

CITY OF NEWPORT NEWS and FORT EUSTIS TIDAL MARSH INVENTORY

Special Report No. 137 in Applied Marine Science and Ocean Engineering

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CITY OF NEWPORT NEWS
AND FORT EUSTIS

TIDAL MARSH INVENTORY

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 <u>Cover:</u> Creek marsh area which is dominated by saltmarsh cordgrass. Located on Mulberry Island.	

INTRODUCTION

This publication is the eleventh in a series of marsh inventory reports compiled by the Wetlands Research Section, Virginia Institute of Marine Science. The nine previous reports that have been published are:

Lancaster County
Northumberland County
Mathews County
York County and
the Town of Poquoson
Stafford County

Prince William County
King George County
City of Hampton
Fairfax County
Gloucester County

This report is presented in much the same format as the preceeding reports.

Under section 62.1-13.4 of the Virginia Wetlands Act, the Virginia Institute of Marine Science is obligated to inventory the tidal wetlands of the Commonwealth. The inventory program is designed to assist wetland boards, cities, counties, planning districts and other local, state and federal agencies as well as the general public and private industry. This document, along with its companion, the Shoreline Literation Report, Newport News, Va., 1974, VIMS SRAMSOE No. 55 is an essential document for those who are participating in the Commonwealth's ongoing Coastal Resources Management Planning Program.

A previously published study, Guidelines for Activities Affecting Virginia Wetlands, Silberhorn, Dawes and Barnard, 1974, VIMS SRAMSOE No. 46, will be helpful in the utilization of this report. Excerpts from the above document are included in the following text, explaining marsh vegetation types and their evaluation. It is our desire that these guidelines and inventory report will be useful to those concerned with conserving this valuable resource.

The wetlands found within the City of Newport News and the Ft. Eustis Military Reservation total 2883 acres. Of this number approximately 70 percent or 2029 acres are located within the boundaries of Ft. Eustis, while the remaining 30 percent or 854 acres are found in Newport News.

The vast majority of marshes described in this report are dominated by salt tolerant plants. These include such species as saltmarsh cordgrass, saltmeadow grasses, black needlerush, salt-bushes and big cordgrass. Generally, freshwater marsh species are found only at the heads of tidal creeks such as Stoney Run, Skiffes Creek and the Warwick River.

This report is organized into seven sections each of which attempts to describe a significant length of shoreline. Section I describes those marshes found in the vicinity of Skiffes Creek and Goose Island. Sections II and III include the marshes located on the Mulberry Island portion of Ft. Eustis. The marshes found along the Warwick River shoreline and it's tributaries are described in Sections III, IV, V, and VI. Finally, Section VII describes most of the Newport News shoreline south of the Warwick River.

The majority of marsh areas included in this inventory report continue to remain in a natural state. This is due in part to the fact that a large portion of these wetlands occur in relatively remote sections of Ft. Eustis. Recent degradation of marsh areas within the military reservation appear minimal, but have been noted where appropriate. Unfortunately many marsh areas located in the City of Newport News have been spoiled through dredging and filling activities. Most of these areas occur along urbanized section of Lukas and Deep Creeks (Sections V and VI). Hopefully, more careful planning and strict controls by the City will help prevent further impacts on this valuable natural resource.

METHODS

Aerial photographs and topographic maps (U.S.G.S) were utilized to obtain wetland locations, wetland boundaries and patterns of marsh vegetation. Acreages and wetland boundaries were substantiated by observations on foot, by boat and by low level overflights. Individual plant species percentages are quantitative estimates of coverage based on visual field inspections of every marsh. In some instances, especially in tidal freshwater areas, these percentages are subject to seasonal bias.

Marshes one quarter of an acre or larger are designated by number. Many marshes smaller than one quarter acre (usually narrow fringing marshes) are designated by the same symbol (shaded) as the larger marshes on the section maps but assigned no number. Small marshes (less than one acre) are exaggerated and are not indicated to scale. Information such as individual marsh acreage, plant species percentage and acreage, marsh type, and other observations are recorded in tabular form. Plant species percentages are recorded to the nearest percent, one acre, the species are recorded to the nearest hundredth of an acre. In those instances where an individual plant species is estimated to amount to less than 0.5 percent, the symbol (-) is used to indicate a trace amount. In unusual situations where an individual marsh is estimated to contain 50 percent or more of a species that is not listed as a marsh type, the closest applicable marsh type is used. For example, a marsh which is judged to contain 60 percent wild rice would be listed as Type XI (Freshwater Mixed).

MARSH TYPES AND EVALUATION

For a better understanding of what is meant by marsh types, some background information is required. The personnel of the Wetland Research Section have classified twelve different common marsh types in Virginia, based on vegetational composition. These marsh types have been evaluated according to certain values and are recorded in the Guidelines report. The following is a brief outline of the wetland types and their evaluation as found in that publication:

"It is recognized that most wetlands areas, with the exception of the relatively monospecific cordgrass marshes of the Eastern Shore, are not homogenously vegetated. Most marshes are, however, dominated by a major plant. By providing the manager with the primary values of each community type and the means of identification he then has a useful and convenient tool for weighing the relative importance of each marsh parcel. In Virginia, many wetlands management problems involve only a few acres or a fraction of an acre. The identification of plant communities permits the manager to evaluate both complete marshes and subareas within a marsh.

"Each marsh type may be evaluated in accordance with five general values. These are:

"1. Production and detritus availability. Previous VIMS reports have discussed the details of marsh production and the role of detritus which results when the plant material is washed into the water column. The term "detritus" refers to plant material which decays in the aquatic system and forms the basis of a major marine food web. The term "production" refers to the amount of plant material which is produced by the various types of marsh plants. Vegetative production of the major species has been measured and marshes have been rated in accordance with their average levels of productivity. If the production is readily available to the marine food web as detritus, a wetlands system is even more important than one of equal productivity where little detritus results. Availability of detritus is generally a function of marsh elevation and total flushing, with detritus more available to the aquatic environment in the lower, well-flushed marshes.

"2. Waterfowl and wildlife utilization. Long before marshes were discovered to be detritus producers, they were known as habitats for various mammals and marsh birds and as food sources for migratory waterfowl. Some marsh types, especially mixed freshwater marshes, are more valuable because of diversity of the vegetation found there.

"3. Erosion buffer. Erosion is a common problem. Marshes can be eroded, but some, particularly the more saline types, are eroded much more slowly than adjacent shores which are unprotected by marsh. This buffering quality is derived from the ability of the vegetation to absorb or dissipate wave energy by establishing a dense root system which stabilizes the substrate. Generally, freshwater species are less effective than saltwater plants in this regard.

"4. Water quality control. The dense growth of some marshes acts as a filter, trapping upland sediment before it reaches waterways and thus protecting shellfish beds and navigation channels from siltation. Marshes can also filter out sediments that are already in the water column. The ability of marshes to filter sediments and maintain water clarity is of particular importance to the maintenance of clam and oyster production. Excessive sedimentation can reduce the basic food supply of shellfish through reduction of the photic zone where algae grows. It can also kill shellfish by clogging their gills. Additionally marshes can assimilate and degrade pollutants through complex chemical processes, a discussion of which is beyond the scope of this paper...."

"5. Flood buffer. The peat substratum of some marshes acts as a giant sponge in receiving and releasing water. This characteristic is an effective buffer against coastal flooding, the effectiveness of which is a function of marsh type and size.

"Research and marsh inventory work accomplished by VIMS personnel indicate that 10 species of marsh vegetation tend to dominate many marshes, the dominant plant depending on water salinity, marsh elevation, soil type and other factors. The term "dominant" is construed to mean that at least 50% of the vegetated surface of a marsh is covered by a single species. Brackish and freshwater marshes often have no clearly dominant species of vegetation. These marshes are considered to be highly valuable in environmental terms."

Marsh Types and Their Environment Contributions

(Edited from Guidelines for Activities Affecting Virginia Wetlands)

Type I Saltmarsh Cordgrass Community

- a. Average yield 4 tons per acre per annum. (Optimum growth up to 10 tons per acre.)
- b. Optimum availability of detritus to the marine environment.
- c. Roots and rhizomes eaten by waterfowl and stems used in muskrat lodge construction. Also serves as nesting material for various birds.
- d. Deterrent to shoreline erosion.
- e. Serves as sediment trap and assimilates flood waters.

Type II Saltmeadow Community

- a. 1-3 tons per acre per annum.
- b. Food (seeds) and nesting areas for birds.
- c. Effective erosion deterrent.
- d. Assimilates flood waters.
- e. Filters sediments and waste material.

- Type III Black Needlerush Community
- a. 3-5 tons per acre per annum.
 - b. Highly resistant to erosion.
 - c. Traps suspended sediments but not as effective as Type II.
 - d. Somewhat effective in absorbing flood waters.
- Type IV Saltbush Community
- a. 2 tons per acre per annum or less
 - b. Nesting area for small birds and habitat for a variety of wildlife.
 - c. Effective trap for flotsam.
- Type V Big Cordgrass Community
- a. 3-6 tons per acre per annum.
 - b. Detritus less available than from Type I.
 - c. Habitat for small animals and used for muskrat lodges.
 - d. Effective erosion buffer.
 - e. Flood water assimilation.
- Type VI Cattail Community
- a. 2-4 tons per acre per annum.
 - b. Habitat for birds and utilized by muskrats.
 - c. Traps upland sediments.
- Type VII Arrow Arum-Pickerel Weed Community
- a. 2-4 tons per acre per annum.
 - b. Detritus readily available to marine environment.
 - c. Seeds eaten by wood ducks.
 - d. Susceptible to erosion from wave action and boat wakes, particularly in winter months.

Type VIII Reed Grass Community

- a. 4-6 tons per acre per annum.
- b. Little value to wildlife except for cover.
- c. Invades marshes and competes with more desirable species.
- d. Deters erosion on disturbed sites.

Type IX Yellow Pond Lily Community

- a. Less than 1 ton per acre per annum.
- b. Cover and attachment site for aquatic animals and algae.
- c. Feeding territory for fish.

Type X Saltwort Community

- a. Less than 0.5 tons per acre per annum.
- b. Little value to aquatic or marsh animals.

Type XI Freshwater Mixed Community

- a. 3-5 tons per acre per annum.
- b. High diversity of wildlife.
- c. High diversity of wildlife foods.
- d. Often associated with fish spawning and nursery grounds.
- e. Ranks high as a sediment trap and nursery grounds.

Type XII Brackish Water Mixed Community

- a. 3-4 tons per acre per annum.
- b. Wide variety of wildlife foods and habitat.
- c. Deterrent to shoreline erosion.
- d. Serves as sediment trap and assimilates flood waters.
- e. Known spawning and nursery grounds for fish.

EVALUATION OF WETLAND TYPES

(From Guidelines for Activities Affecting Virginia Wetlands)

For management purposes, the twelve types of wetlands identified above are grouped into five classifications based on the estimated total environmental value of an acre of each type.

Group One:

Saltmarsh Cordgrass (Type I)
Arrow Arum-Pickerel Weed (Type VII)
Freshwater Mixed (Type XI)
Brackish Water Mixed (Type XII)

Group One marshes have the highest values in productivity and wild-fowl and wildlife utility and are closely associated with fish spawning and nursery areas. They also have high value as erosion inhibitors, are important to the shellfish industry and valued as natural shoreline stabilizers. Group One marshes should be preserved.

Group Two:

Big Cordgrass (Type V)
Saltmeadow (Type II)
Cattail (Type VI)

Group Two marshes are of only slightly lesser value than Group One marshes. The major difference is that detritus produced in these marshes is less readily available to the marine environment due to higher elevations and consequently less tidal action to flush the detritus into adjacent waterways. Group Two marshes have very high values in protecting water quality and acting as buffers against coastal flooding. These marshes should also be preserved, but if development in wetlands is considered to be justified it would be better to alter Group Two marshes than Group One marshes.

Group Three:

Yellow Pond Lily (Type IX)
Black Needlerush (Type III)

The two marshes in the Group Three category are quite dissimilar in properties. The yellow pond lily marsh is not a significant contributor to the food web but it does have high values to wildlife and waterfowl. Black needlerush has little wildlife value but it ranks high as an erosion flood buffer. Group Three marshes are important though their total values are less than Group One and Two marshes. If development in wetlands is considered necessary, it would be better to alter Group Three marshes than Groups One or Two.

Group Four:

Saltbush (Type IV)

The saltbush community is valued primarily for the diversity and bird nesting area it adds to the marsh ecosystem. To a lesser extent it acts as an erosion buffer. Group Four marshes should not be unnecessarily disturbed but it would be better to concentrate necessary development in these marshes rather than disturb any of the marshes in the preceding groups.

Group Five:

Saltwort (Type X)
Reedgrass (Type VIII)

Based on present information Group Five marshes have few values of any significance. While Group Five marshes should not be unreasonably disturbed, it is preferable to develop in these marshes than in any other types.

For a better understanding of Virginia's Wetlands in general, the Wetlands Act of 1972 and marsh types and their evaluation, the following publications are recommended:

Coastal Wetlands of Virginia
Interim Report No. 3
Guidelines for Activities
Affecting Virginia's Wetlands
Special Report in Applied Marine
Science and Ocean Engineering No. 46
Gene M. Silberhorn, George M. Dawes,
Thomas A. Barnard, Jr., June 1974
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Local Management of Wetlands
Environmental Considerations
Special Report in Applied Marine
Science and Ocean Engineering No. 35
Kenneth Marcellus, George M. Dawes,
Gene Silberhorn, June 1973
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Coastal Wetlands of Virginia
Interim Report No. 2
Special Report in Applied Marine
Science and Ocean Engineering No. 27
Kenneth Marcellus, July 1972
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Coastal Wetlands of Virginia Interim Report
Special Report in Applied Marine
Science and Ocean Engineering No. 10
Marvin Wass and Thomas Wright, December 1969
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

Laws of Virginia Relating to Wetlands
and Subaqueous Waters
Virginia Marine Resources Commission
2401 West Avenue
Newport News, Virginia 23607

Wetlands Guidelines
Virginia Marine Resources Commission
2401 West Avenue
Newport News, Virginia 23607

Tidal Wetland Plants of Virginia
Educational Series No. 19
Gene M. Silberhorn, illustrated by
Mary Warriner, Aug. 1976
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

MARSH PLANTS

Common and Scientific Names as found in the Data Tables

Arrowhead	<u>Sagittaria</u> <u>latifolia</u> willd.
Arrow Arum	<u>Peltandra</u> <u>virginica</u> (L.) Kunth
Big Cordgrass	<u>Spartina</u> <u>cynosuroides</u> (L.) Roth
Black Needlerush	<u>Juncus</u> <u>roemerianus</u> Scheele
Cardinal Flower*	<u>Lobelia</u> <u>cardinalis</u> L.
Cattails	
Common	<u>Typha</u> <u>latifolia</u> L.
Narrow-leaved	<u>Typha</u> <u>angustifolia</u> L.
Common Threesquare	<u>Scirpus</u> <u>americanus</u> Persoon.
Cutgrass	<u>Leersia</u> <u>oryzoides</u> (L.) Swartz
Giant Bulrush	<u>Scirpus</u> <u>validus</u> Vahl.
Jewel-weed*	<u>Impatiens</u> <u>capensis</u> Meerb.
Marsh Hibiscus	<u>Hibiscus</u> <u>moscheutos</u> L.
Marsh Mallow*	<u>Kosteletzkya</u> <u>virginica</u> (L.) Presl.
Marsh Pennywort*	<u>Hydrocotyle</u> <u>umbellata</u> L.
Mock Bishop-weed*	<u>Ptilimnium</u> <u>capillaceum</u> (Michaux) Raf.
Olney Threesquare	<u>Scirpus</u> <u>olneyi</u> Gray
Pickerelweed	<u>Pontederia</u> <u>cordata</u> L.

*Marsh species not included in Virginia's Wetlands Act of 1972.

MARSH PLANTS (cont.)

Reed Grass	<u>Phragmites australis</u> (CAV.) Trin ex Steud.
Saltbushes	
Groundsel Tree	<u>Baccharis halimifolia</u> L.
Marsh Elder	<u>Iva frutescens</u> L.
Saltmarsh Aster*	<u>Aster tenuifolius</u> L.
Saltmarsh Bulrush	<u>Scirpus robustus</u> Pursh.
Saltmarsh Cordgrass	<u>Spartina alterniflora</u> Loisel.
Saltmarsh Fimbristylis*	<u>Fimbristylis spadicea</u> (L.) Vahl.
Saltmarsh Fleabane	<u>Pluchea purpurascens</u> (Swartz) DC.
Saltmarsh Loosestrife*	<u>Lythrum lineare</u> L.
Saltmeadow Grasses	
Saltgrass	<u>Spartina patens</u> (Aiton) Muhl
Saltmeadow Hay	<u>Distichlis spicata</u> (L.) Greene
Sea Lavender	<u>Limonium carolinianum</u> (Walter) Britton
Sea Oxeye	<u>Borrichia frutescens</u> (L.) DC.
Smartweed	<u>Polygonum</u> spp.
Swamp Milkweed*	<u>Asclepias incarnata</u> L.
Water Dock	<u>Rumex verticillatus</u> L.
Water Hemlock*	<u>Cicuta maculata</u> L.
Water-Hemp	<u>Amaranthus cannabina</u> (L.) J.D. Sauer

*Marsh species not included in Virginia's Wetlands Act of 1972.

MARSH PLANTS (cont.)

Water Parsnip*

Sium suave Walter

Wild Rice

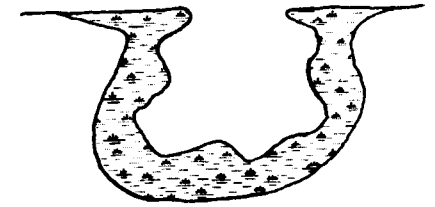
Zizania aquatica L.

*Marsh species not included in Virginia's Wetlands Act of 1972.

Glossary of Descriptive Terms

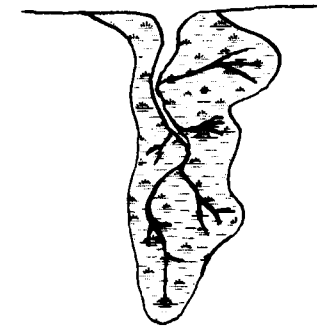
cove marsh

a marsh contained within a concavity or recessed area on a shoreline; the marsh vegetation is usually found surrounding a central, open-water pond, and tidal flushing is permitted through an inlet.



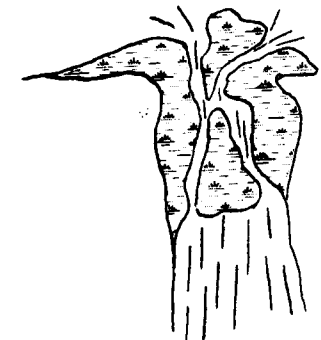
creek or embayed marsh

a marsh occupying a drowned creek valley; in many large creek marshes the salinity decreases headward; this type of marsh may be divided for inventory purposes into sections if significant changes in the plant community occur along its length.



delta marsh

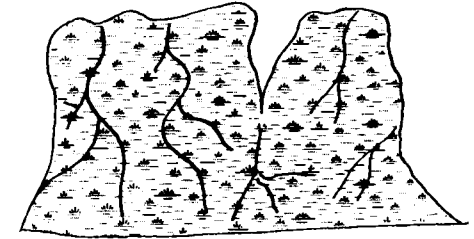
a marsh found growing on sediment deposited at the mouth of a tidal creek; tidal exchange through the creek mouth is usually restricted to narrow channels by the marsh.



Glossary of Descriptive Terms

extensive marsh

a large marsh where the length and depth or width are roughly comparable; most extensive marshes are drained by many tidal channels and creeks which have little freshwater input.



fringe marsh

a marsh which borders along a section of shoreline and generally has a much greater length than width or depth.



high marsh

the marsh surface is at an elevation of mean high water or above; it is usually inundated less than twice daily by tidal action.

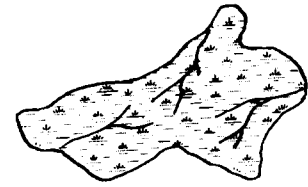
low marsh

the marsh surface is at an elevation below mean high water; it is usually inundated twice daily by tidal action.

Glossary of Descriptive Terms

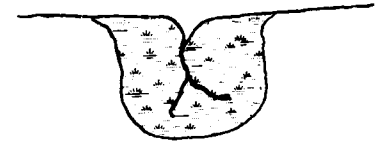
marsh island

an isolated marsh surrounded on all sides by open water; interior portions of the marsh may contain trees scattered at highest elevations



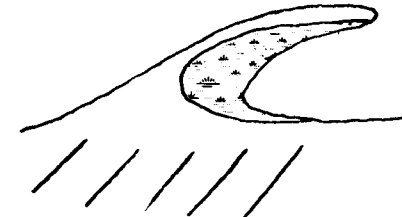
pocket marsh

a marsh contained within a small, essentially semi-circular area on a shoreline

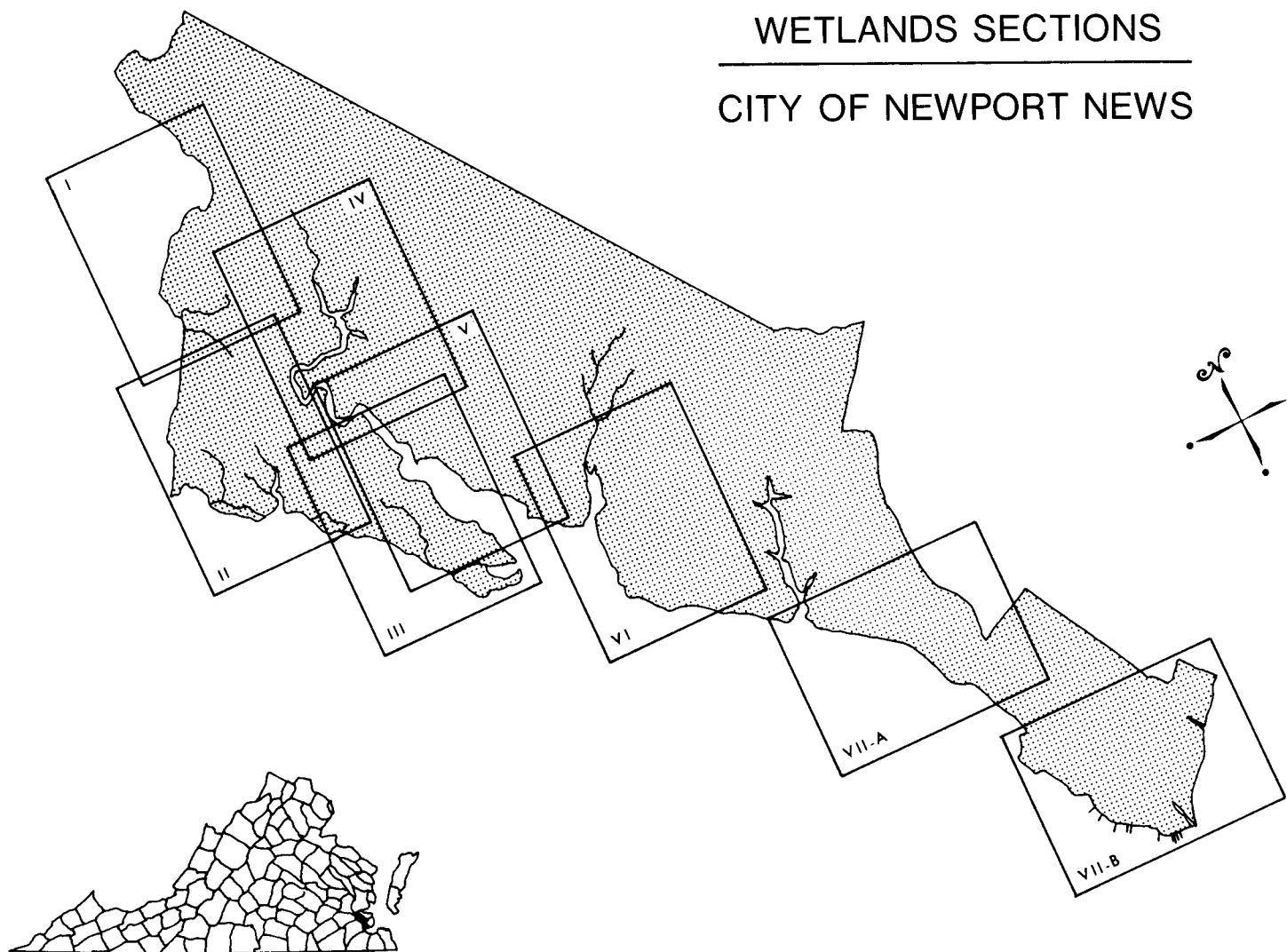


point or spit marsh

a marsh which extends from the uplands in the form of a point or spit; its development is usually influenced by tidal currents that form a sand berm behind which the marsh forms.



REFERENCE MAP
WETLANDS SECTIONS
CITY OF NEWPORT NEWS



SECTION I.

SKIFFES CREEK AND FORT EUSTIS

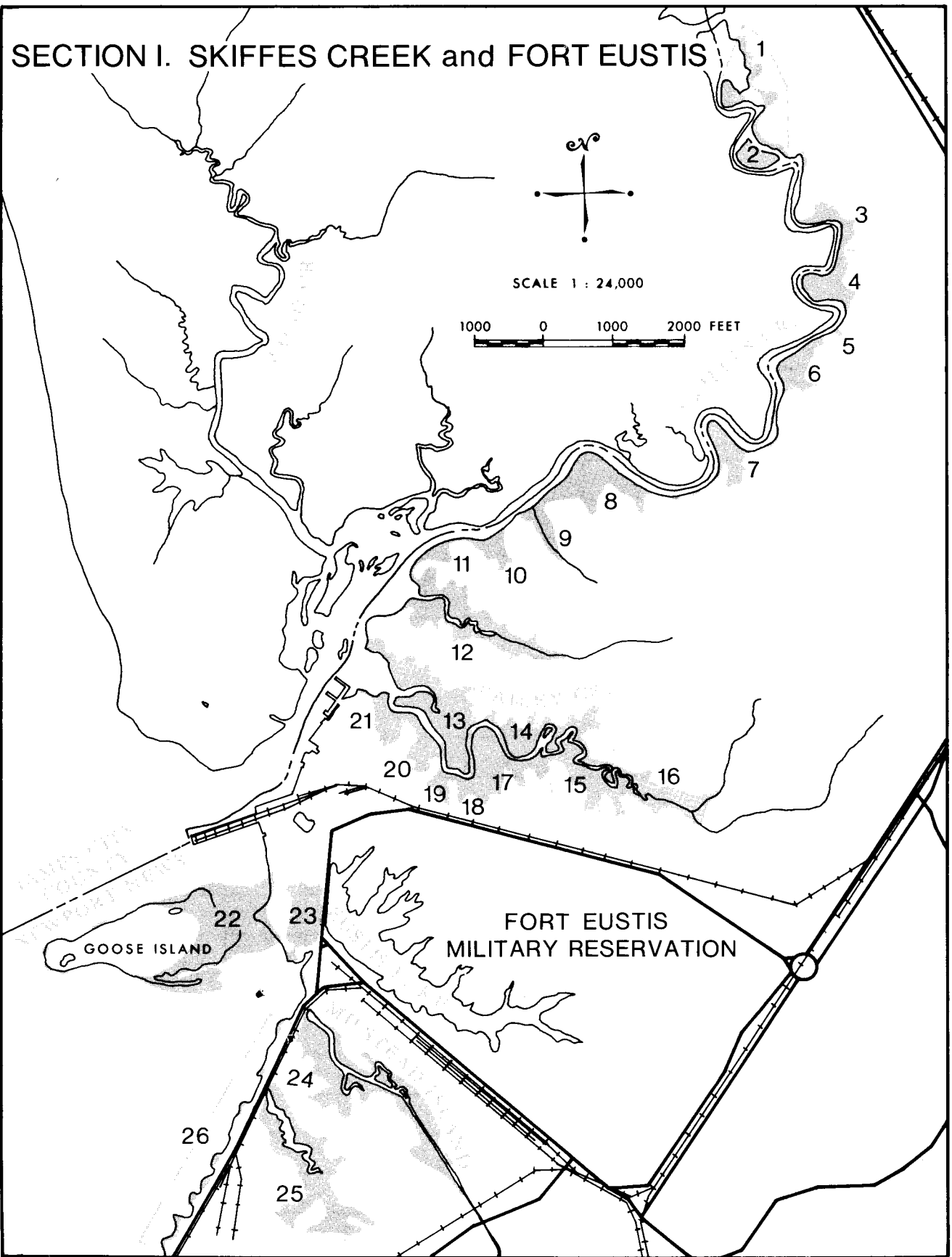
The tidal marshes of the eastern side of Skiffes Creek and those of Bailey's Creek dominate this section of shoreline. Both creeks are dominated by Type I, brackish water marshes and are characterized in downstream section by saltmarsh cordgrass, with saltmeadow grasses and big cordgrass at areas of higher elevation within each marsh. Cattails, marsh hibiscus and other species which tolerate only low salinity water are found along the upland-marsh boundary and at the heads of small pocket areas.

Proceeding upstream in both creeks, plant species associated with freshwater conditions such as pickerelweed, water dock and smartweed increase in abundance. Although saltmarsh cordgrass can grow well in freshwater areas it can not successfully compete with species that are adapted to only fresh water. This is evident at the head of Skiffes Creek where saltmarsh cordgrass, although present, is greatly reduced in abundance when compared to the downstream marsh areas.

The marsh area (#22) extending between Goose Island and the mainland has apparently become recently established. It is a diverse, brackish marsh area that grades from saltmarsh cordgrass at lowest elevations to saltmeadow grass, big cordgrass and other species in interior sections of higher elevation. An adjacent pocket marsh area formed along the downstream edge of the Eustis Lake dam is somewhat restricted to tidal flushing by a narrow channel. The marsh itself is a viable brackish water area (Type XII) with abundant cattails, saltmarsh bulrush, and marsh mallow. It is an excellent wildlife habitat.

The two creek marsh areas, which include Milstead Island Creek, are experiencing reduced tidal flushing due to narrow culverts at their mouths. The marshes within the creeks themselves are diverse, brackish water areas with abundant saltmarsh cordgrass. The upstream section of one creek marsh (#25) grades to large stands of cattails that border a large, diked dredge disposal area.

SECTION I. SKIFFES CREEK and FORT EUSTIS



Section I. Skiffes Creek and Ft. Eustis

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
1	Skiffes Creek	6.0	%	40				-	-	-	-					-		5	-				45	10	-			Upper section of tidal Skiffes Creek; pocket marsh areas dominated by pickerelweed; large patch of saltmarsh cordgrass in center of creek.	XI
			acres	2.4				-	-	-	-					-		0.3	-				2.7	0.6	-				
2	Skiffes Creek	3.7	%	35				10	-	-	-	-				15		5	-				20	15	-			Marsh island with diverse mixture of fresh and brackish water species.	XI
			acres	1.3				0.4	-	-	-	-				0.6		0.2	-				0.7	0.6	-				
3	Skiffes Creek	2.2	%	40				-	5	-	5	-		15		15		-	-				20	-	-			Fringe marsh extends back to gravel loading dock; partially filled; invasion by Reed grass.	XII
			acres	0.9				-	0.1	-	0.1	-		0.3		0.3		-	-				0.4	-	-				
4	Skiffes Creek	6.9	%	65				20	-		-	-				10		-	-				5	-	-			Creek marsh; small areas of pickerelweed but mostly saltmarsh cordgrass and big cordgrass.	I
			acres	4.5				1.4	-		-	-				0.7		-	-				0.3	-	-				
5	Skiffes Creek	0.60	%	55				10	-		5	10						-					20	-	-			Small pocket marsh; dominated by saltmarsh cordgrass; interior section mostly pickerelweed, hibiscus and cattail.	I
			acres	0.33				0.06	-		0.03	0.06						-					0.12	-	-				
6	Skiffes Creek	5.5	%	75	-			25	-		-	-						-					-	-	-			Creek marsh dominated by saltmarsh cordgrass with big cordgrass; scattered cattails along upland edge.	I
			acres	4.1	-			1.4	-		-	-						-					-	-	-				
7	Skiffes Creek	5.0	%	60	-			35	-		3	-						-					2	-	-			Creek marsh dominated by saltmarsh cordgrass with big cordgrass; interior pocket area with pickerelweed and cattails.	I
			acres	3.0	-			1.8	-		0.2	-						-					0.1	-	-				
8	Skiffes Creek	11.3	%	70	5			25	-		-	-				-							-	-	-			Creek marsh dominated by saltmarsh cordgrass with big cordgrass; pickerelweed and cattails in pockets along uplands.	I
			acres	7.9	0.6			2.8	-		-	-				-							-	-	-				

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d = Jewel Weed

e = Mock Bishop-weed
f = Water Parsnip

g = Water Hemlock
h = Marsh Pennywort

i = Arrowhead
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Section I. Skiffes Creek and Ft. Eustis

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
9	Skiffes Creek	2.9	%	65	15	-	-	15	-		5	-											-					Pocket marsh dominated by saltmarsh cordgrass; meadow grasses and cattails at head of pocket; scattered big cordgrass.	I
			acres	1.9	0.4	-	-	0.4	-		0.1	-											-						
10	Skiffes Creek	2.6	%	90	5	-	-	5	-		-	-																Saltmarsh cordgrass dominated pocket marsh; scattered big cordgrass and meadow grasses.	I
			acres	2.3	0.1	-	-	0.1	-		-	-																	
11	Skiffes Creek	1.2	%	90	-			5	-		5	-																Saltmarsh cordgrass dominated pocket marsh; some cattails at head of pocket.	I
			acres	1.1	-			0.1	-		0.1	-																	
12	Skiffes Creek	18.3	%	60	15	5	-	20	-		-	-																Large pocket marsh; saltmarsh cordgrass predominates in lower portion; some cattails at head.	I
			acres	11.1	2.7	0.9	-	3.7	-		-	-																	
13	Baileys Creek	20.0	%	85	-	5		-	-	-	-	5						-					-	5				Creek marsh section dominated by saltmarsh cordgrass; needlerush in pockets along uplands.	I
			acres	17.0	-	1.0		-	-	-	-	1.0						-					-	1.0					
14	Baileys Creek	5.3	%	60	5	-		20	-	-	-	10						5					-	-				Creek marsh section dominated by saltmarsh cordgrass with abundant big cordgrass; scattered hibiscus; muskrat lodges.	I
			acres	3.2	0.3	-		1.1	-	-	-	0.5						0.3					-	-					
15	Baileys Creek	11.3	%	80	-			15	-	-	-	5	-					-						-				Creek marsh section dominated by saltmarsh cordgrass; scattered big cordgrass and marsh hibiscus.	I
			acres	9.0	-			1.7	-	-	-	0.6	-					-						-					
16	Baileys Creek	10.8	%	30	5	-		45	-	-	-	5						5					5	5	-			Marsh section at head of creek; dominated by big cordgrass but grades upstream to fresh-water species.	XII
			acres	3.2	0.5	-		4.9	-	-	-	0.5						0.5					0.5	0.5	-				

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Section I. Skiffes Creek and Ft. Eustis

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
17	Baileys Creek	8.9	%	65	5	-		25	-	-	-	-												5				Creek marsh section dominated by saltmarsh cordgrass; stands of big cordgrass and scattered hibiscus.	I
			acres	5.8	0.4	-		2.2	-	-	-	-												0.4					
18	Baileys Creek	2.6	%	90	5	-		-				5	-			-							-	-				Pocket marsh of mostly saltmarsh cordgrass; some pickereelweed in interior sections.	I
			acres	2.3	0.1	-		-			0.1	-					-							-	-				
19	Baileys Creek	1.6	%	90	5	-		5	-		-	-				-		-					-	-				Pocketmarsh of saltmarsh cordgrass; scattered big cordgrass and hibiscus.	I
			acres	1.4	0.1	-		0.1	-		-	-					-		-					-	-				
20	Baileys Creek	4.5	%	70	-	15		-	-	-	-	5				-		5					-	5				Pocket marsh dominated by saltmarsh cordgrass; stands of needlerush with other species scattered throughout.	I
			acres	3.2	-	0.7		-	-	-	-	0.2					-		0.2					-	0.2				
21	Baileys Creek	4.4	%	80	-		-	5	-	-	-	5				-		-					-	10				Pocketmarsh near mouth of creek; mostly saltmarsh cordgrass with abundant smartweed.	I
			acres	3.5	-		-	0.2	-	-	-	0.2					-		-					-	0.4				
22	Goose Island	30.9	%	55	15	10	5	15	-	-		-						-										Extensive marsh formed between island and mainland; saltmarsh cordgrass grades to interior of high marsh species.	I
			acres	17.0	4.6	3.1	1.5	4.6	-	-		-							-										
23	Eustis Lake	6.9	%	-			-	5	20	-	35	-	5	15				5					-	15				Pocket marsh completely enclosed except for narrow tidal opening; mostly cattails with stands of reed grass, big cordgrass, and bulrush.	XII
			acres	-			-	0.3	1.4	-	2.4	-	0.3	1.0				0.3					-	1.0					
24	Milstead Island Creek	27.7	%	55	10	-	25	10	-	-	-	-	-	-				-					-	-				High diversity brackish marsh; grades upstream to areas dominated by saltbushes and saltmeadow grasses.	I
			acres	15.2	2.8	-	6.9	2.8	-	-	-	-	-	-				-					-	-					

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Section I. Skiffes Creek and Ft. Eustis

[illegible]

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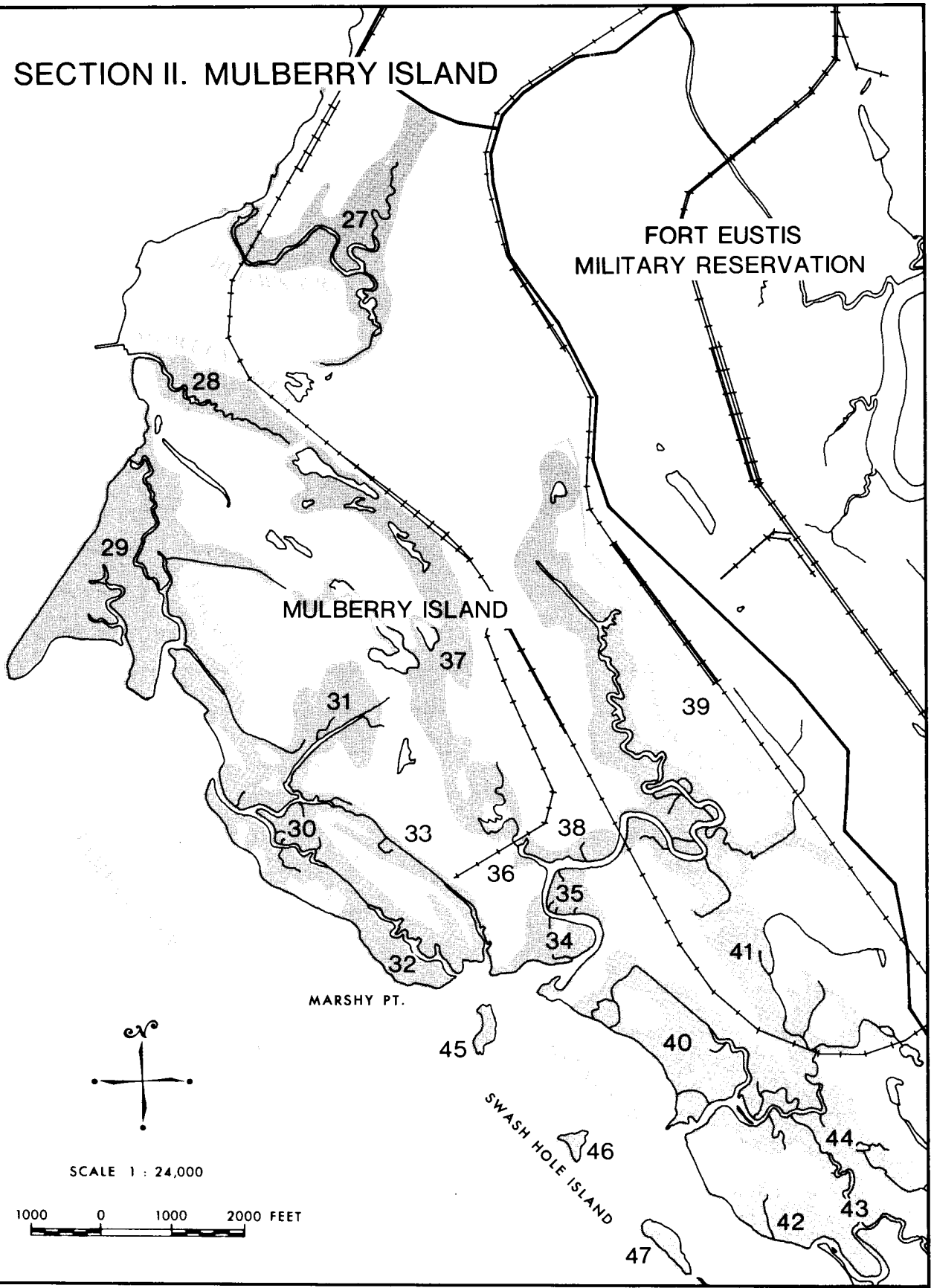
SECTION II.

MULBERRY ISLAND

This section of shoreline includes the marsh found along the tidal creeks which are located in the northern half of Mulberry Island. Most of the marshes are dominated by broad areas of black needlerush (Type III) with abundant saltmarsh cordgrass (Type I) at lower elevations, especially along the creek channels. In the upstream creek sections one finds such marsh species as hibiscus and cattails. These plants generally occur in areas where salinities are very low.

One of the important values of a black needlerush marsh is its ability to resist erosion. This value is especially appropriate along this section of the James River where these marshes help to protect the shoreline from the erosive action of storm waves and currents. The marshes also serve as important wildlife habitat and, although there has been some fill in areas, as a whole one finds them relatively undisturbed by man's activities. One branch of Morrisons Creek is periodically dammed to control the water level. Although this serves to improve the habitat for waterfowl utilization, it inhibits the beneficial exchange that would occur between the marsh and the creek were tidal flushing unimpeded.

SECTION II. MULBERRY ISLAND



Section II. Mulberry Island

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickeweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
27	Blows Creek	63.3	%	20	20	30	5	20	3	-	-	2		-		-		-					-					Creek marsh with broad areas of big cordgrass, needlerush and meadow grasses; saltmarsh cordgrass along areas of lowest elevation.	XII
			acres	12.7	12.7	19.0	3.2	12.7	1.9	-	-	1.3		-		-		-					-					Creek marsh dominated by areas of needlerush and big cordgrass; upstream boundary formed by road.	XII
28	Morley's Gut	26.0	%	5	15	40	-	40	-			-				-		-										Creek marsh dominated by areas of needlerush and big cordgrass; upstream boundary formed by road.	XII
			acres	1.3	3.9	10.4	-	10.4	-			-				-		-										Creek marsh dominated by areas of needlerush and big cordgrass; upstream boundary formed by road.	XII
29	Fort Creek	135.0	%	20	5	60	-	15	-	-	-			-														Extensive marsh dominated by stands of needlerush; saltbushes growing on berm along river shoreline; big cordgrass & reed grass dominate north end.	III
			acres	27.0	6.8	81.0	-	20.2	-	-	-			-														Extensive marsh dominated by stands of needlerush; saltbushes growing on berm along river shoreline; big cordgrass & reed grass dominate north end.	III
30	Mulberry Island	56.0	%	15	-	85	-	-	-					-														Creek marsh dominated by large stands of needlerush; saltmarsh cordgrass along creek channels; marsh extends between ridges of upland.	III
			acres	8.4	-	47.6	-	-	-					-														Creek marsh dominated by large stands of needlerush; saltmarsh cordgrass along creek channels; marsh extends between ridges of upland.	III
31	Mulberry Island	29.0	%	5	5	90	-	-	-	-	-			-														Upper section of creek marsh; almost completely black needlerush with some saltmarsh cordgrass and meadow grasses; scattered cattails along uplands.	III
			acres	1.4	1.4	26.1	-	-	-	-	-			-														Upper section of creek marsh; almost completely black needlerush with some saltmarsh cordgrass and meadow grasses; scattered cattails along uplands.	III
32	Mulberry Island	39.2	%	25	-	70	-	5	-	-																		Creek marsh dominated by black needlerush; cordgrasses along creek channels; berm with saltbushes along river shoreline.	III
			acres	9.8	-	27.4	-	2.0	-	-																		Creek marsh dominated by black needlerush; cordgrasses along creek channels; berm with saltbushes along river shoreline.	III
33	Mulberry Island	17.5	%	20	-	80	-	-																				Long, narrow pocket marsh bordered by ridge of upland; mostly needlerush with saltmarsh cordgrass along creek channels.	III
			acres	3.5	-	14.0	-	-																				Long, narrow pocket marsh bordered by ridge of upland; mostly needlerush with saltmarsh cordgrass along creek channels.	III
34	Morrisons Creek	12.5	%	20	5	75	-	-	-	-																		Creek marsh section dominated by needlerush; surrounds small wooded upland area.	III
			acres	2.5	0.6	9.4	-	-	-	-																		Creek marsh section dominated by needlerush; surrounds small wooded upland area.	III

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Section II. Mulberry Island

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
35	Morrison's Creek	7.3	%	20	-	80		-	-	-																		Creek marsh dominated by needlerush; saltmarsh cordgrass in low areas along channels.	III
			acres	1.5	-	5.8		-	-	-																			
36	Morrison's Creek	1.1	%	20	-	80	-	-																				Pocket marsh dominated by needlerush; some saltmarsh cordgrass in areas of lowest elevations.	III
			acres	0.2	-	0.9	-	-																					
37	Morrison's Creek	85.0	%	-		98		-	-	-	2	-	-			-		-						-				Upper section of creek branch above dirt road; irregularly flooded through weir under road; waterfowl management area.	III
			acres	-		83.3		-	-	-	1.7	-	-			-		-						-					
38	Morrison's Creek	7.9	%	20	-	80	-	-	-																			Creek marsh section dominated by needlerush; saltmarsh cordgrass along creek channels.	III
			acres	1.6	-	6.3	-	-	-																				
39	Morrison's Creek	123.0	%	15	10	65	-	5	-	-	2	3			-													Creek marsh above railroad crossing; lower portion dominated by black needlerush; cattails and hibiscus in most upstream section.	III
			acres	18.4	12.3	80.0	-	6.2	-	-	2.5	3.7			-														
40	Mulberry Island	91.0	%	30	3	65	1	1	-	-	-																	Extensive creek marsh area; dominated by needlerush with saltmarsh cordgrass along drainage creeks; scattered big cordgrass.	III
			acres	27.3	2.7	59.2	0.9	0.9	-	-	-																		
41	Mulberry Island	38.5	%	15	5	70	-	10	-		-	-			-	-		-										Upper section of creek marsh; dominated by needlerush with cordgrass along channels; cattails, hibiscus, threesquares in most upstream areas.	III
			acres	5.8	1.9	27.0	-	3.8	-		-	-			-	-		-											
42	Mulberry Island	18.1	%	10	-	85	3	2	-																			Broad pocket marsh; mostly needlerush with saltmarsh cordgrass along channels and in fringe across front of marsh.	III
			acres	1.8	-	15.4	0.5	0.4	-																				

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Section II. Mulberry Island

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereiwed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
43	Mulberry Island	22.5	%	65	5	25	-	5	-	-																		Creek marsh dominated by salt-marsh cordgrass with stands of needlerush; big cordgrass along upland edges and scattered throughout marsh.	I
			acres	14.6	1.1	5.6	-	1.1	-	-																			
44	Mulberry Island	24.0	%	30	5	60	-	5	-		-				-													Upstream section of creek marsh dominated by needlerush with saltmarsh cordgrass along creek channels.	III
			acres	7.2	1.2	14.4	-	1.2	-		-					-													
45	Swash Hole Island	3.1	%	20	20	30	30	-	-								-			-								Marsh island dominated by high marsh species; some erosion evident.	XII
			acres	0.6	0.6	0.9	0.9	-	-									-			-								
46	Swash Hole Island	2.2	%	40	20	10	30	-	-								-			-								Marsh island; saltbushes around perimeter ; interior mostly saltmeadow grasses and salt-marsh cordgrass.	XII
			acres	0.9	0.4	0.2	0.7	-	-									-			-								
47	Swash Hole Island	4.1	%	30	10	30	30	-	-								-			-								Marsh island; interior dominated by saltbushes and needlerush; fringed by saltmarsh cordgrass.	XII
			acres	1.2	0.4	1.2	1.2	-	-									-			-								
	Total Section II	806.3	%	18	6	66	1	7	-	-	1	1		-	-	-	-	-		-			-	-					
			acres	147.7	46.0	535.1	7.4	58.9	1.9	-	4.2	5.0		-	-	-	-	-		-				-	-				

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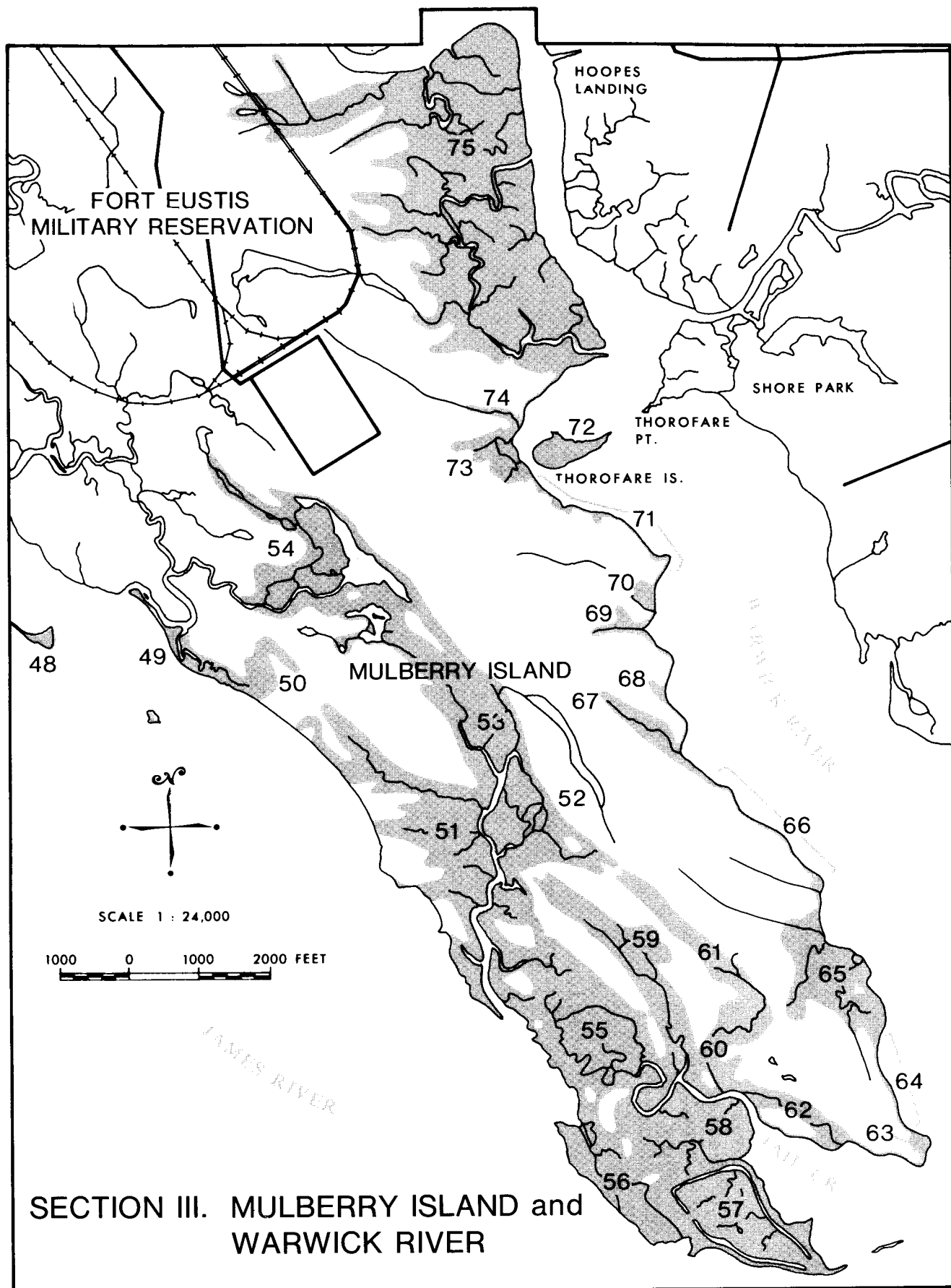
SECTION III

MULBERRY ISLAND AND WARWICK RIVER

The remainder of the tidal marshes found along the James River shoreline of Mulberry Island are included in this section. Most of these creeks marsh areas are dominated by either saltmarsh cordgrass (Type I) or black needlerush (Type III). Scattered throughout areas of higher elevation are saltmeadow grasses (Type II) as well as other high marsh species. These marshes, as well as helping to protect this section of shoreline from erosion, are an important waterfowl and wildlife habitat. They also are an important source of organic material for the James River estuary.

A large marsh area at the southern tip of Mulberry Island apparently had been previously diked and used as a disposal area for dredged sediments. Natural erosive forces have breached the dikes in many places and have allowed the interior to be recolonized with marsh plants. The resultant increase in elevation, however, has resulted in a change in the plant species composition from that found in adjacent areas. Big cordgrass (Type V) which is generally found at elevations of mean high water and above covers a large portion of this marsh. Less desirable species such as reed grass (Type VIII) and saltbushes (Type IV) have also invaded certain areas including the remnants of the old dikes.

Those marshes found along the Warwick River shoreline include a variety of species such as: saltmarsh cordgrass, black needlerush, big cordgrass, saltmeadow grasses and saltbushes. They are found in both fringe and pocket marsh areas as well as in one large, extensive marsh (#75). These marshes have remained relatively undisturbed by man's activities and in such a state help to maintain the high productivity of the Warwick River.



SECTION III. MULBERRY ISLAND and
WARWICK RIVER

Section III. Mulberry Island and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
48	Swash Hole Island	1.4	%	30	20	20	30	-	-								-			-								Marsh island; interior of saltbushes, needlerush and meadow grasses; fringed by saltmarsh cordgrass.	XII
			acres	0.4	0.3	0.3	0.4	-	-									-			-								
49	Mulberry Island	7.1	%	70	5	20	5	-	-	-																		Creek marsh branch; berm with saltbushes formed along James River shoreline; interior of marsh mostly saltmarsh cordgrass.	I
			acres	5.0	0.4	1.4	0.4	-	-	-																			
50	Mulberry Island	6.8	%	5	15	50	30	-	-						-													Pocket marsh; dominated by high marsh species; large stands of needlerush predominate.	III
			acres	0.3	1.0	3.4	2.0	-	-						-														
51	Mulberry Island	63.7	%	20	20	60	-	-		-					-													Creek marsh dominated by needlerush with saltmarsh cordgrass along channels; areas of meadow grasses extend to river between pine woods.	III
			acres	12.7	12.7	38.2	-	-		-					-														
52	Mulberry Island	35.5	%	30	20	50	-	-		-					-													Creek marsh section dominated by needlerush; saltmarsh cordgrass along drainage creeks; other species scattered throughout.	III
			acres	10.6	7.1	17.8	-	-		-					-														
53	Mulberry Island	38.1	%	20	15	60	5	-	-	-	-				-													Upper section of creek marsh; dominated by needlerush with saltmarsh cordgrass and meadow areas; grades upstream to high marsh of saltbushes & meadow.	III
			acres	7.6	5.7	22.9	1.9	-	-	-	-				-														
54	Mulberry Island	73.4	%	20	25	45	2	-	-	-	-	5		-	3			-										Upper section of creek marsh; dominated by needlerush with saltmarsh cordgrass along creeks; threesquare in pockets along uplands.	XII
			acres	14.7	18.4	33.0	1.5	-	-	-	-	3.7		-	2.2			-											
55	Jail Creek	81.5	%	40	5	50	5	-	-	-				-	-													Extensive marsh area drained by two creeks; mixture of saltmarsh cordgrass and needlerush areas; other species scattered throughout.	III
			acres	32.6	4.1	40.8	4.1	-	-	-				-	-														

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j = Cutgrass

Section III. Mulberry Island and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickersweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type	
56	Jail Point	33.7	%	80	10	10	-	-	-	-																		Extensive marsh area dominated by saltmarsh cordgrass; extends back to upland islands of pine, myrtle, cedar, magnolia.	I	
			acres	27.0	3.4	3.4	-	-	-	-																				
57	Jail Point	35.4	%	30	10	25	15	20	-					-															Diked marsh surrounded by berm with saltbushes; dike breached in many places allowing tidal flushing to interior.	XII
			acres	10.6	3.5	8.8	5.3	7.1	-					-																
58	Jail Creek	42.6	%	50	5	40	5	-	-	-					-														Extensive creek marsh area; extends south to diked marsh area and west to small upland ridges.	I
			acres	21.3	2.1	17.0	2.1	-	-	-					-															
59	Jail Creek	42.5	%	10	15	60	15	-	-	-					-														Creek marsh branch; dominated by needlerush with saltbushes and meadow grasses more abundant in upstream portion.	III
			acres	4.2	6.4	25.5	6.4	-	-	-					-															
60	Jail Creek	11.2	%	50	5	35	5		5						-														Lower section of creek marsh branch; dominated by saltmarsh cordgrass with large stands of needlerush; partially crossed by remnants of old dike.	I
			acres	5.6	0.6	3.9	0.6		0.6						-															
61	Jail Creek	18.3	%	20	25	35	20		-		-				-		-												Upper section of creek marsh branch; dominated by high marsh species of needlerush, saltbushes meadow grasses; saltmarsh cordgrass along creek channels.	XII
			acres	3.7	4.6	6.5	3.7		-		-				-		-													
62	Jail Creek	11.3	%	60	10	30	-	-	-						-														Long pocket marsh extends behind area of upland woods; open to tidal flushing at both ends.	I
			acres	6.8	1.1	3.4	-	-	-						-															
63	Curtis Point	1.9	%	20	15	20	40	5	-						-		-												Spit marsh dominated by high marsh species; saltmarsh cordgrass fringe along river and in small interior section.	XII
			acres	0.4	0.3	0.4	0.8	0.1	-						-		-													

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d = Jewel Weed

e = Mock Bishop-weed
f = Water Parsnip

g = Water Hemlock
h = Marsh Pennywort

i = Arrowhead
j = Cutgrass

Section III. Mulberry Island and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type	
64	Warwick River	0.60	%	40	10	30	15	5	-																			Marsh fringe along section of shoreline; average width 20 ft; predominately saltmarsh cordgrass and black needlerush.	XII	
			acres	0.24	0.06	0.18	0.09	0.03	-																					
65	Warwick River	30.0	%	15	20	55	5	5	-		-			-															Large pocket marsh dominated by needlerush; surrounds small upland area of pine.	III
			acres	4.5	6.0	16.5	1.5	1.5	-			-			-															
66	Warwick River	0.80	%	25	10	40	20	5	-		-																		Marsh fringe dominated by needlerush and saltmarsh cordgrass; saltbushes and meadow-grasses along upland edge.	XII
			acres	0.20	0.08	0.32	0.16	0.04	-			-																		
67	Warwick River	5.8	%	45	10	40	2	2	-		-			1															Pocket marsh of saltmarsh cordgrass and black needlerush; other species mostly along upland edge.	XII
			acres	2.6	0.6	2.3	0.1	0.1	-			-			0.1															
68	Warwick River	0.90	%	40	10	25	5	15	-		5																		Pocket marsh with saltmarsh cordgrass and needlerush most abundant; interior of marsh mostly big cordgrass and saltbushes.	XII
			acres	0.36	0.09	0.22	0.04	0.14	-			0.04																		
69	Warwick River	4.7	%	40	5	45	5	-	5		-																		Pocket marsh with large stands of black needlerush; saltmarsh cordgrass along creek channels and other low areas.	XII
			acres	1.9	0.2	2.1	0.2	-	0.2			-																		
70	Warwick River	2.3	%	35	10	35	20	-	-		-																		Pocket marsh dominated by high marsh areas; saltmarsh cordgrass abundant in several sections.	XII
			acres	0.8	0.2	0.8	0.5	-	-			-																		
71	Warwick River	2.0	%	50	5	30	5	10	-		-				-														Marsh fringe (5 - 20 ft. wide) along section of shoreline; includes several pocket marshes with high marsh species.	I
			acres	1.0	0.1	0.6	0.1	0.2	-			-				-														

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f = Water Parsnip

g = Water Hemlock
h = Marsh Pennywort

i = Arrowhead
j = Cutgrass

Section III. Mulberry Island and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type	
72	Thorofare Island	7.2	%	55	-	45		-	-																			Marsh island; a mixture of saltmarsh cordgrass and black needlerush areas.	I	
			acres	4.0	-	3.2		-	-																					
73	Warwick River	10.8	%	60	-	35	-	5	-		-				-													Pocket marsh dominated by saltmarsh cordgrass with black needlerush; big cordgrass and cattails along uplands.	I	
			acres	6.5	-	3.8	-	0.5	-		-					-														
74	Warwick River	1.5	%	35	20	30	10	5	-		-				-													Pocket marsh with lower portion dominated by saltmarsh cordgrass and black needlerush; interior grades to high marsh.	XII	
			acres	0.5	0.3	0.4	0.2	0.1	-		-					-														
75	Warwick River	232.5	%	15	30	35	10	10	-		-				-													Extensive marsh dominated by areas of needlerush and meadow; saltmarsh cordgrass along creeks and river; meadow and big cordgrass in pocket along upland.	XII	
			acres	34.9	69.8	81.4	23.2	23.2	-		-					-														
	Total Section III	803.5	%	28	19	42	7	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
			acres	221.0	149.1	338.4	55.3	33.0	0.8	-	0.04	3.7	-	2.3	-	-	-	-	-	-	-	-	-	-	-	-	-			-

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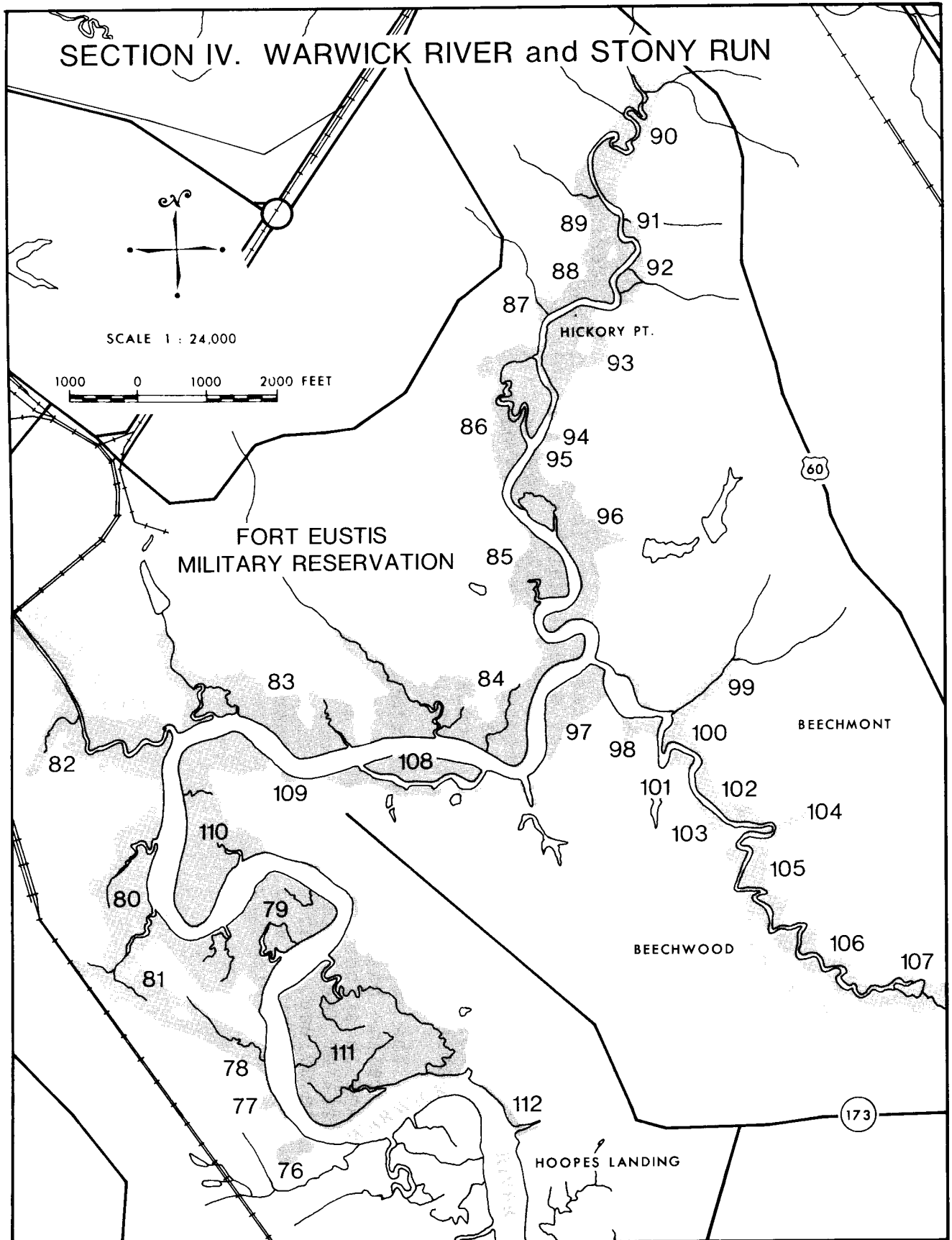
SECTION IV

WARWICK RIVER AND STONEY RUN

This section of shoreline includes the majority of marsh areas found along the Warwick River and its tributaries. Generally, the marshes are characterized by brackish water species with abundant saltmarsh cordgrass (Type I) and big cordgrass (Type V). Proceeding upstream however, certain species such as black needlerush and salt-meadow grasses are replaced by species which tolerate only low salinity or freshwater. Marsh hibiscus, marsh mallow, and cattails are several of these. At the head of Stoney Run the brackish water plants have been replaced by freshwater species (Type XI). This is a particularly interesting area in that it contains a large stand of wild rice. This valuable freshwater marsh plant is found nowhere else in the city.

The recent urban growth along much of this section Newport News shoreline has resulted in the destruction of small areas of marsh at many locations. Most of this destruction occurs either directly as fill or indirectly through poor containment of sediment runoff from the upland. Unfortunately, continued destruction of wetland areas can only contribute to the deterioration of water quality and productivity of the Warwick River.

SECTION IV. WARWICK RIVER and STONY RUN



Section IV. Warwick River and Stony Run

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickeweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
76	Warwick River	2.6	%	70	-	10	-	20	-		-																	Pocket marsh; dominated by saltmarsh cordgrass with big cordgrass along upland; berm partially across front of marsh.	I
			acres	1.8	-	0.3	-	0.5	-		-																		
77	Warwick River	0.90	%	30	-	25		45	-		-	-			-													Pocket marsh; dike across front has been broken through allowing tidal flushing to interior.	XII
			acres	0.27	-	0.22		0.40	-		-	-			-														
78	Warwick River	8.3	%	25	10	20	-	40	2		-	-			3													Pocket marsh; dominated by big cordgrass and saltmarsh cordgrass; interior portions grade to high marsh mixed with trees.	XII
			acres	2.1	0.8	1.7	-	3.3	0.2		-	-			0.3														
79	Warwick River	45.5	%	45	5	35	5	10	-	-	-	-			-													Saltbushes form ridge along river's edge; interior of marsh a mixture of needlerush, cordgrass and meadow areas.	XII
			acres	20.5	2.3	15.9	2.3	4.6	-	-	-	-			-														
80	Warwick River	33.6	%	20	5	35	5	35	-	-	-	-		-	-													Broad creek marsh; extends back around upland areas; dominated by big cordgrass and needlerush areas; saltmarsh cordgrass along creek channels.	XII
			acres	6.7	1.7	11.8	1.7	11.8	-	-	-	-		-	-														
81	Warwick River	10.3	%	5	-	85	2	3	-		3	-		-	2													Interior section of creek marsh; almost completely black needlerush which grades to uplands; pocket of cattails.	III
			acres	0.5	-	8.8	0.2	0.3	-		0.3	-		-	0.2														
82	Butlers Gut	32.0	%	25	5	25	15	30	-		-	-		-	-													Disturbed area near mouth that is overgrown with saltbushes; berm of saltbushes parallels dredged creek channel; connects with Milstead Island Creek.	XII
			acres	8.0	1.6	8.0	4.8	9.6	-		-	-		-	-														
83	Warwick River	39.9	%	50	-	20	-	30	-	-	-	-						-										Broad creek marsh extends back to several pocket areas that are mostly needlerush; remainder of marsh dominated by cordgrass.	I
			acres	20.0	-	8.0	-	12.0	-	-	-	-						-											

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g = Water Hemlock
h = Marsh Pennywort

i = Arrowhead
j = Cutgrass

Section IV. Warwick River and Stoney Run

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
84	Warwick River	54.2	%	30	5	20	3	40	1	-	-	1																Extensive creek marsh; mostly a mixture of saltmarsh cordgrass and big cordgrass areas with large stands of needlerush.	XII
			acres	16.3	2.7	10.8	1.6	21.7	0.5	-	-	0.5																	
85	Warwick River	13.0	%	85	-			15	-	-	-	-							-					-		-	i,-	Creek marsh dominated by saltmarsh cordgrass with scattered big cordgrass; cattails along upland edge.	I
			acres	11.0	-			2.0	-	-	-	-							-					-		-	i,-		
86	Warwick River	24.9	%	65	-			5	-	5	-	5	-			5			10		-			5		-	i,-	Creek marsh dominated by saltmarsh cordgrass; other species scattered throughout.	I
			acres	16.2	-			1.2	-	1.2	-	1.2	-			1.2			2.5		-			1.2			i,-		
87	Warwick River	0.80	%	65				10		-	5	10	5			-		-	-		-			5		-	i,-	Pocket marsh dominated by saltmarsh cordgrass; other species scattered throughout.	I
			acres	0.52				0.08		-	0.04	0.08	0.04			-		-	-		-			0.04		-	i,-		
88	Warwick River	6.2	%	45				-		-	-	10	5			10		-	25		-	-	-	-		-	i,-	Creek marsh; mixture of freshwater and brackish species.	XII
			acres	2.8				-		-	-	0.6	0.3			0.6		-	1.6		-	-	-	-		-	i,-		
89	Warwick River	11.3	%	35			15			-	5	10	10			-		-	20		-	-	-	-		-	j,5	Berm with saltbushes along channel edge; interior of marsh largely saltmarsh cordgrass mixed with freshwater species.	XII
			acres	4.0			1.7			-	0.6	1.1	1.1			-		-	2.3		-	-	-	-		-	j,0.6		
90	Warwick River	17.8	%	10			35			-	5	10	5			-		-	10		-	-	-	-		-	b,-	Creek marsh at head of river; dominated by saltbushes with other species scattered throughout.	XII
			acres	1.8			6.2			-	0.9	1.8	0.9			-		-	1.8		-	-	-	-		-	j,2.7		
91	Warwick River	1.3	%	45			5	20		15		5	-			-		-	5		-		-	-		-	j,5	Creek marsh section; berm with saltbushes along channel edge; interior mostly saltmarsh cordgrass and big cordgrass.	XII
			acres	0.6			0.1	0.3		0.2		0.1	-			-		-	0.1		-		-	-		-	j,0.1		

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Section IV. Warwick River and Stony Run

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
92	Warwick River	3.7	%	45			-	-		-		5	5			10				30			-			-	i,- j,5	Creek marsh section; dominated by saltmarsh cordgrass with abundant loosestrife.	XII
			acres	1.7			-	-		-		0.2	0.2			0.4				1.1			-			-	i,- j,0.2		
93	Warwick River	14.7	%	45	-	-	5	-		-	5	10	5			5				25				-		-	b,- i,- j,-	Creek marsh dominated by saltmarsh cordgrass and loosestrife extends back around upland to area dominated by hibiscus.	XII
			acres	6.6	-	-	0.7	-		-	0.7	1.5	0.7			0.7				3.7				-		-	b,- i,- j,-		
94	Warwick River	0.60	%	65	-			10		5	10	5	5			-										-		Small pocket marsh dominated by saltmarsh cordgrass; cattails and big cordgrass abundant in interior.	I
			acres	0.39	-			0.06		0.03	0.06	0.03	0.03			-										-			
95	Warwick River	0.05	%	45		-		5		-	5	10	30			-			5							-	b,- i,-	Pocket marsh; interior area mostly hibiscus and marsh mallow; cordgrasses dominate lower portion.	XII
			acres	0.22		-		0.02		-	0.02	0.05	0.15			-			0.02							-	b,- i,-		
96	Warwick River	29.5	%	55	-			30	-	5	-	-	-			-			5					5		-	i,-	Extensive creek marsh dominated by cordgrass and big cordgrass; water hemp scattered throughout	I
			acres	16.2	-			8.8	-	1.5	-	-	-			-			1.5					1.5		-	i,-		
97	Warwick River	11.5	%	75	5			15	-	-	-	-	-	5	-				-									Creek marsh along both Stony Run and Warwick River; interior section partially filled; reed grasses along upland.	I
			acres	8.6	0.6			1.7	-	-	-	-	-	0.6	-				-										
98	Stony Run	3.1	%	80	-			15	-	-	-	-	5						-									Creek marsh dominated by saltmarsh cordgrass with stands of big cordgrass; hibiscus and mallow scattered throughout.	I
			acres	2.5	-			0.5	-	-	-	-	0.2						-										
99	Stony Run	5.6	%	55	5	-	-	35	-	-	-	5	-	-		-			-					-	-			Pocket marsh dominated by big cordgrass and saltmarsh cordgrass; scattered hibiscus with patches of reed grass.	I
			acres	3.1	0.3	-	-	2.0	-	-	-	0.3	-	-		-			-					-	-				

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Section IV. Warwick River and Stony Run

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickrelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
100	Stony Run	1.9	%	45		-		40	-			10	5			-			-				-					Creek marsh section dominated by saltmarsh cordgrass and big cordgrass; hibiscus and mallow scattered throughout.	XII
			acres	0.9		-		0.8	-			0.2	0.1			-			-				-						
101	Stony Run	1.8	%	65	-			30	-	-		-	5	-					-									Creek marsh dominated by saltmarsh cordgrass; big cordgrass along upland; hibiscus and mallow scattered throughout.	I
			acres	1.2	-			0.5	-	-		-	0.1	-					-										
102	Stony Run	5.0	%	65	-	-	-	30		-	-	-	5						-				-	-				Creek marsh dominated by a mixture of saltmarsh cordgrass and big cordgrass; interior section along upland has been filled.	I
			acres	3.2	-	-	-	1.5		-	-	-	0.2						-				-	-					
103	Stony Run	1.9	%	80		-		20		-	-	-	-						-									Creek marsh dominated by saltmarsh cordgrass; marsh has been dredged in several places to provide small boat slips.	I
			acres	1.5		-		0.4		-	-	-	-						-										
104	Stony Run	20	%	40				60	-	-	-	-	-											-				Branch of creek where main channel has been altered by highway construction; marsh extends to pocket area above road.	V
			acres	0.8				1.2	-	-	-	-	-											-					
105	Stony Run	13.0	%	20				35		-	-	25	-			10							10	-	-		c,-	Creek marsh section; saltmarsh and big cordgrass as well as hibiscus are most abundant; pickerelweed and threesquare in upstream portion only.	XII
			acres	2.6				4.6		-	-	3.2	-			1.3							1.3	-	-		c,-		
106	Stony Run	10.3	%	25				40		-		35				-							-	-	-		c,-	Creek marsh section; includes mixture of brackish and freshwater species.	XII
			acres	2.6				4.1		-		3.6				-							-	-	-		c,-		
107	Stony Run	9.5	%	-				-		-	5	15	-			5							20	5			c,50	Upstream portion of creek; freshwater species, especially wild rice, dominate.	XI
			acres	-				-		-	0.5	1.4	-			0.5							1.9	0.5			c,4.8		

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Section IV. Warwick River and Stony Run

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type			
108	Warwick River	16.5	%	50	-	5		35	-	-	-	-	5	-					5							-		Creek marsh with wide channel extending across marsh; open to river at both ends.	I			
			acres	8.2	-	0.8		5.8	-	-	-	-	0.8	-						0.8						-						
109	Warwick River	0.50	%	95				5	-	-		-																Small pocket marsh dominated by saltmarsh cordgrass; big cordgrass along upland edge.	I			
			acres	0.48				0.02	-	-		-																				
110	Warwick River	48.3	%	35	5	30	-	30	-	-	-	-	-		-				-									Extensive creek marsh; dominated by big cordgrass and saltmarsh cordgrass; several large areas of needlerush.	XII			
			acres	16.9	2.4	14.5	-	14.5	-	-	-	-	-	-	-		-				-											
111	Warwick River	98.4	%	30	20	15	5	30	-	-	-	-	-		-													Extensive creek marsh; large areas of meadow grasses, big cordgrass, saltmarsh cordgrass and black needlerush.	XII			
			acres	29.5	19.7	14.8	4.9	29.5	-	-	-	-	-	-	-		-															
112	Hoopes Landing	2.0	%	10	35	30	10	15	-		-				-													Includes area of high marsh fringe along river; extends back to pocket marsh area dominated by needlerush.	XII			
			acres	0.2	0.7	0.6	0.2	0.3	-		-		-		-		-															
	Total Section IV	582.9	%	38	6	17	4	25	-	-	-	3	1	-	-	1		-	3		-	-	1	1			b,- c,1	e,- f,-	g,- h,-	i,- j,1		
acres			220.5	32.8	96.2	24.4	144.1	0.7	2.9	2.5	15.9	4.8	0.6	0.5	4.7		-	15.4		-	-	3.2	3.2				b,- c,4.8	e,- f,-	g,- h,L8	i,- j,3.9		

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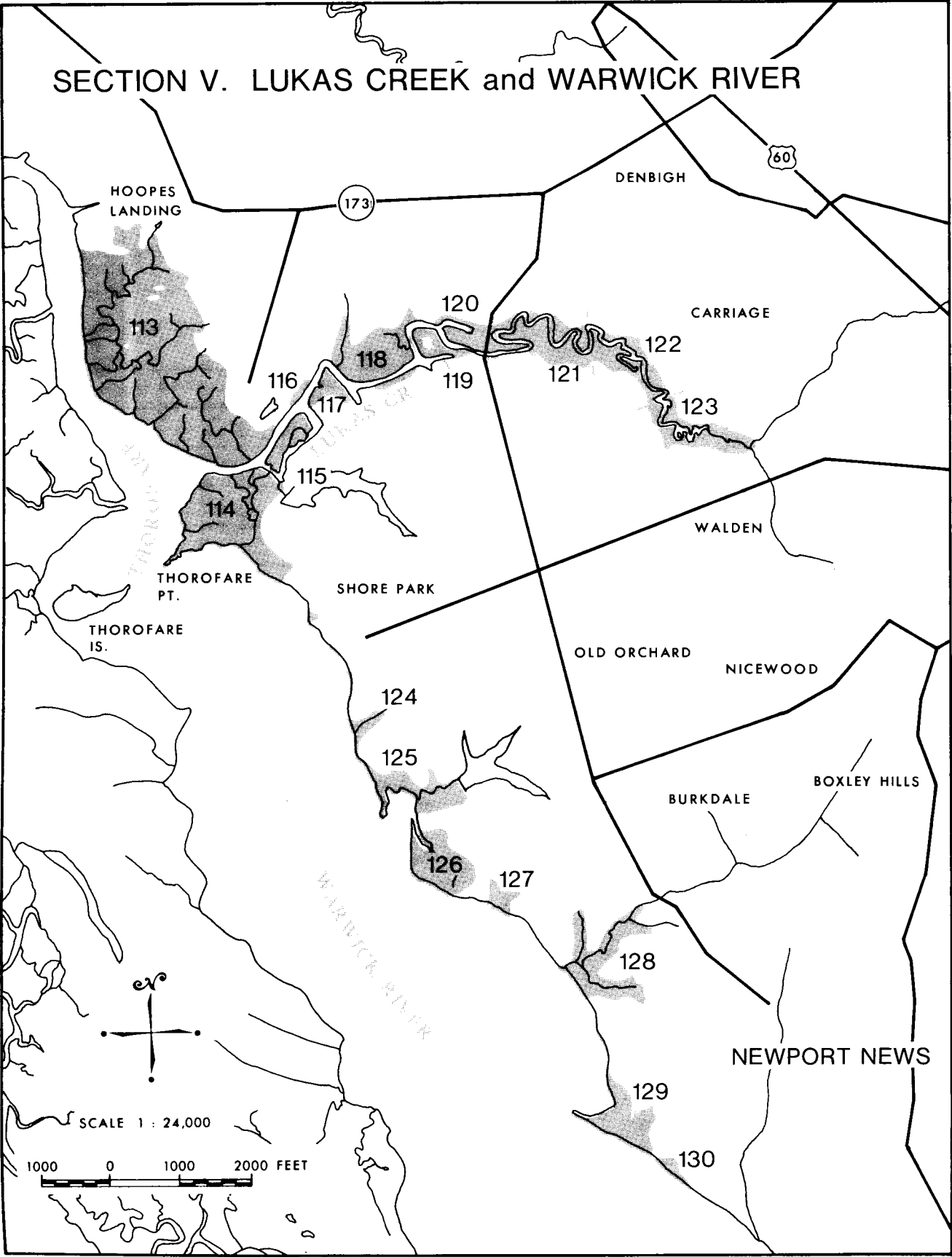
SECTION V

LUKAS CREEK AND WARWICK RIVER

The tidal marshes found along this section of Warwick River shoreline are predominately of saltmarsh cordgrass with areas of black needle-rush and saltmeadow grasses. As such, they would be Type I or Type XII marsh communities and are considered of highest value to the marine environment. Much of the marsh remains relatively undisturbed. However, several creek marsh areas have been dammed to form non-tidal lakes. Other areas adjacent to residential developments have been filled.

Those marsh areas found along portions of Lukas Creek have fared less well than those along the Warwick River. Several marsh areas at the mouth of the creek have apparently been used as a dump for trash and other refuse. Other areas along the lower half of the creek have been used as disposal areas for dredged spoil. The effects of this destruction are very evident, with areas of unvegetated sand covering what was once saltmarsh cordgrass (Type I) dominated wetlands. Areas which were not completely destroyed have managed natural recolonization and are now vegetated with high marsh species such as saltbushes (Type III).

Those marsh areas found along the upper portion of Lukas Creek are largely undisturbed. Big cordgrass is very abundant, along with other species such as marsh hibiscus and marsh mallow which tolerate only low salinities. Some freshwater species including pickerelweed are found at the head of the creek. If left alone, these marshes will continue to provide excellent waterfowl and wildlife habitats.



Section V. Lukas Creek and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
121	Lukas Creek	16.4	%	25	10		25	20	-	-	-	10	5										5					Largely undisturbed creek marsh section above highway bridge; dominated by cordgrass mixed with saltbushes; scattered hibiscus and mallow.	XII
			acres	4.1	1.6		4.1	3.3	-	-	-	1.6	0.8										0.8						
122	Lukas Creek	10.3	%	15	-			50	-		-	15	5										15					Creek marsh section dominated by big cordgrass; saltmarsh cordgrass only as fringe along channels; hibiscus scattered throughout.	V
			acres	1.5	-			5.2	-		-	1.5	0.5										1.5						
123	Lukas Creek	11.1	%	-				5		-	-	40	25			-							5	25			f, - b, -	Most upstream section of Lukas Creek marsh; dominated by hibiscus and mallow with fresh-water species evident.	XI
			acres	-				0.6		-	-	4.4	2.8			-							0.6	2.8			f, - b, -		
124	Lukas Creek	1.7	%	85	5	5		-	-	-	5	-	-															Pocket marsh dominated by saltmarsh cordgrass; cattails in interior section.	I
			acres	1.4	0.1	0.1		-	-	-	0.1	-	-																
125	Warwick River	10.8	%	85	5	10	-	-	-	-	-	-	-															Creek marsh dominated by saltmarsh cordgrass with scattered patches of needlerush; upstream portion of creek dammed to form lake.	I
			acres	9.2	0.5	1.1	-	-	-	-	-	-	-																
126	Warwick River	14.0	%	65	10	25	-	-	-	-	-	-	-			-												Pocket marsh; narrow upland berm with trees along river shoreline; marsh grades from saltmarsh cordgrass back to stands of needlerush and meadow grasses.	I
			acres	9.1	1.4	3.5	-	-	-	-	-	-	-			-													
127	Warwick River	2.2	%	80	5	15	-	-	-	-	-	-	-															Pocket marsh; dominated by saltmarsh cordgrass with scattered patches of needlerush.	I
			acres	1.7	0.1	0.3	-	-	-	-	-	-	-																
128	Warwick River	12.2	%	85	10	-	5	-	-	-	-	-	-															Pocket marsh with several branches; several areas filled adjacent to residential development.	I
			acres	10.4	1.2	-	0.6	-	-	-	-	-	-																

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b = Swamp Milkweed

c = Wild Rice
d = Jewel Weed

e = Mock Bishop-weed
f = Water Parsnip

g = Water Hemlock
h = Marsh Pennywort

i = Arrowhead
j = Cutgrass

Section V. Lukas Creek and Warwick River

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickersweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
129	Warwick River	9.2	%	55	10	25	5	5	-	-	-	-	-															Narrow berm with saltbushes along river side; interior of marsh mostly saltmarsh cordgrass, needlerush and big cordgrass along uplands.	I
			acres	5.1	0.9	2.3	0.5	0.5	-	-	-	-	-																
130	Warwick River	1.6	%	10	-	10	-	5	-	-	35	30	10	-		-								-		-		Pocket marsh; saltmarsh cordgrass and needlerush across front of marsh; interior dominated by cattails and hibiscus.	XII
			acres	0.2	-	0.2	-	0.1	-	-	0.6	0.5	0.2	-		-								-		-			
	Total Section V	268.4	%	31	22	23	6	11	-	-	-	3	2	-	-	-							-	2		-	a, - b, - c, -		
			acres	82.8	57.7	62.2	15.9	30.7	-	-	0.72	8.0	4.5	-	-	-								0.6	5.1		-		

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SECTION VI

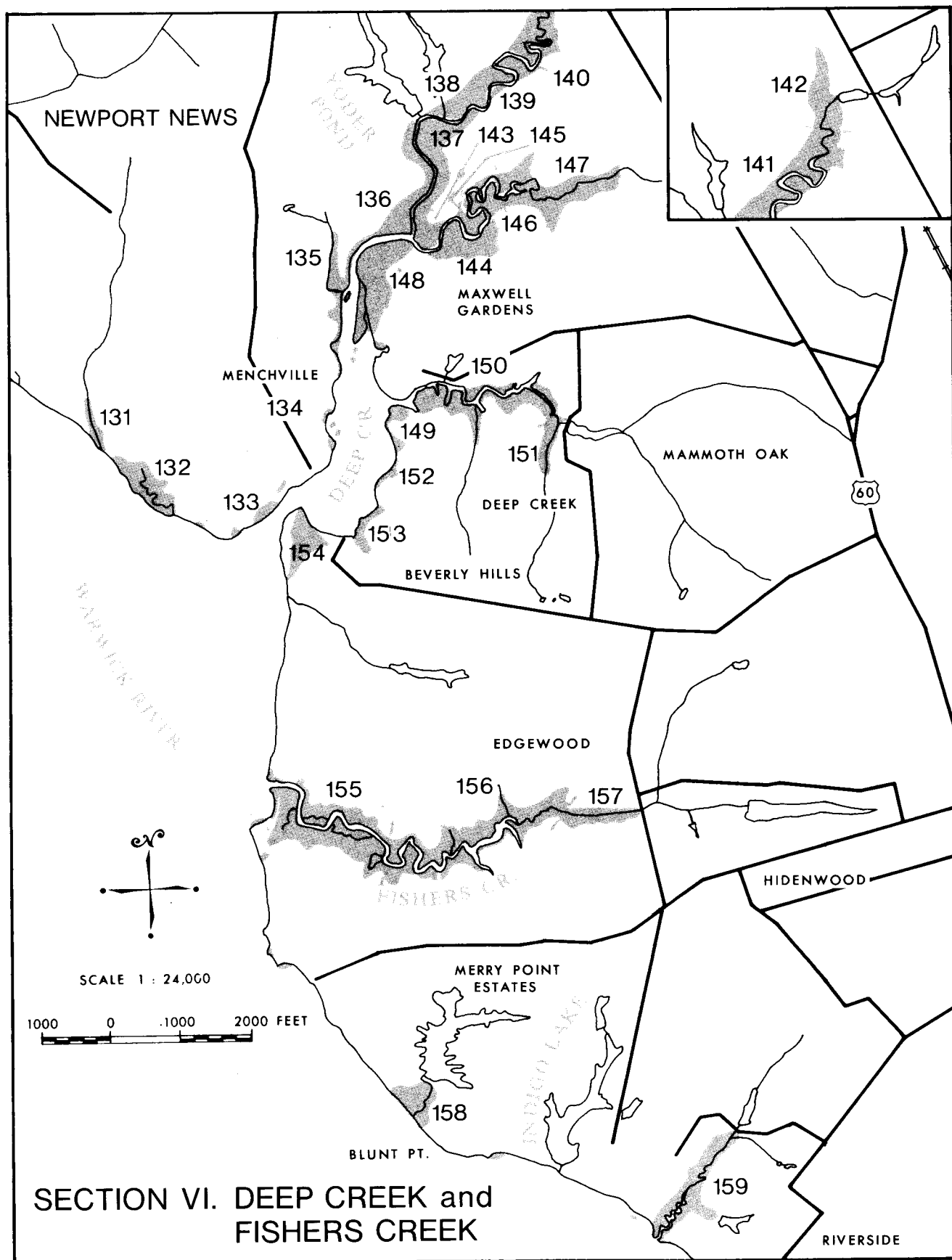
DEEP CREEK AND FISHERS CREEK

Deep Creek includes some of the most heavily impacted wetland areas within the City of Newport News. Much of this destruction has been caused by the City itself, where uncontained spoil from its landfill has been pushed out over several acres of Type I wetlands (#136). Only the ability of the remaining marsh to act as a filter and trap these upland sediments is preventing the direct contamination and siltation of the creek channel.

The marshes found along one branch of Deep Creek (#150) have been smothered by spoil deposition as a result of channel dredging. Besides leaving large areas of unvegetated sand on previously productive salt-marshes, much of the material has eroded back into the dredged channels, thus accelerating their resiltation and contributing to demands for maintenance dredging.

Those marshes found at the head of Deep Creek have remained relatively undisturbed in contrast to those along the rest of the creek. Most areas are dominated by either saltmarsh cordgrass or big cordgrass while some freshwater species such as pickerelweed are able to exist in the most upstream sections. These marshes produce abundant organic material which is of importance to the rest of the creek system. At the same time they are valuable habitats for fish, waterfowl and other wildlife.

The marshes found within Fishers Creek have also remained undisturbed in spite of surrounding urban development. Saltmarsh cordgrass dominates this creek marsh system and as such the wetlands would be consider Type I, of highest value to the marine environment.



Section VI. Deep Creek and Fishers Creek

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
131	Warwick River	3.0	%	10	-	10	-	5	-	-	35	30	10															Pocket marsh; saltmarsh cordgrass and black needlerush at mouth of marsh; interior dominated by cattails and hibiscus.	XII
			acres	0.3	-	0.3	-	0.2	-	-	1.0	0.9	0.3																
132	Warwick River	7.4	%	90	5	-	5	-	-	-	-	-	-															Berm across front of marsh covered with saltbushes and meadow grasses; saltmarsh cordgrass dominates interior with cattails and big cordgrass along uplands.	I
			acres	6.7	0.4	-	0.4	-	-	-	-	-	-																
133	Deep Creek	0.80	%		10		10	80	-			-																Pocket marsh partially behind sand beach; slowly being destroyed by dirt fill, automobile parking, trash dumping.	V
			acres		0.08		0.08	0.64	-			-																	
134	Deep Creek	1.0	%	90	-	5	-	5	-	-	-																	Fringe and pocket marsh areas along section of shoreline; dominated by saltmarsh cordgrass with other species along upland border.	I
			acres	0.9	-	0.05	-	0.05	-	-	-																		
135	Deep Creek	1.8	%	99	-	-	-	1	-	-	-	-																Pocket marsh almost entirely of saltmarsh cordgrass; upper portion has been filled by extension of Newport News City dump.	I
			acres	1.8	-	-	-	-	-	-	-	-																	
136	Deep Creek	7.7	%	90	5	-	-	5	-	-		-		-														Portions of this marsh have been smothered by fill from adjacent city dump; runoff from dump is still destroying marsh.	I
			acres	6.9	0.4	-	-	0.4	-	-		-		-															
137	Deep Creek	8.3	%	50	20	20	-	5	5	-	-	-		-													d,-	Creek marsh section; dominated by saltmarsh cordgrass but includes several areas of meadow grasses and needlerush.	I
			acres	4.2	1.7	1.7	-	0.4	-	-	-	-		-													d,-		
138	Deep Creek	7.6	%	35	30	5	-	30	-	-	-	-		-										-				Creek marsh section; cordgrasses dominate along creek channels and other low areas; interior of marsh contains large areas of meadow grasses.	XII
			acres	2.7	2.3	0.4	-	2.3	0-4	-	-	-		-										-					

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b = Swamp Milkweed

c = Wild Rice

d = Jewel Weed

e = Mock Bishop-weed

f = Water Parsnip

g = Water Hemlock

h = Marsh Pennywort

i = Arrowhead

j = Cutgrass

Section VI. Deep Creek and Fishers Creek

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Oney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
139	Deep Creek	0.40	%	40	5		-	55	-	-		-												-				Small creek marsh section; dominated by big cordgrass with abundant saltmarsh cordgrass.	V
			acres	0.16	0.02		-	0.22	-	-		-																	
140	Deep Creek	1.5	%	15	35	5		45	-	-		-												-				Creek marsh section; interior area of saltmarsh grasses; big cordgrass dominates along creek channel.	XII
			acres	0.2	0.5	0.1		0.7	-	-		-																	
141	Deep Creek	7.4	%	5	5			70	-	5		5											-	10	-			Creek marsh section dominated by big cordgrass; smartweed and hemp increase proceeding upstream while saltmarsh cordgrass decreases.	V
			acres	0.4	0.4			5.2	-	0.4		0.4												-	0.7	-			
142	Deep Creek	6.4	%	-				65	-	5	-	15											5	10	-		e,- d,-	Creek marsh section at head of creek; dominated by big cordgrass but significant amounts of freshwater species.	V
			acres	-				4.2	-	0.3	-	1.0												0.3	0.6	-		e,- d,-	
143	Deep Creek	3.8	%	85	5	5	-	5	-	-		-																Creek marsh section formed between two branches of creek; dominated by saltmarsh cordgrass with other species scattered throughout.	I
			acres	3.2	0.2	0.2	-	0.2	-	-		-																	
144	Deep Creek	5.6	%	70	5	15	-	5	5	-	-	-																Marsh section dominated by saltmarsh cordgrass with several areas of big cordgrass and needlerush; cattails in pockets along uplands.	I
			acres	3.9	0.3	0.8	-	0.3	0.3	-	-	-																	
145	Deep Creek	1.6	%	55	15	15	-	15		-	-	-																Creek marsh section dominated by saltmarsh cordgrass but with scattered areas of needlerush, meadow grasses and big cordgrass.	I
			acres	0.9	0.2	0.2	-	0.2		-	-	-																	
146	Deep Creek	5.9	%	40	10	10	-	35	5	-	-	-																This creek marsh section has increased abundance of big cordgrass over downstream sections of creek.	XII
			acres	2.4	0.6	0.6	-	2.1	0.3	-	-	-																	

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Section VI. Deep Creek and Fishers Creek

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickersweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type
147	Deep Creek	11.0	%	15	-			65		5	-	15	-											-			e, - d, -	Upstream section of creek marsh branch; dominated throughout by big cordgrass with hibiscus more abundant toward head.	V
			acres	1.6	-			7.2		0.6	-	1.6	-											-			e, - d, -		
148	Deep Creek	13.5	%	98	-	2	-	-	-	-	-																	Creek marsh section almost entirely of saltmarsh cordgrass; other species along upland border.	I
			acres	13.2	-	0.3	-	-	-	-	-																		
149	Deep Creek	1.3	%	45	5	-	5	45	-			-		-														Marsh at mouth of creek branch; adjacent spoil areas from dredging operations remain as unvegetated bare sand.	XII
			acres	0.6	0.1	-	0.1	0.6	-			-		-															
150	Deep Creek	11.5	%	45	15	5	10	15	-		-	-		10			-				-						a, - d, -	Much of marsh in this section has been smothered by uncontained spoil deposition; large unvegetated areas of bare sand.	XII
			acres	5.2	1.7	0.6	1.2	1.7	-		-	-		1.2			-				-						a, - d, -		
151	Deep Creek	2.1	%	45	-	10	-	5	-	-	-	20	-			5		-						10		-	d, 5	Pocket marsh at head of creek branch above road; grades from saltmarsh cordgrass to marsh hibiscus and cattails.	XII
			acres	0.9	-	0.2	-	0.1	-	-	-	0.4	-			0.1		-						0.2		-	d, 0.1		
152	Deep Creek	1.1	%	40	5	5	10	40	-	-	-	-								-								Marsh fringe of saltmarsh cordgrass and big cordgrass; several pocket marsh areas of big cordgrass.	XII
			acres	0.44	0.06	0.06	0.11	0.44	-	-	-	-								-									
153	Deep Creek	1.7	%	55	10	5	5	25	-	-	-	-		-			-											Small marsh fringe and pocket marsh area adjacent to Marina; mixed areas of saltmarsh cordgrass and big cordgrass.	I
			acres	0.9	0.2	0.1	0.1	0.4	-	-	-	-		-			-												
154	Deep Creek	5.9	%	45	10	5	10	30	-	-	-	-					-				-							Marsh formed behind sand spit at mouth of creek; largely saltmarsh cordgrass with interior dominated by big cordgrass.	XII
			acres	2.6	0.6	0.3	0.6	1.8	-	-	-	-					-				-								

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Section VI. Deep Creek and Fishers Creek

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickelweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type	
155	Fishers Creek	21.8	%	98	-	2	-		-	-	-																	Marsh along lower half of creek almost entirely saltmarsh cordgrass with scattered waterhemp and needlerush.	I	
			acres	21.4	-	0.4	-		-	-	-																			
156	Fishers Creek	22.5	%	95	-	5	-	-	-	-	-																		Marsh along upstream half of creek; increased abundance of needlerush, big cordgrass, bulrush over downstream portion of creek.	I
			acres	21.4	-	1.1	-	-	-	-	-																			
157	Fishers Creek	3.5	%	85	5	-	-	5	-	-	5																		Pocket marsh at head of creek; construction of upland dike partially separates marsh from downstream areas; tidal flushing permitted.	I
			acres	3.0	0.2	-	-	0.2	-	-	0.2																			
158	Merry Point	4.9	%	20	10	60	-	5	5		-						-												Berm across front of marsh with saltbushes and big cordgrass; interior dominated by needlerush; upper portion dammed forming lake.	III
			acres	1.0	0.5	2.9	-	0.2	0.2		-							-												
159	Riverside	10.2	%	90	5	-	5	-	-	-	-	-					-												Pocket marsh with berm of saltbushes around mouth; interior of marsh dominated by saltmarsh cordgrass.	I
			acres	9.2	0.5	-	0.5	-	-	-	-	-						-												
	Total Section VI	181.2	%	64	6	6	2	16	1	1	1	2	-	1	-	-	-	-						-	1	-	-	a, d, e, -		
			acres	116.1	11.0	10.3	3.1	29.8	1.2	1.3	1.2	4.3	0.3	1.2	-	0.1	-	-						0.3	1.5	-	-	a, d, e, -		

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SECTION VII

JAMES RIVER AND HAMPTON ROADS

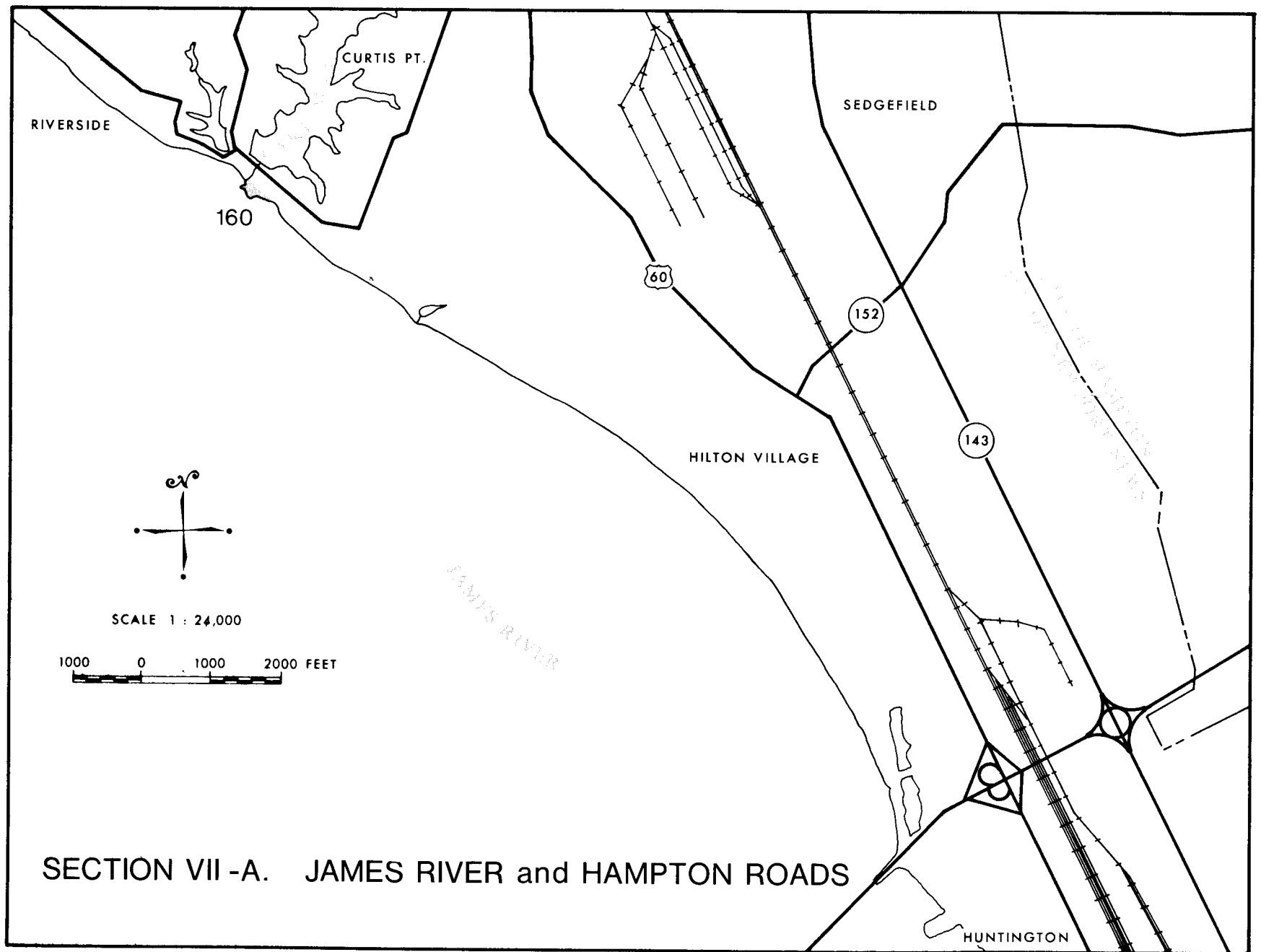
Although this section includes a significant length of shoreline there are few tidal marsh areas to be found. This is not only because of the high energy nature of the shoreline but also because of the high degree of industrialization which long ago dredged or filled any then existing fringe or pocket marsh areas.

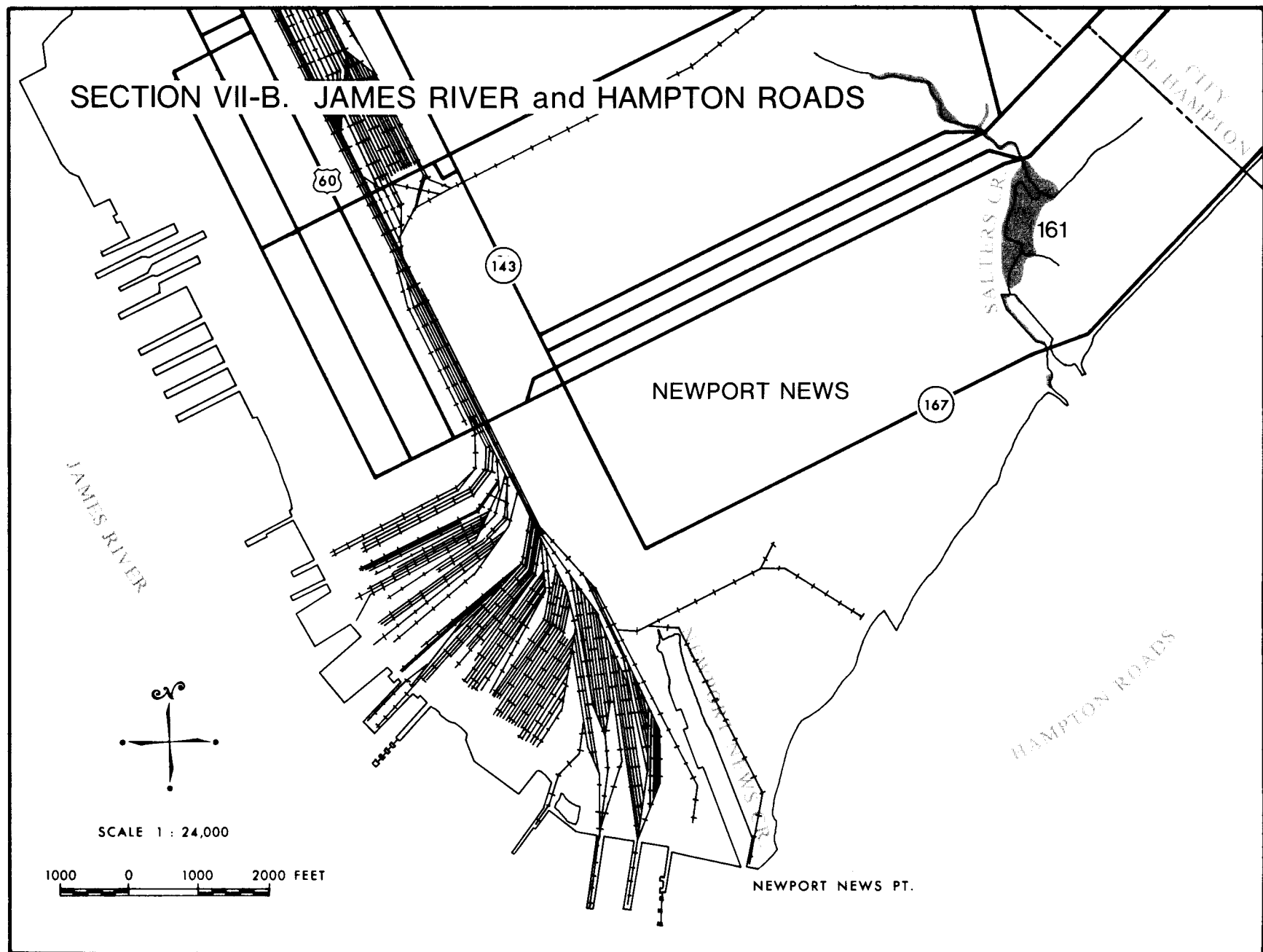
The first significant marsh area is found at the mouth of Lake Maury (#160). This fringing marsh has formed on sediments which have been deposited adjacent to the spillway culverts. The perimeter of the marsh has an elevated berm of saltbushes, while the interior is inter-tidal and dominated by saltmarsh cordgrass.

The second marsh area found in this section is located along Salters Creek (#161). The lower half of this creek has been dredged and bulk-headed and is used as a boat basin. The bulkhead is in need of repair, and as a result sediments have eroded from the upland and into the creek. Fringing saltmarsh cordgrass has, however, become re-established along much of this shoreline. Besides serving as a valuable habitat for small fishes and crabs, the marsh also helps to prevent further erosion from the upland.

The main portion of Salters Creek is a large, creek marsh area of approximately 17 acres which is dominated by saltmarsh cordgrass. Although surrounded by a highly urbanized area this marsh section is doing quite well. One section of the marsh is enclosed by an old dike which is presently vegetated with saltbushes. The berm has been breached in several places and tidal flushing is permitted to the interior. The marsh has also been filled in several areas with the result being an invasion by reed grass onto these spoiled sections.

Tidal action in Salters Creek extends upstream for quite a distance. For most of this length the creek has been reduced through fill to a narrow channel with a fringe of saltmarsh cordgrass. In several areas the creek widens and the saltmarsh cordgrass is found mixed with stands of cattail, marsh hibiscus and reed grass.





Section VII. James River and Hampton Roads

#	Marsh Location	Total Acres		Saltmarsh Cordgrass	Saltmeadow Grasses	Black Needlerush	Saltbushes	Big Cordgrass	Saltmarsh Bulrush	Water Hemp	Cattails	Marsh Hibiscus	Marsh Mallow	Reed Grass	Olney Threesquare	Common Threesquare	Sea Oxeye	Water Dock	Saltmarsh Loosestrife	Sea Lavender	Saltmarsh Fleabane	Saltmarsh Aster	Pickereleweed-Arrow Arum	Smartweed	Giant Bulrush	Cardinal Flower	Other	Observations	Marsh Type			
160	Lake Maury	0.60	%	40	15		30	15	-			-	-									-						Broad fringing marsh south of spillway culverts; saltbushes around perimeter; interior mostly saltmarsh cordgrass.	XII			
			acres	0.24	0.09		0.18	0.09	-				-	-									-									
161	Salters Creek	20.0	%	80	15		5	-	-	-	-	-	-	-			-	-				-				-		Fringe of saltmarsh cordgrass and saltbushes around shoreline of dredged boat basin; upper section dominated by cordgrass & patches of saltmeadow grasses.	I			
			acres	16.0	3.0		1.0	-	-	-	-	-	-	-	-			-	-				-				-					
	Total Section VII	20.6	%	79	15		6	-	-	-	-	-	-	-			-	-				-				-						
			acres	16.2	3.1		1.2	0.1	-	-	-	-	-	-	-			-	-				-				-					
	Total City of Newport News and Ft. Eustis	2882.5	%	32	11	36	4	12	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	1	-	-	a,- b,-	c,- d,-	e,- f,-	g,- h,-	i,- j,-	
			acres	929.4	314.1	1050	118.3	332.9	6.1	4.2	13.1	40.1	9.9	3.1	2.8	6.4	-	1.8	15.4	-	-	-	8.9	14.5	-	-	a,- b,-	c,4.8 d,-	e,- f,-	g, h,1.8	i,- j,3.9	

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