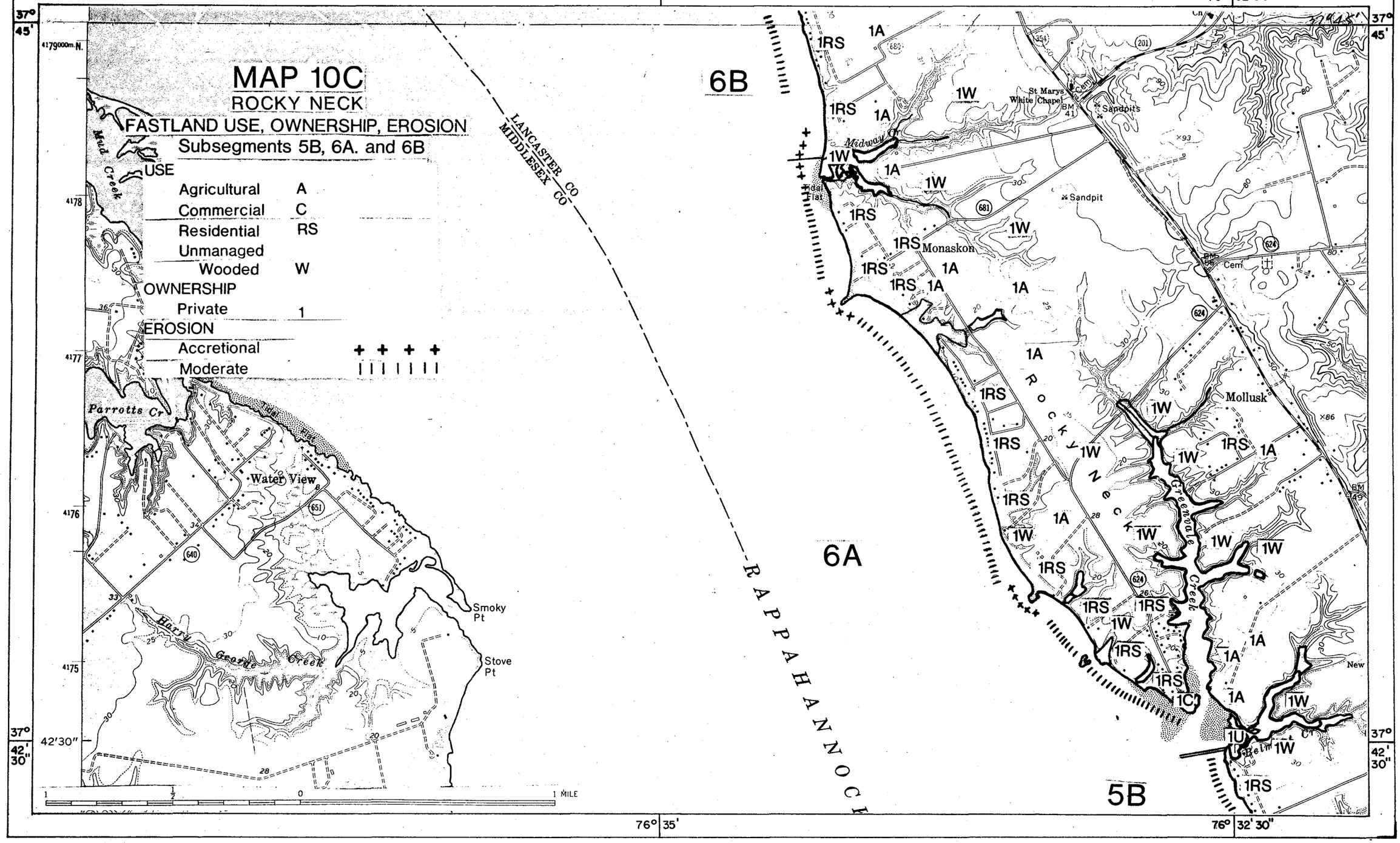
MAP 10C

ROCKY NECK

FASTLAND USE, OWNERSHIP, EROSION

Subsegments 5B, 6A. and 6B

USE	
Agricultural	A
Commercial	C
Residential	RS
Unmanaged Wooded	W
OWNERSHIP	
Private	1
EROSION	
Accretional	+ + + +
Moderate	| | | | | |



MAP 11A

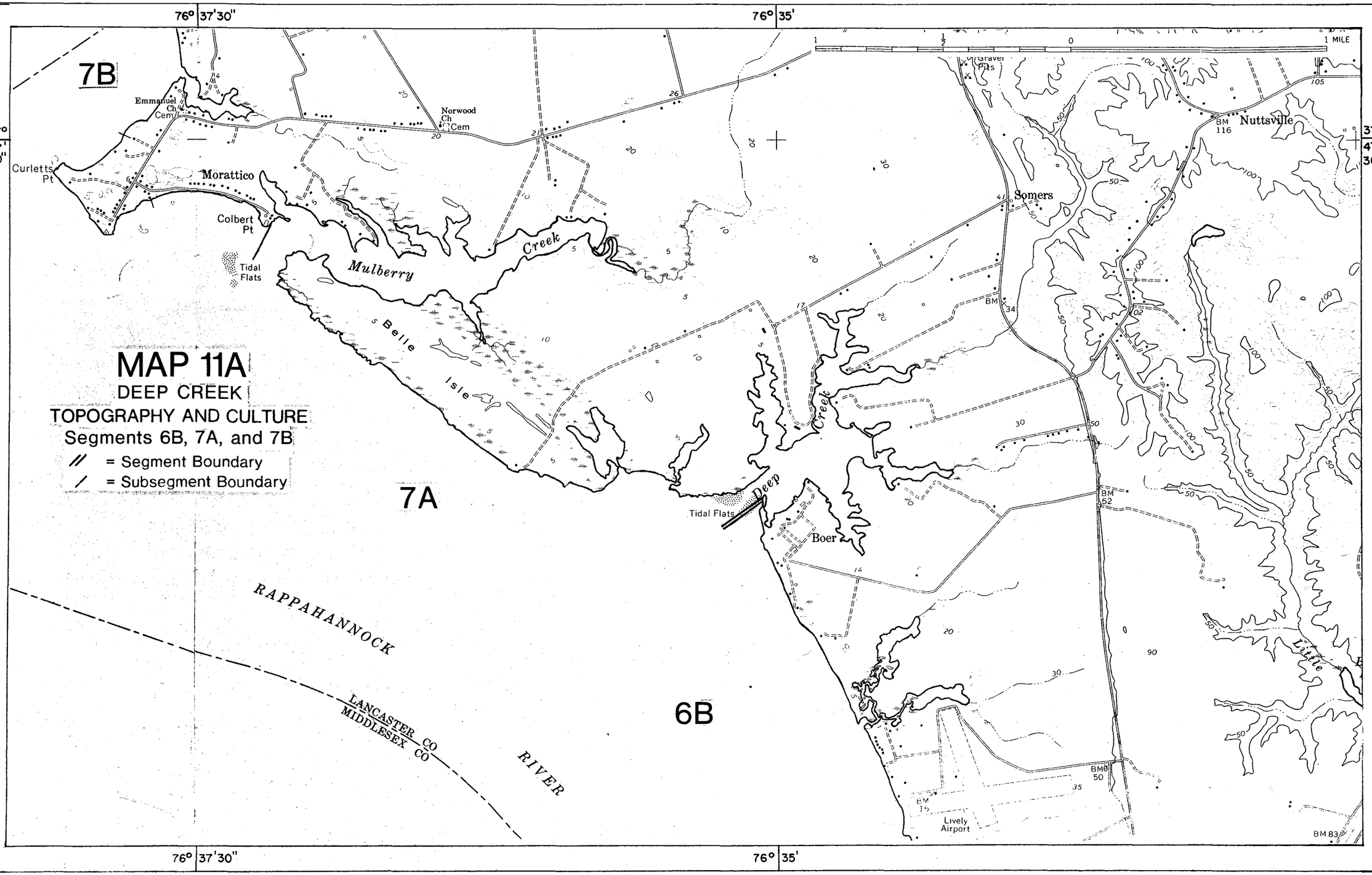
DEEP CREEK

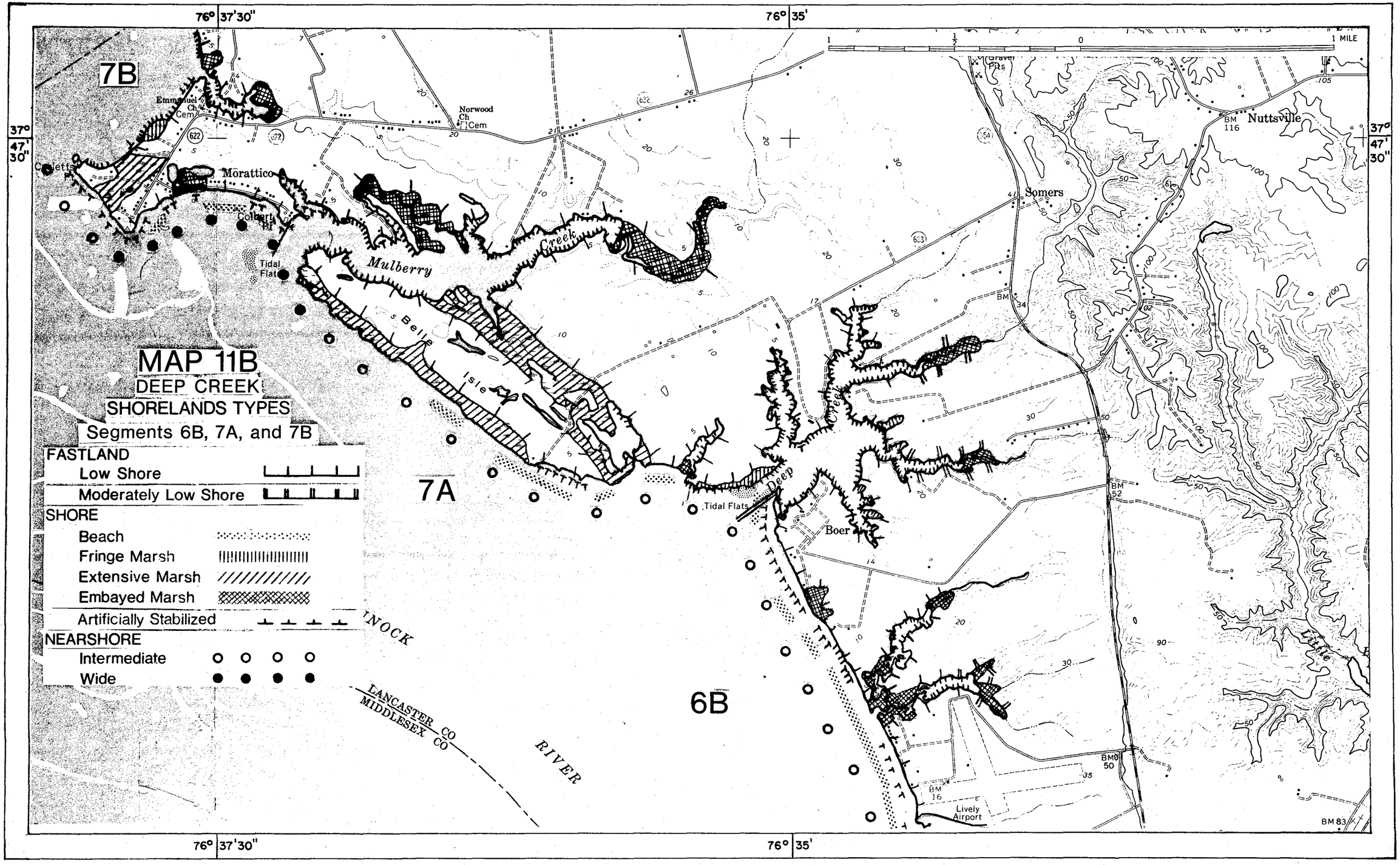
TOPOGRAPHY AND CULTURE

Segments 6B, 7A, and 7B

// = Segment Boundary

/ = Subsegment Boundary




76° 37'30"
76° 35'
37° 47' 30"
1 0 1 MILE
7B
7A
6B
MAP 11B
DEEP CREEK
SHORELANDS TYPES
Segments 6B, 7A, and 7B
FASTLAND
Low Shore
Moderately Low Shore
SHORE
Beach
Fringe Marsh
Extensive Marsh
Embayed Marsh
Artificially Stabilized
NEARSHORE
Intermediate
Wide
Emmanuel Ch Cem
Norwood Ch Cem
Morattico
Colletts
Collarts Pt
Tidal Flat
Mulberry Creek
Belle Isle
Gravel Pits
Nuttsville
BM 116
Somers
BM 34
Deep Creek
Tidal Flats
Boer
BM 52
BM 50
BM 16
Lively Airport
BM 83
Little
LANCASTER CO
MIDDLESEX CO
RIVER

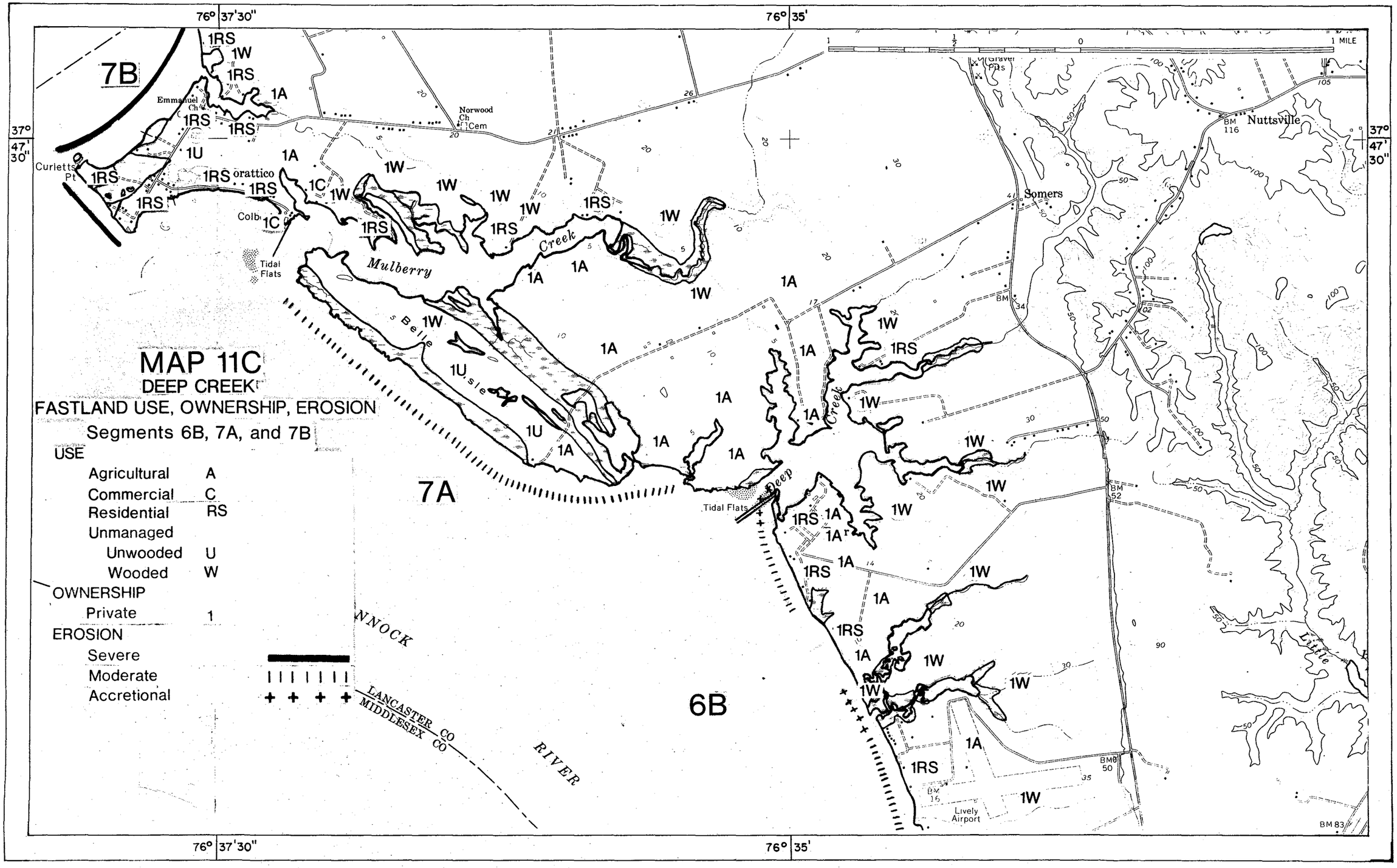
MAP 11C

DEEP CREEK

FASTLAND USE, OWNERSHIP, EROSION

Segments 6B, 7A, and 7B

USE	
Agricultural	A
Commercial	C
Residential	RS
Unmanaged	
Unwooded	U
Wooded	W
OWNERSHIP	
Private	1
EROSION	
Severe	
Moderate	
Accretional	



MAP 12A

LANCASTER CREEK
TOPOGRAPHY AND CULTURE
Subsegment 7B

// = Segment Boundary

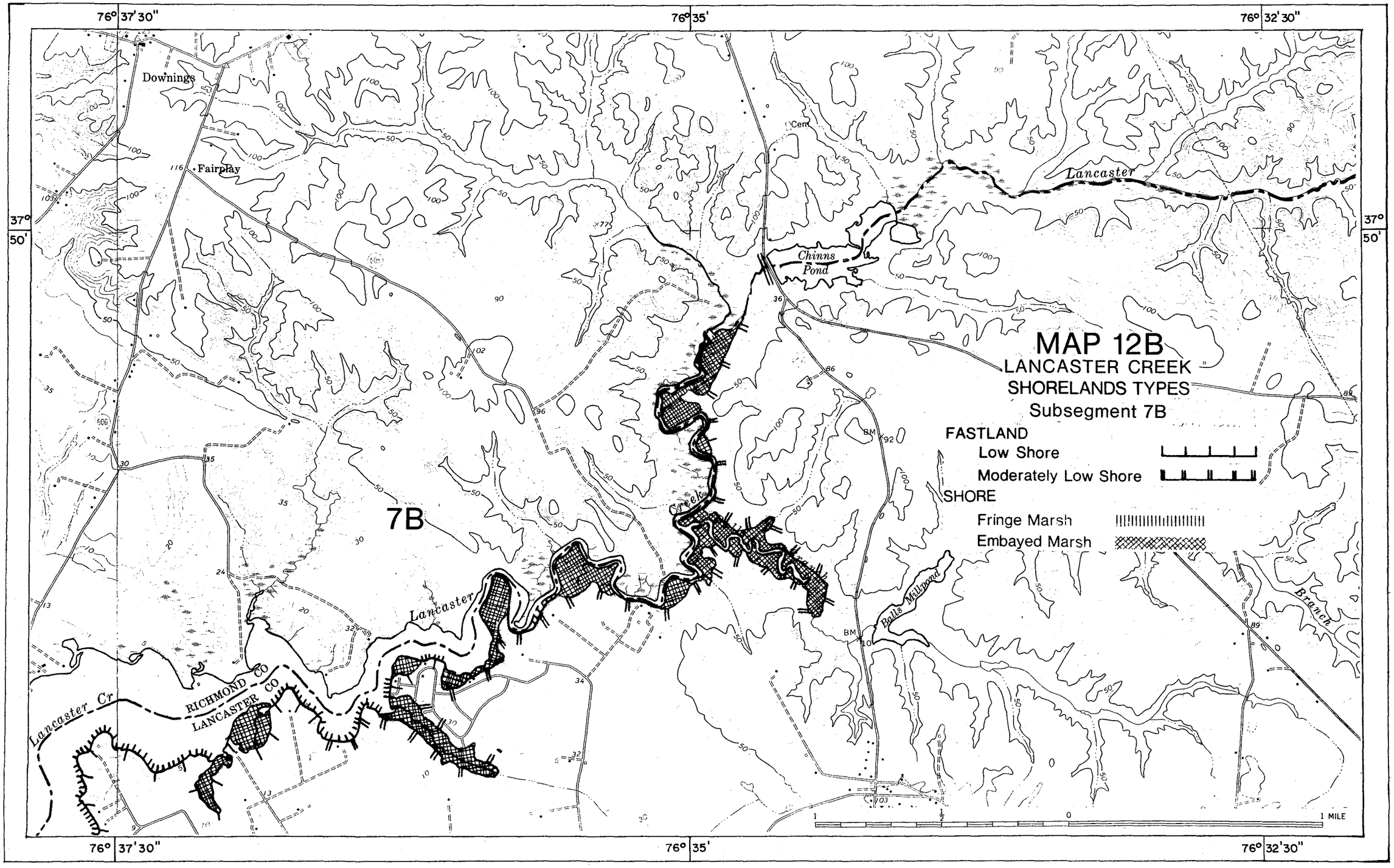
/ = Subsegment Boundary

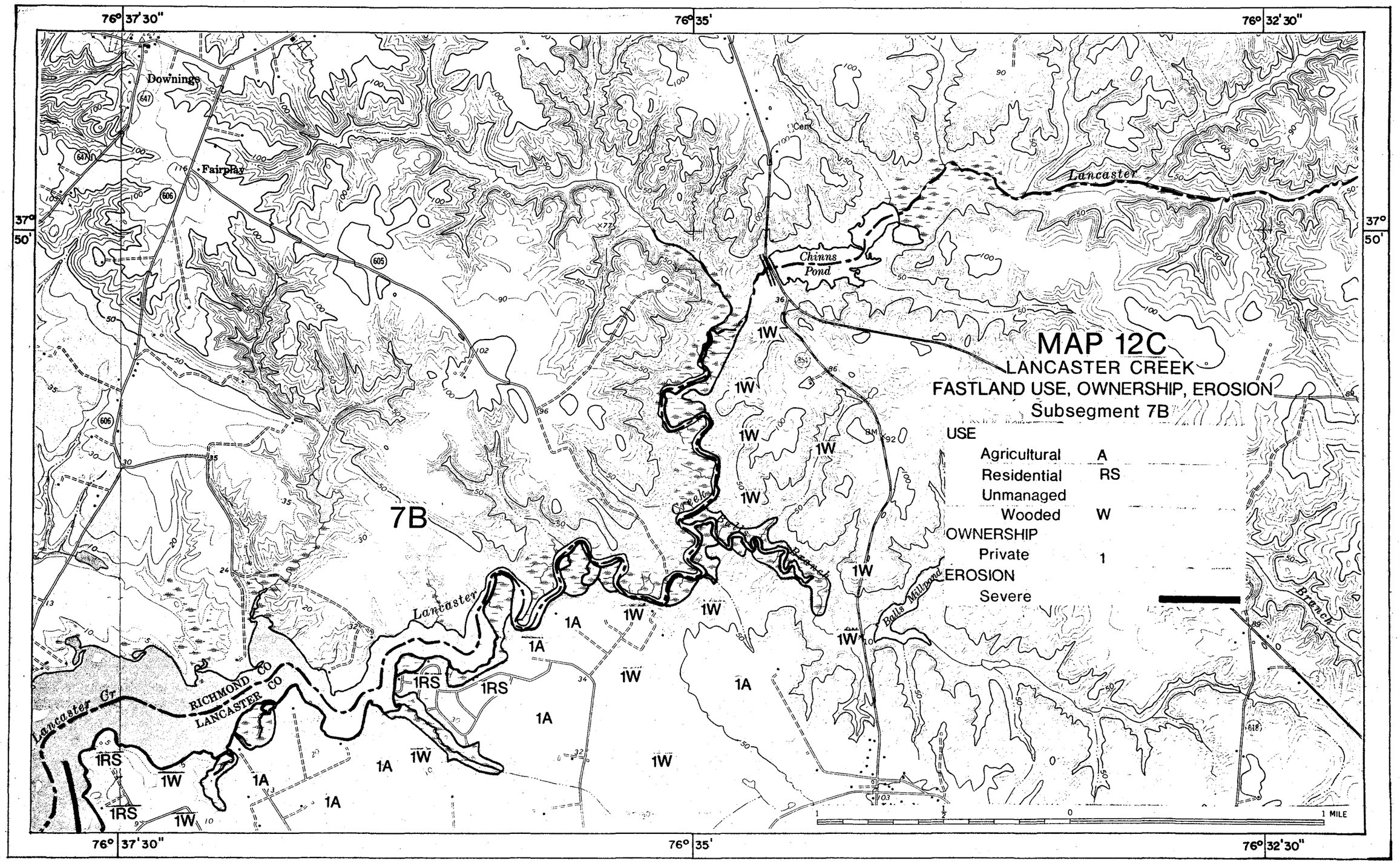
7B

76° 37' 30" | 76° 35' | 76° 32' 30"

37° 50'

Downings · Fairplay · Cem · Lancaster · Chinns Pond · Balls Branch · Balls Millpond · Lancaster Cr · RICHMOND CO · LANCASTER CO · BM · 1 ½ 0 1 MILE


76° 37' 30"
76° 35'
76° 32' 30"
37° 50'
Downings
Fairplay
Cem
Lancaster
Chinns Pond
7B
Lancaster
Lancaster Cr
RICHMOND CO
LANCASTER CO
Creek
Balls Millpond
Branch
BM
MAP 12B
LANCASTER CREEK
SHORELANDS TYPES
Subsegment 7B
FASTLAND
Low Shore
Moderately Low Shore
SHORE
Fringe Marsh
Embayed Marsh
1 0 1 MILE


76° 37' 30"
76° 35'
76° 32' 30"
37° 50'
Downings
Fairplay
Lancaster
Chinns Pond
Cem
MAP 12C
LANCASTER CREEK
EASTLAND USE, OWNERSHIP, EROSION
Subsegment 7B
USE
Agricultural A
Residential RS
Unmanaged
Wooded W
OWNERSHIP
Private 1
EROSION
Severe
7B
1W
1A
1RS
Lancaster Cr
RICHMOND CO
LANCASTER CO
Bells Millpond Branch
Creek
Branch
1 MILE