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City of Norfolk Tidal Marsh Inventory

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TIDAL MARSH INVENTORY

Special Report No. 281 in Applied Marine Science and Ocean Engineering

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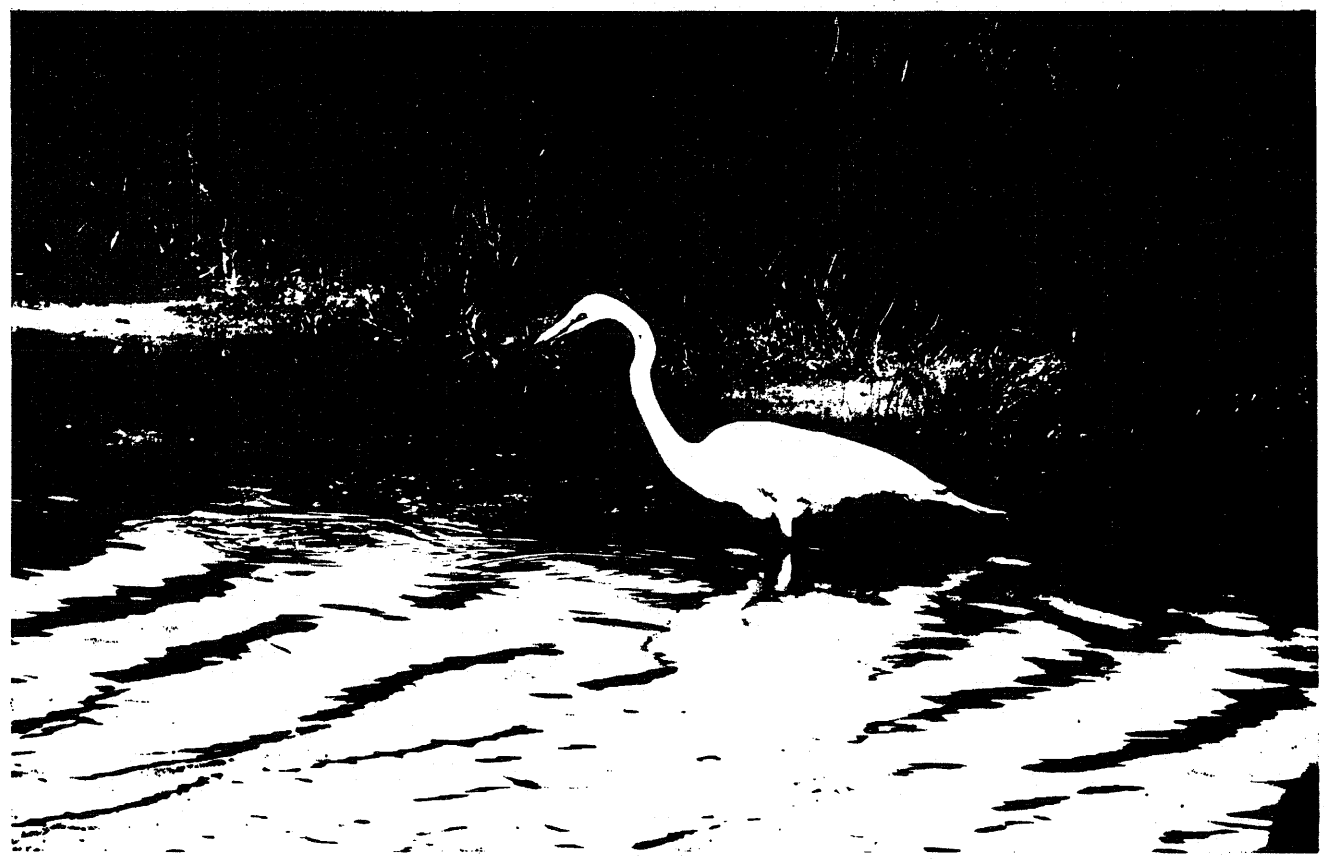

VIRGINIA INSTITUTE OF MARINE SCIENCE
SCHOOL OF MARINE SCIENCE
THE COLLEGE OF WILLIAM AND MARY
Gloucester Point, Virginia 23062

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Gene M. Silberhorn, Project Leader

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College of William and Mary
Gloucester Point, Virginia 23062

Dr. Frank O. Perkins, Dean/Director

FEBRUARY 1987

Preface

This publication is one of a series of county and city tidal marsh inventories prepared by the Wetlands Advisory Group of the Virginia Institute of Marine Science. The previously published reports include:

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
City of Virginia Beach Vol. 1 and 2
City of Newport News and Fort Eustis
Accomack County
Northampton County
Westmoreland County
James City County and the City of Williamsburg
Surry County
Spotsylvania and Caroline Counties and the City of Fredericksburg
New Kent County
Essex County
Isle of Wight County
Middlesex County

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. This inventory program is designed to aid the local wetlands boards, the state and federal regulatory agencies, and regional planning districts in making informed rational decisions on the uses of these valuable resources. They are also intended for use by the general public as a natural history guide and the scientific community as a research data source.

The reader is referred to the Shoreline Situation Report, Cities of Chesapeake, Norfolk and Portsmouth, D. Owen, L. Rogers and M. Peoples, 1976, SRAMSOE No. 136. This report focuses on various shoreline characteristics including areas of erosion and accretion, beaches, marshes, artificially stabilized areas, and fastland types and uses.

Also of interest may be a booklet, Wetlands Guidelines, available from the Marine Resources Commission, Newport News, Virginia, which describes the wetlands types and the types of shoreline activities which affect wetlands and what these effects are.

Acknowledgements

First among the many people that we owe thanks are Arthur Harris and Mark Zeigler for their invaluable field assistance and help in data reduction. We also thank Kenneth Moore and Judy Hudgins for reviewing and editing the manuscript. We are also indebted to Josephine Shackleford and Harold Burrell for map illustrations and cover design and William Jenkins for photographic assistance. We also greatly appreciate the talents of Janet Walker for text processing and reproduction and Sylvia Motley for printing.

Finally, we thank the Army Corps of Engineers for the loan of recent aerial photography which greatly aided this project.

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Introduction

The tidal wetlands within the City of Norfolk have been subjected to enormous development pressures historically. Since the turn of the century, entire creeks, eg. Boush, Mason, Tarrant, Newton, Lamberts, Smith and Colley, have been either filled in or reduced to mere vestiges of nineteenth century areas. Against this background, the remaining 722 acres of tidal wetlands represent a valuable resource well worth the conscientious management program currently protecting them.

The value of these areas to wildlife, fishes, water quality and the quality of life in general is many faceted. They make a significant contribution to the estuarine food web by virtue of the organic matter produced and exported to adjacent waters. Marshes provide important nursery areas for the juveniles of many commercially important finfish and shellfish as well as feeding areas for numerous forage fishes. The wildlife habitat they provide for waterfowl, wading birds, shorebirds, song birds and small mammals is vitally important, particularly in a highly-urbanized setting. Their role as a filter for upland runoff and as a center of nutrient cycling is again especially important in intensely developed areas where upland inputs of nutrients and various pollutants can have a significant impact on adjacent water quality. Tidal marshes can also provide an effective buffer against shoreline erosion by binding sediments and dissipating wave energy. These same areas can effectively mitigate the impacts of coastal flooding by absorbing floodwaters and buffering flood heights.

Over half of the tidal wetlands in Norfolk (408 acres) is comprised of Type I Saltmarsh Cordgrass marshes. These areas are regularly flooded by tides and provide some of the highest ecological values to the estuarine system. The majority of these marshes, 218 acres, are located within the Lafayette River system with the Little Creek system supporting the second highest acreage at 125 acres.

The second most abundant marsh type is the Saltbush Community, Type IV. This is a high marsh community that is irregularly flooded by the tides. This marsh type is found predominately at the heads of tidal tributaries and has been often impacted by ditching for drainage and mosquito control. The largest acreage, 99 acres, is found in the Lafayette River with the Broad Creek drainage having the second highest total at 86 acres.

The other major community types represented in the Norfolk inventory include: Mixed Brackish Marsh, Type XII (46 acres); Common Reed, Type VIII (43 acres); Saltmeadow, Type II (6 acres); and Black Needlerush, Type III (.86 acres). The Broad Creek area supports the highest amount of Mixed Brackish Community at 29 acres with the remaining acreage relatively evenly distributed among the other sections. The majority of the Common Reed Community, 35 acres, is located in the Lafayette River with the remaining 8.4 acres in Mason Creek. This community type is often associated with filling activities and hydrologic modifications.

Methods

Aerial photographs and topographic maps (U.S.G.S.) were utilized to determine 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, those percentages are subject to seasonal bias.

Most of the field work was done in the summer of 1977. Subsequent field work was done in 1984 and 1986 when more recent imagery (1982) became available from the U.S. Army Corps of Engineers, Norfolk.

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 (color) 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, and acreages to the nearest tenth of an acre. In marshes of less than one acre, the areas 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.

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 Advisory Group 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 homogeneously 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 coastal 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 grow. 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 Environmental 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 wildfowl 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 are 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 XI)
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.

Marsh Plants

Abbreviations, common names and scientific names as found in the data tables.

Sa	Saltmarsh Cordgrass	*Spartina alterniflora*
Jr	Black Needlerush	*Juncus roemerianus*
Md	Salt Grass	*Distichlis spicata*
	Saltmeadow Hay	*Spartina patens*
Sb	Saltbushes Marsh Elder	*Iva frutescens*
	Groundsel Tree	*Baccharis halimifolia*
Sc	Big Cordgrass	*Spartina cynosuroides*
Pa	Reed Grass	*Phragmites australis*
a	Cattails	*Typha angustifolia*
		Typha latifolia
b	Saltmarsh Fimbristylis	*Fimbristylis spadicea*
c	Giant Foxtail Grass	*Setaria magna*
d	Marsh Fleabane	*Pluchea purpurascens*
e	Marsh Mallow	*Kosteletskya virginica*
f	Orach	*Atriplex patula*
g	Saltmarsh Aster	*Aster tenuifolius*
h	Sea Oxeye	*Borrchia frutescens*
i	Switch Grass	*Panicum virgatum*
j	Water Dock	*Rumex verticillatus*
k	Water Hemp	*Amaranthus cannabinus*
l	Arrow Arum	*Peltandra virginica*
m	Pickerel Weed	*Pontederia cordata*
n	Smartweed	*Polygonum punctatum*
o	Marsh Hibiscus	*Hibiscus moscheutos*

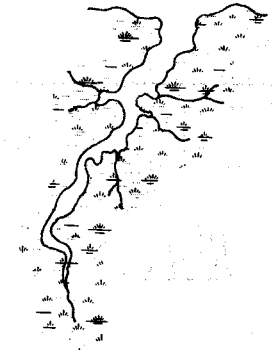
Glossary of Descriptive Terms

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.

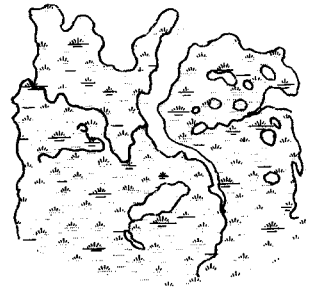


Delta Marsh

A marsh 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.

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 a section of shoreline and generally has a much greater length than width or depth.

High Marsh

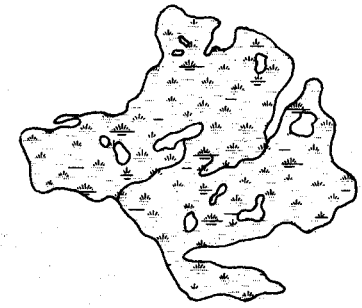
The marsh surface is at an elevation of mean high water or above; it is usually inundated less than twice daily by tidal action.

Low Marsh

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

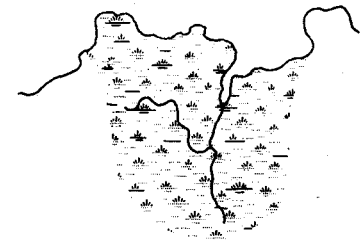
Marsh Island

An isolated marsh surrounded on all sides by open water. Interior portions of the marsh may contain trees scattered at highest elevations.



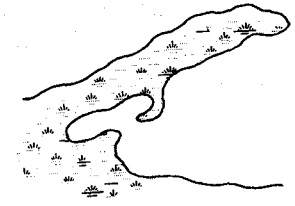
Pocket Marsh

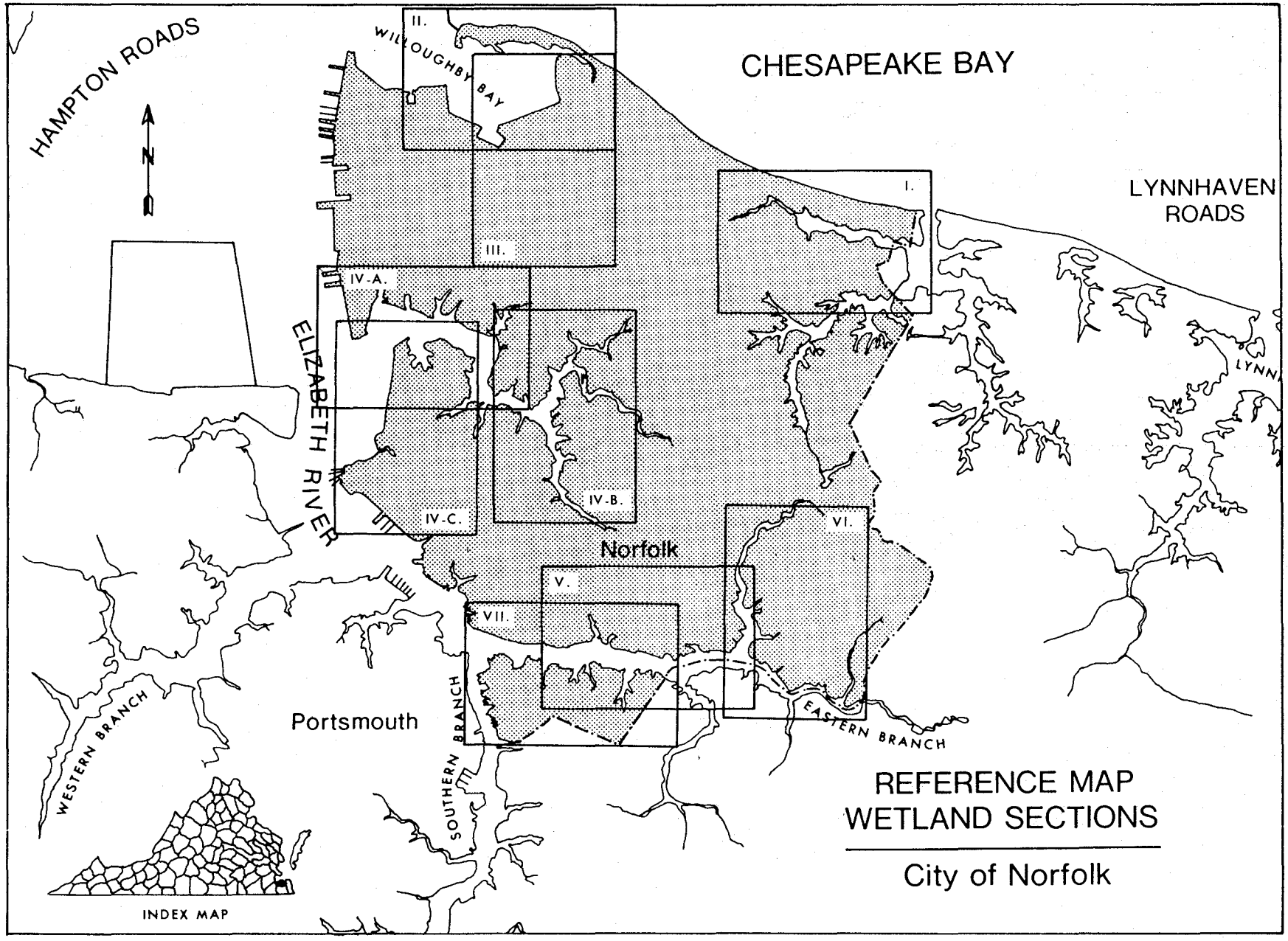
A marsh contained within a small, essentially semi-circular area on a shoreline.



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.




HAMPTON ROADS
N
II.
WILLOUGHBY BAY
CHESAPEAKE BAY
I.
LYNNHAVEN ROADS
III.
IV-A.
ELIZABETH RIVER
IV-B.
IV-C.
VI.
Norfolk
V.
VII.
Portsmouth
WESTERN BRANCH
SOUTHERN BRANCH
EASTERN BRANCH
INDEX MAP
REFERENCE MAP
WETLAND SECTIONS
City of Norfolk

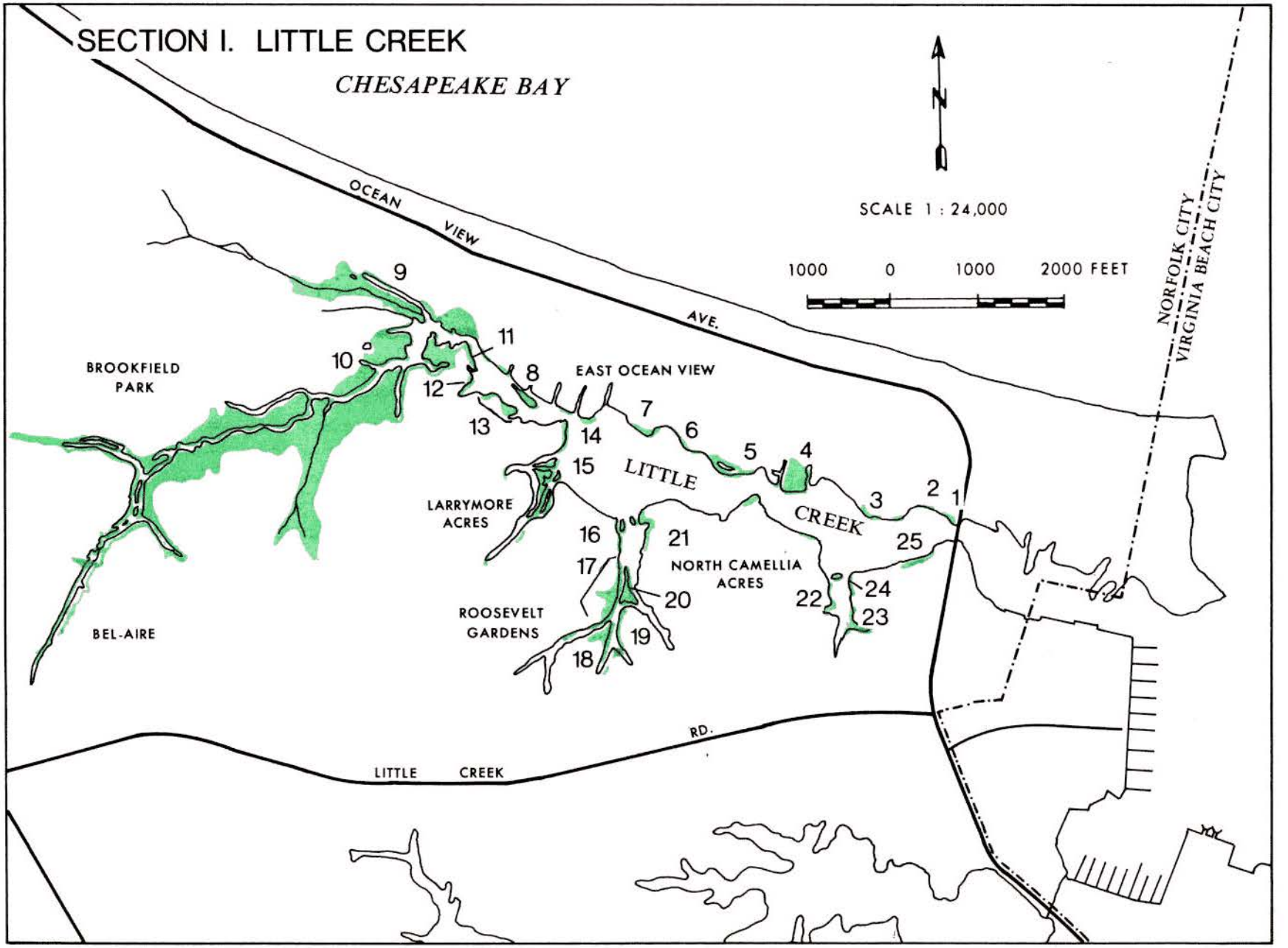
SECTION I

LITTLE CREEK

The Little Creek estuary is shared by the cities of Norfolk and Virginia Beach. Much of the Virginia Beach section of the waterway is occupied by the Little Creek Amphibious Base (U.S. Navy) and has been greatly modified for vessel mooring and related functions.

The Norfolk branch of the estuary is less developed and supports a larger marsh system (25 individual marshes totaling over 127 acres). A large portion (101.8 acres) of these marshes is intertidal saltmarsh cordgrass *(Spartina alterniflora)* wetlands. The largest single marsh (#10) is found at the upper end of the Creek with 87 acres, dominated by *Spartina alterniflora.* This is also the largest single marsh in the City of Norfolk. Most of the marshes in Little Creek, however, are much smaller, ranging in area from .25 to 13.00 acres.

As one would expect in an urban area, shoreline modifications have altered some of the marshes through bulkheading, filling and channelization.


SECTION I. LITTLE CREEK
CHESAPEAKE BAY
OCEAN VIEW AVE.
N
SCALE 1 : 24,000
1000 0 1000 2000 FEET
NORFOLK CITY
VIRGINIA BEACH CITY
BROOKFIELD PARK
EAST OCEAN VIEW
LARRYMORE ACRES
LITTLE CREEK
NORTH CAMELLIA ACRES
ROOSEVELT GARDENS
BEL-AIRE
LITTLE CREEK RD.
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25

Section I: Little Creek

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
1	East Ocean View	.25	30	.08	50	.13	5	.02	15	.04							pocket marsh	III
2	East Ocean View	.25	40	.10	20	.05	10	.03	30	.08							fringe marsh	XII
3	East Ocean View	.25	70	.18			10	.03	20	.05							fringe marsh	I
4	East Ocean View	2.00	15	.30	25	.50			60	1.20					i --	--	pocket marsh, old spoil berm	IV
5	East Ocean View	2.00	60	1.20	10	.20	15	.30	15	.30					h --	--	fringe and tidal pond	I
6	East Ocean View	.27	90	.25			5	.02	5	.02							fringe	I
7	East Ocean View	.50	50	.25			10	.05	30	.15			10	.05			fringe	I
8	East Ocean View	.70	100	.70													low island	I
9	East Ocean View	13.00	90	11.7					10	1.30							creek marsh, channelized	I
10	Brookfield Park	87.00	80	69.6	8	6.9	4	3.5	8	6.9					a -- g -- h --	-- -- --	creek marsh	I
11	Little Creek	1.00	90	.90	2	.02	3	.03	5	.05							island	I
12	Larrymore Acres	.50	75	.35			5	.03	25	.13							fringe	I
13	Larrymore Acres	3.00	80	2.40			3	.09	15	.45			2	.06			fringe	I
14	Larrymore Acres	.25	90	.22	5	.02	5	.02	--								fringe	I

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section I: Little Creek

#	Marsh Location	Acres	Sa		Jr		Md		Sb		Sc		Pa		Others		Observations	Marsh Type
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres		
15	Larrymore Acres	4.00	85	3.40	-		2	.08	13	.52							islands, channelized	I
16	Roosevelt Gardens	.50	70	.35	10	.05	10	.05	10	.05							fringe, island	I
17	Roosevelt Gardens	4.00	90	3.60	5	.20			5	.20							fringe	I
18	Roosevelt Gardens	2.00	90	1.80			3	.06	2	.14							fringe	I
19	North Camellia Acres	1.00	70	.70			10	.10	15	.15			5	.05			fringe	I
20	North Camellia Acres	1.00	95	.95					5	.05							low island	I
21	North Camellia Acres	.25	10	.03			80	.20	10	.03							fringe	I
22	North Camellia Acres	.25	80	.20			5	.02	5	.02							fringe	I
23	Little Creek	2.00	80	1.60					20	.40							pocket marsh	I
24	Little Creek	1.00	80	.80					20	.20							fringe	I
25	Little Creek	.25	80	.20					20	.04							fringe	I
	Total Section I	127.22		101.8		8.05		4.63		12.47				.16				

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
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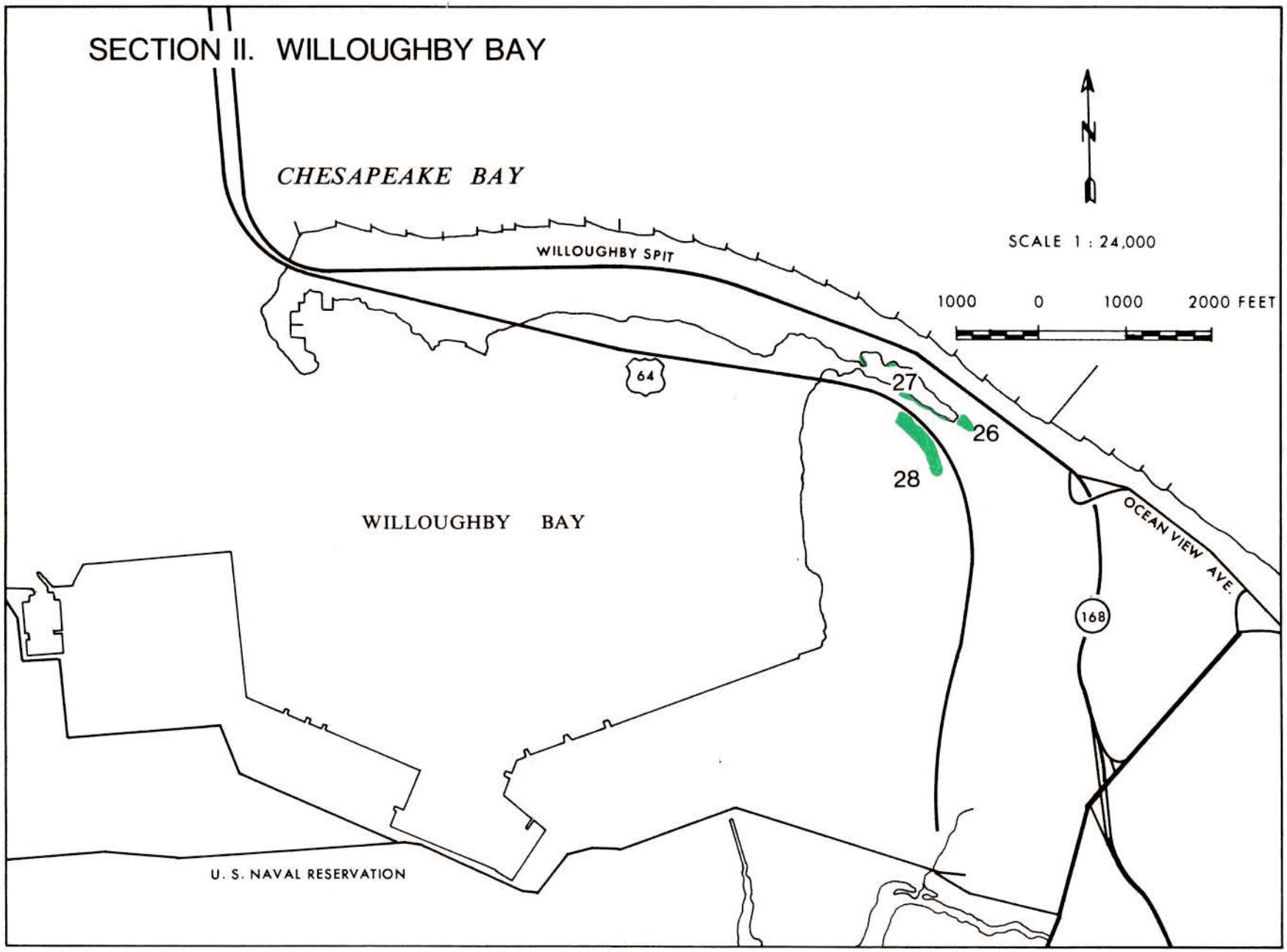
SECTION II

WILLOUGHBY BAY

Historically, Willoughby Bay may have supported more extensive marshes when Mason Creek and Boush Creek still emptied into the Bay. Currently though, the marsh areas are limited to a few small pocket and fringe marshes and a 6.5 acre man-made marsh.

In the early 1950's, the Navy diked off the head of Willoughby Bay to form a dredged material disposal area. Part of the interior portion of the disposal area remained tidal via a culvert through the dike and developed into vegetated wetlands.

In 1984, the Navy needed to reuse the disposal area for another dredging project. As a condition of the dredging permit, the Navy was required to compensate for the loss of the existing wetlands by grading another area of the site to an intertidal elevation and planting it with saltmarsh cordgrass. In effect, this moved the wetlands to a section of the disposal area that will be protected in the future. To date, the project appears to be successful; however, the question of whether it has truly replaced the functional values of the displaced marsh remains to be answered by future research.


SECTION II. WILLOUGHBY BAY
CHESAPEAKE BAY
WILLOUGHBY SPIT
N
SCALE 1 : 24,000
1000 0 1000 2000 FEET
64
27
26
28
WILLOUGHBY BAY
OCEAN VIEW AVE.
168
U. S. NAVAL RESERVATION

Section II: Willoughby Bay

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
26	Willoughby Bay	.50	50	.25			10	.05	40	.20							pocket marsh	I
27	Willoughby Bay	.64	85	.55			5	.04	10	.07							fringe	I
28	Monkey Bottom	6.5	85	5.52					5	.32			10	.65			man-made marsh	I
	Total Section II	7.64		6.32				.09		.59				.65				

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

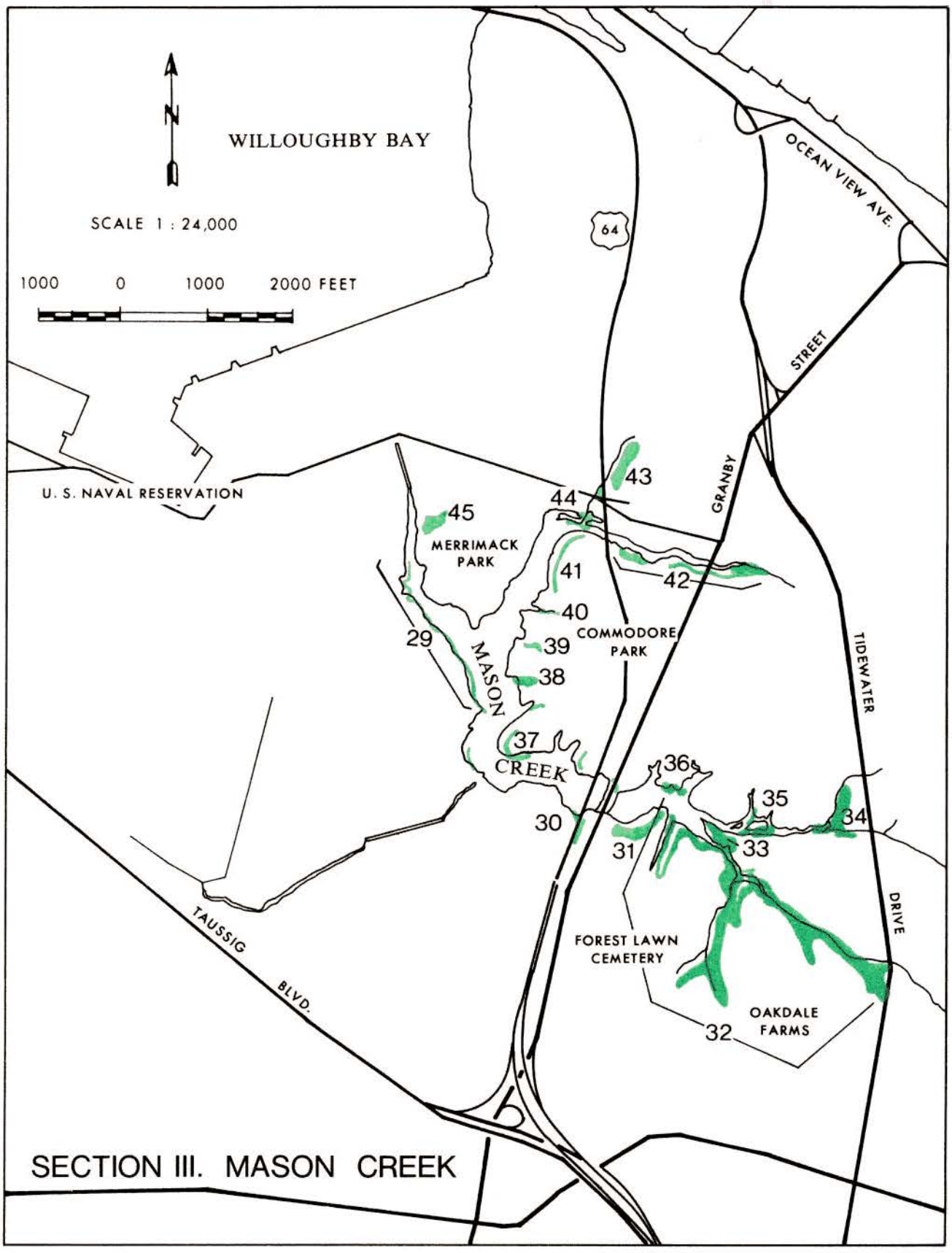
SECTION III

MASON CREEK

Mason Creek is a tributary of Willoughby Bay via an underground aquaduct. Approximately one quarter of its original length has been so modified. The remaining waterway is somewhat natural except for evidence of filling, bulkheading, piers and other shoreline alterations.

Despite these modifications, Mason Creek supports 17 individual marshes, totaling over 53 acres. Most of the marshes are dominated by high marsh species such as saltmeadow hay *(Spartina patens)*, saltgrass *(Distichlis spicata)*, marsh elder *(Iva frutescens)*, groundsel tree *(Baccharis halimifolia)* and reed grass *(Phragmites australis)*. Marsh community structure may be influenced by restricted tidal exchange caused by the aquaduct.

The largest marsh complex (#32, 30.6 acres) is located on the east side of I-64. The marsh is dominated by high marsh plants except at the extreme upper end (Tidewater Drive) where freshwater marsh species are found in trace amounts. In this part of the marsh are found arrow arum *(Peltandra virginica)*, pickerel weed *(Pontederia cordata)* and marsh hibiscus *(Hibiscus moscheutos)*. Mosquito ditches are also evident in this area.


N
WILLOUGHBY BAY
SCALE 1 : 24,000
1000 0 1000 2000 FEET
64
OCEAN VIEW AVE.
STREET
GRANBY
U. S. NAVAL RESERVATION
43
44
45
MERRIMACK PARK
41
42
40
COMMODORE PARK
29
MASON
39
38
37
CREEK
36
35
34
30
31
33
TIDEWATER
DRIVE
FOREST LAWN CEMETERY
OAKDALE FARMS
32
TAUSSIG
BLVD.
SECTION III. MASON CREEK

Section III: Mason Creek

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
29	Mason Creek	.50	80	.40					--	--			20	.12			narrow fringe marsh	I
30	Mason Creek	.50	70	.35					15	.08			15	.08			pocket marsh	I
31	Camp Apasus	3.0					65	1.95	30	.90			5	.15			pocket marsh	II
32	Forest Lawn Cem./ Northside Park	30.6	2	.61			27	8.26	60	18.36	2	.61	9	2.75	– l – m – n – o		extensive marsh, upper end of Mason Creek - trace of fresh-water plants near Tidewater Dr. - mosquito ditched	IV
33	Northside Park	1.6	--	--			60	.96	40	.64	–	–	–	–			point marsh	II
34	Northside	3.7					10	.37	20	.74			40	1.48	e 20 .74 n 5 .18 o 5 .18		freshwater marsh plants, narrow cove marsh, ditched	XII
35	Northside	1.0	--	--			20	.20	10	.10			70	.70			two marsh islands	VIII
36	Northside	.85	--	--			60	.51	40	.34							point marsh	II
37	Commodore Park	.75	80	.60	5	.04	15	.12									fringe/point marsh	I
38	Commodore Park	.50	30	.15	10	.05	30	.15	20	.10			10	.05			pocket marsh	XII
39	Commodore Park	.50	80	.43					5	.02			10	.05			pocket marsh with dredged channel	I
40	Commodore Park	1.00	5	.05			30	.30	30	.30			35	.35			pocket marsh with dredged channel	XII
41	Commodore Park	.58	80	.46			5	.03	15	.08							fringe marsh	I
42	Commodore Park	4.4	5	.22			5	.22	40	1.76			50	2.2	– a – j – n		discontinuous fringe marsh avenue 30 feet wide - marginally tidal behind Granby St.	VIII

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp
l = Arrow Arum
m = Pickerel Weed
n = Smartweed
o = Marsh Hibiscus

Section III: Mason Creek

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
43	Pamlico	3.0							--	--			100	3.0			marginally tidal - disturbed by I64 construction	VIII
44	Merrimack Park	1.00	40	.40					30	.30			30	.30				XII
45	Merrimack Park	2.00	50	1.00	5	.10	10	.20	30	.60			5	.10			pocket marsh	I
	Total Section III	55.48		4.67		.19		13.27		24.32		.61		11.33		1.10		

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

SECTION IV

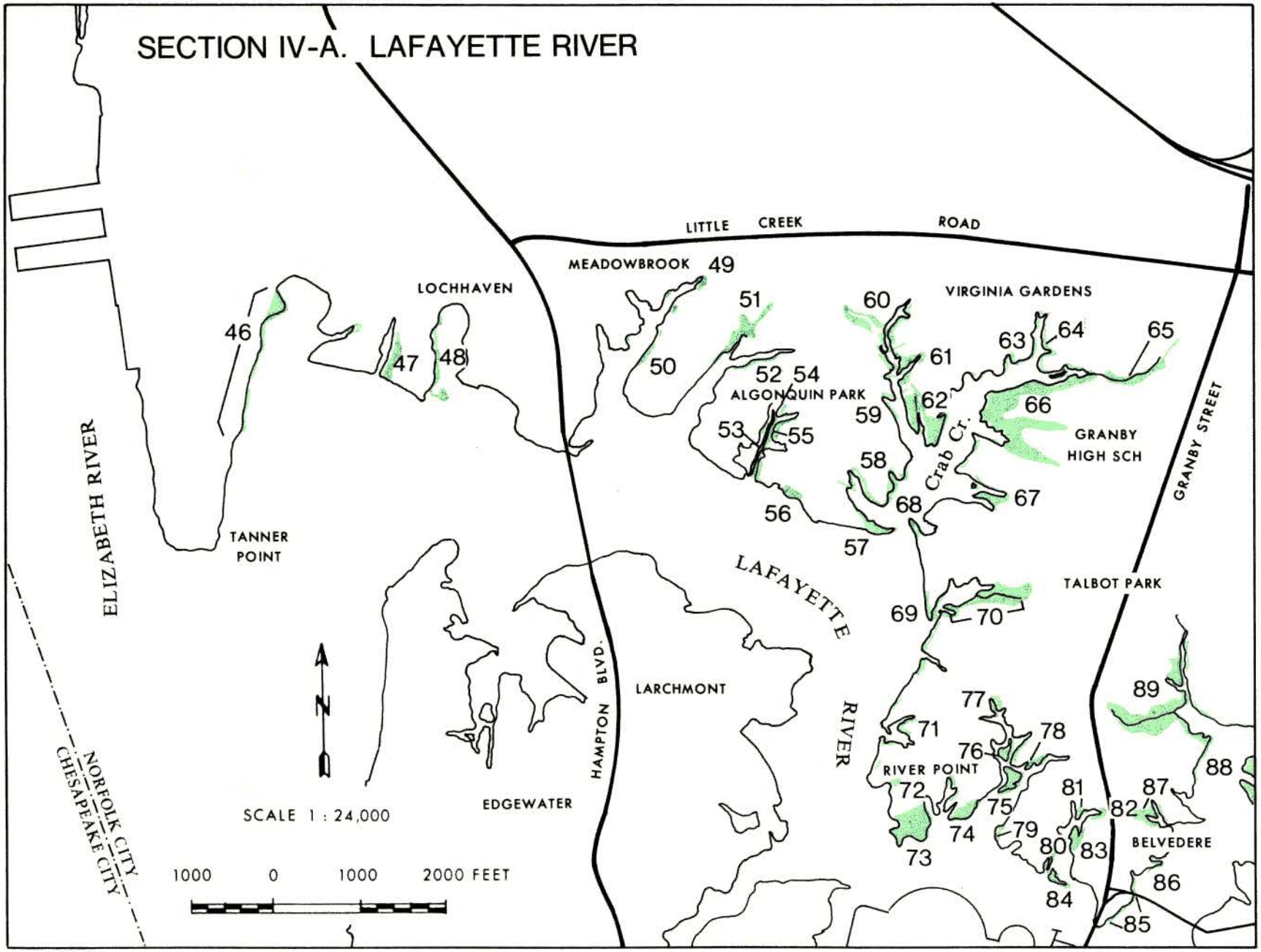
LAFAYETTE RIVER

Slightly over one half of the tidal wetlands (362 acres) found in the City of Norfolk are located on the Lafayette River. This system drains the majority of the City and provides an effective interspersion of wetland habitats throughout the City.

The marshes found in the Lafayette system run the gamut of the types found in Norfolk. The majority (218 acres) are dominated by saltmarsh cordgrass, *Spartina alterniflora*. This type is found primarily in the lower reaches of the system as are the 10 acres of mixed-brackish marsh type. The upper reaches and the heads of tributaries support most of the other types, saltbush (99 acres) dominated by the shrubs, marsh elder, *Iva frutescens*, and groundsel tree, *Baccharis halimifolia*, and common reed (35 acres) dominated by *Phragmites australis*.

The largest marsh in this section, no. 133 (35 acres) is the large creek marsh at the head of the river near Ballentine Place. Two of the major species in this marsh, saltbush and common reed, reflect the numerous modifications to the area by ditching, filling and impoundment.

The headwaters of Wayne Creek show the influence of freshwater runoff, reducing salinities in marsh no. 112 (24.2 acres) where freshwater plant species, e.g. arrow arum, *Pontederia cordata*, and smartweed, *Polygonum punctatum*, are found in limited quantities.


SECTION IV-A. LAFAYETTE RIVER
LITTLE CREEK ROAD
MEADOWBROOK
LOCHHAVEN
VIRGINIA GARDENS
ALGONQUIN PARK
GRANBY HIGH SCH
GRANBY STREET
Crab Cr.
ELIZABETH RIVER
TANNER POINT
LAFAYETTE RIVER
TALBOT PARK
HAMPTON BLVD.
LARCHMONT
RIVER POINT
BELVEDERE
EDGEWATER
NORFOLK CITY
CHESAPEAKE CITY
N
SCALE 1 : 24,000
1000 0 1000 2000 FEET
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Section IV-A: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
46	Tanners Point	1.00	50	.50			10	.10	20	.20			20	.20			fringe marsh	I
47	Lochhaven	1.75	95	1.66			–	–	5	.09			–	–			cove and fringe marsh	I
48	Lochhaven	.50	85	.43			5	.02	10	.05							concrete rubble riprap and marsh fringe	I
49	Meadowbrook	.25	50	.13					40	.10			10	.03	f-	--	cove marsh	I
50	Meadowbrook	.50	20	.10			40	.20	20	.10			20	.10	k-	--	cove marsh	XII
51	Lafayette R.	2.00	90	1.80	--	--			10	.20							embayed marsh	I
52	Algonquin Park	.25	40	.10					20	.05			40	.10			fringe marsh	XII
53	Algonquin Park	.48	100	.48					–	--							marsh island	I
54	Algonquin Park	.25	85	.21					10	.02			5	.01			fringe marsh	I
55	Algonquin Park	.25	85	.21					10	.02			5	.01			fringe marsh	I
56	Algonquin Park	.50	90	.45			5	.03	5	.03							fringe marsh	I
57	Crab Creek	2.13	90	1.92			5	.11	5	.11							spit and fringe marsh	I
58	Crab Creek	.72	85	.61			5	.04	10	.07							fringe and pocket marsh	I
59	Crab Creek	.25	95	.24					5	.01							fringe marsh	I

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section IV-A: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
60	Crab Creek	3.00	40	1.2			5	.15	15	.45			40	1.2			dredged channel in marsh	XII
61	Crab Creek	.50	60	.30					20	.10			20	.10			embayed marsh	I
62	Crab Creek	7.00	80	5.6			5	.35	10	.70			5	.35			large point marsh	I
63	Crab Creek	.28	40	.11			10	.03	10	.03			40	.11			fringe marsh	XII
64	Crab Creek	.92	60	.55			10	.09	10	.09			20	.18			fringe marsh	I
65	Crab Creek	4.0	55	2.2			5	.20	40	1.6	–	--	–	–			pocket marsh	I
66	Granby High School	14.33	95	13.61					5	.72							extensive marsh	I
67	Crab Creek	1.23	95	1.17			5	.06									embayed marsh	I
68	Crab Creek	.92	70	.64			5	.05	20	.18			5	.05			spit marsh	I
69	Talbot Park	.57	60	.34			10	.06	30	.17							fringe marsh	I
70	Talbot Park	6.00	95	5.70					5	.30							embayed cove marsh	I
71	Riverpoint	.20	95	.19					5	.01							fringe marsh	I
72	Riverpoint	.50	95	.48					5	.03							pocket marsh	I
73	Riverpoint	6.00	100	6.0													marsh island	I

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Md = Saltgrass Meadow
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Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section IV-A: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
74	Riverpoint	1.72	80	1.38					5	.09			15	.26			point marsh	I
75	Riverpoint	2.29	80	1.83					20	.46							marsh island	I
76	Riverpoint	1.60	85	1.36					15	.24			5	.08			marsh island	I
77	Riverpoint	.50	50	.25					10	.05			40	.20			fringe marsh	I
78	Riverpoint	.50	20	.10					10	.05			70	.35			embayed marsh (2) spoil evident in the areas	VIII
79	Riverpoint	.25	20	.05					40	.10			40	.10			point marsh	XII
80	Riverpoint	.25	70	.18					20	.05			10	.03			fringe marsh	I
81	Riverpoint	.50	20	.10					40	.20			40	.20			point marsh	XII
82	Riverpoint	.25	90	.23					10	.03							cove marsh	I
83	Riverpoint	1.83	90	1.65					10	.18							embayed marsh	I
84	Riverpoint	1.37	70	.96					10	.14			20	.27			marsh island	I
85	Belvedere	.25	60	.15	–	–			40	.10							fringe marsh	I
86	Belvedere	.25	60	.15									40	.10			fringe marsh spoil evident	I
87	Belvedere	1.50	80	1.20					20	.3			–	–			embayed creek marshes	I

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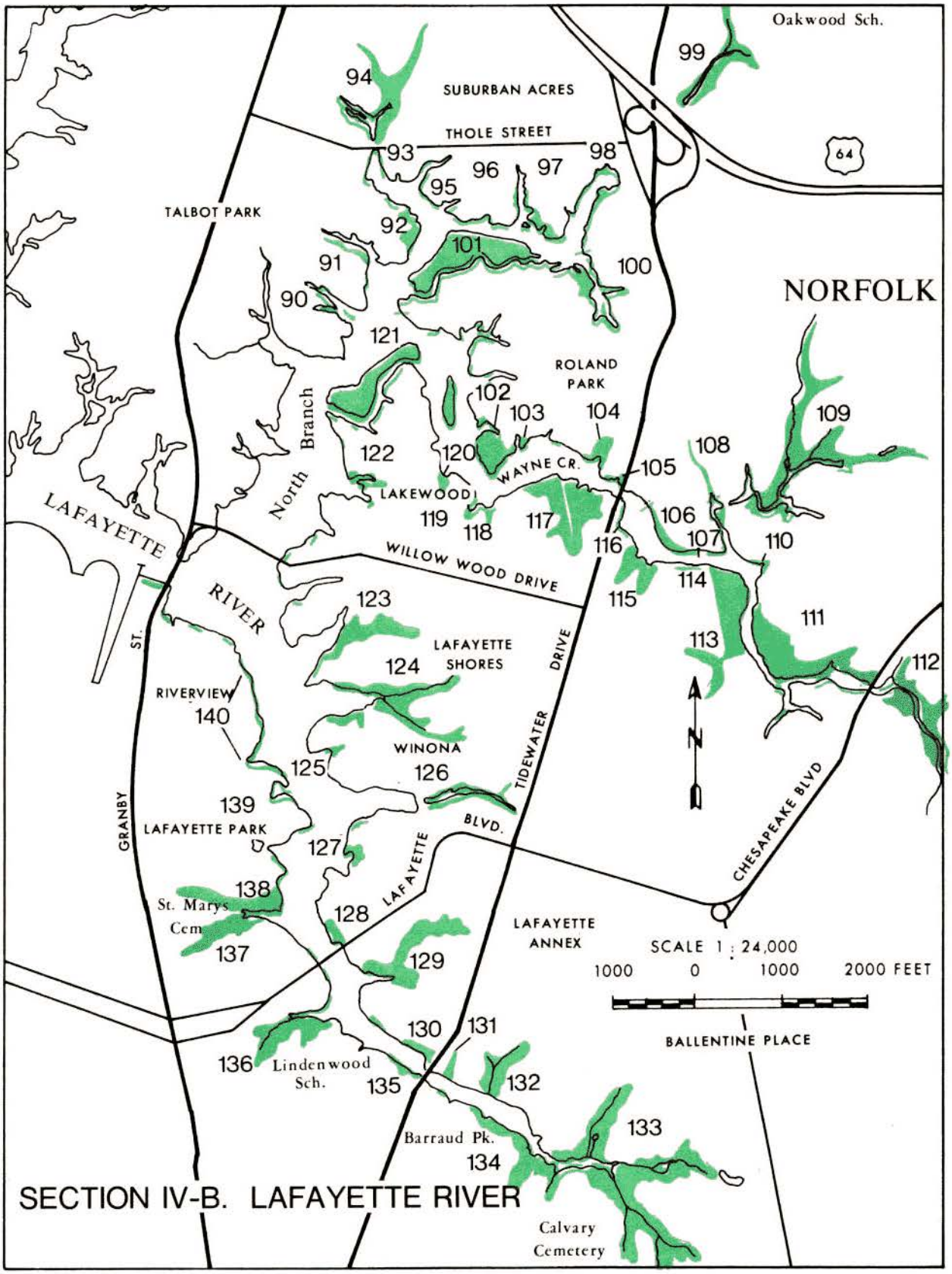
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section IV-A: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
88	Cromwell Place	1.50	95	1.42	1	.02			3	.04	1	.02					fringe marsh	I
89	Cromwell Place	8.0	95	7.60					2	.16	2	.16			k 1	.08	dredged channel	I
	Total Section IV-A	78.84		65.54		.02		1.49		7.62		.18		4.03		.08		

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp



SECTION IV-B. LAFAYETTE RIVER

Section IV-B: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
90	Talbot Park	.25	50	.12			--	--	30	.08			20	.05			point marsh, dredged fill	I
91	Talbot Park	.75	20	.15			--	--	40	.30			40	.30			fringe marsh	IV
92	Talbot Park	3.0	70	2.10			--	--	30	.90							point marsh, dredged fill	I
93	Talbot Park	.32	80	.26			--	--	20	.06							fringe marsh	I
94	Talbot Park	10.0	60	6.00			--	--	40	4.00							fringe marsh	I
95	Suburban Acres	.40	80	.32			--	--	20	.08							fringe marsh	I
96	Suburban Acres	.42	80	.34			--	--	20	.08							fringe marsh	I
97	Suburban Acres	3.0	60	1.80			5	.15	30	.90			5	.15	b -	--	fringe and marsh island	I
98	Suburban Acres	.75	50	.37					25	.20			25	.20			fringe marsh	I
99	Oakwood School	5.5							--	--			70	3.85	a 30	1.65	marginally tidal, conduit connection to Lafayette R.	VIII
100	Roland Park	2.00	50	1.00			20	.40	25	.50			5	.10	k - c - o -	-- -- --	fringe and marsh island	I
101	Roland Park	11.0	50	5.50			5	.55	40	4.40			5	.55	k -	--	fringe and marsh island	I
102	Wayne Creek	5.0	35	1.75			30	1.50	35	1.75	--	--	--	--	k -	--	dredged boat basin	XII
103	Wayne Creek	1.0	35	.35					55	.55			10	.10			point marsh	IV

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp
o = Marsh Hibiscus

Section IV-B: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
104	Wayne Creek	3.0	70	2.10			10	.30	20	.60			–	–			pocket marsh	I
105	Wayne Creek	.25	40	.10					60	.15							embayed marsh	IV
106	Wayne Creek	.75											100	.75			marsh impacted by fill	VIII
107	Wayne Creek	1.0	–	–			60	.60	40	.40							marsh impacted by fill	II
108	Wayne Creek	.50	30	.15					40	.20	5	.025	5	.025			creek marsh	IV
109	Wayne Creek	27.8	3	.83			10	2.78	25	6.95	15	4.17	40	11.12	a 5 k 2	1.39 .55	extensive marsh	VIII
110	Wayne Creek	.25	70	.18			–	–	20	.05	10	.02					pocket marsh	I
111	Wayne Creek	6.0	10	.60			5	.30	50	3.00	20	1.20	10	.60	f - k 5	– .30	fringe and marsh island	IV
112	Wayne Creek	24.2	20	4.84			–	–	50	12.1	20	4.84	10	2.42	l - m - o -	– – –	extensive creek marsh, nearly fresh at upper end	IV
113	Wayne Creek	13	10	1.30			10	1.30	70	9.10	–	–	10	1.30	b - f - k -	– – –	high marsh, dominated by saltbush	IV
114	Wayne Creek	.25	80	.20					10	.02			10	.02			fringe marsh	I
115	Wayne Creek	2.50	50	1.25			–	–	20	.50	–	–	30	.75			embayed marsh	I
116	Wayne Creek	.25	70	.18					15	.04	–	–	15	.04			fringe marsh	I
117	Lakewood Park	13	20	2.60			10	1.30	70	9.10	–	–	–	–	d - k -	– –	embayed marsh	IV

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
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Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
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e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp
l = Arrow Arum
m = Pickerel Weed
n = Smartweed
o = Marsh Hibiscus

Section IV-B: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
118	Lakewood	5.0	40	2.00					20	1.00	10	.50	30	1.50			embayed marsh	IV
119	Lakewood	.50	90	.45					10	.05							embayed marsh	I
120	Lakewood	3.0	80	2.40			--	--	20	.60							marsh island	I
121	Lakewood	10.0	80	8.00	5	.50	5	.50	10	1.00							marsh island	I
122	Lakewood	.50	90	.45					5	.02					a 5	.02	pocket marsh	I
123	Lafayette Shores	8.0	90	7.20			--	--	10	.80			--	--			pocket marsh and fringe	I
124	Lafayette Shores	11.0	65	7.15			--	--	35	3.85							pocket marsh, dredged channel	I
125	Winona	.50	90	.45			--	--	10	.05							pocket marsh	I
126	Lafayette Annex	.75	40	.30			--	--	60	.45							narrow, fringe marsh	IV
127	Lafayette Annex	.25	90	.22					10	.02							pocket marsh	I
128	Lafayette Annex	1.00	85	.85			5	.05	10	.10					g -	--	embayed marsh	I
129	Lafayette Annex	9.0	60	5.40					40	3.60			--	--			large, embayed marsh	I
130	Lafayette Annex	.25	80	.20					10	.02			10	.02			fringe marsh	I
131	Lafayette Annex	.25	70	.18					20	.05			10	.02			embayed marsh	I

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section IV-B: Lafayette River

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
132	Lafayette Annex	2.0	60	1.20			--	--	30	.60			10	.20			creek marsh	I
133	Ballentine Place and Calvary Cemetery	35.0	30	10.50			--	--	50	17.50	--	--	20	7.00			creek marsh	IV
134	Barraud Park	8.0	90	7.20			--	--	10	.80			--	--	a -	--	broad fringe and embayed marsh	I
135	Lindenwood School	1.0	80	.80			--	--	20	.20							fringe marsh	I
136	Lafayette River	7.4	70	5.18			5	.37	18	1.33	--	--	2	.15	a - g -	-- --	creek marsh	I
137	St. Mary's Cemetery	5.7	70	4.00			--	--	20	1.14			10	.57			creek marsh	I
138	St. Mary's Cemetery	9.6	70	6.72			--	--	20	1.92			10	.96			creek marsh	I
139	Lafayette Park	1.0	60	.60					40	.40							cove marsh	I
140	Riverview	3.22	80	2.58					20	.64							fringe marsh	I
	Total Section IV-B	259.06		108.36		.50		10.10		92.14		10.75		32.74		3.91		

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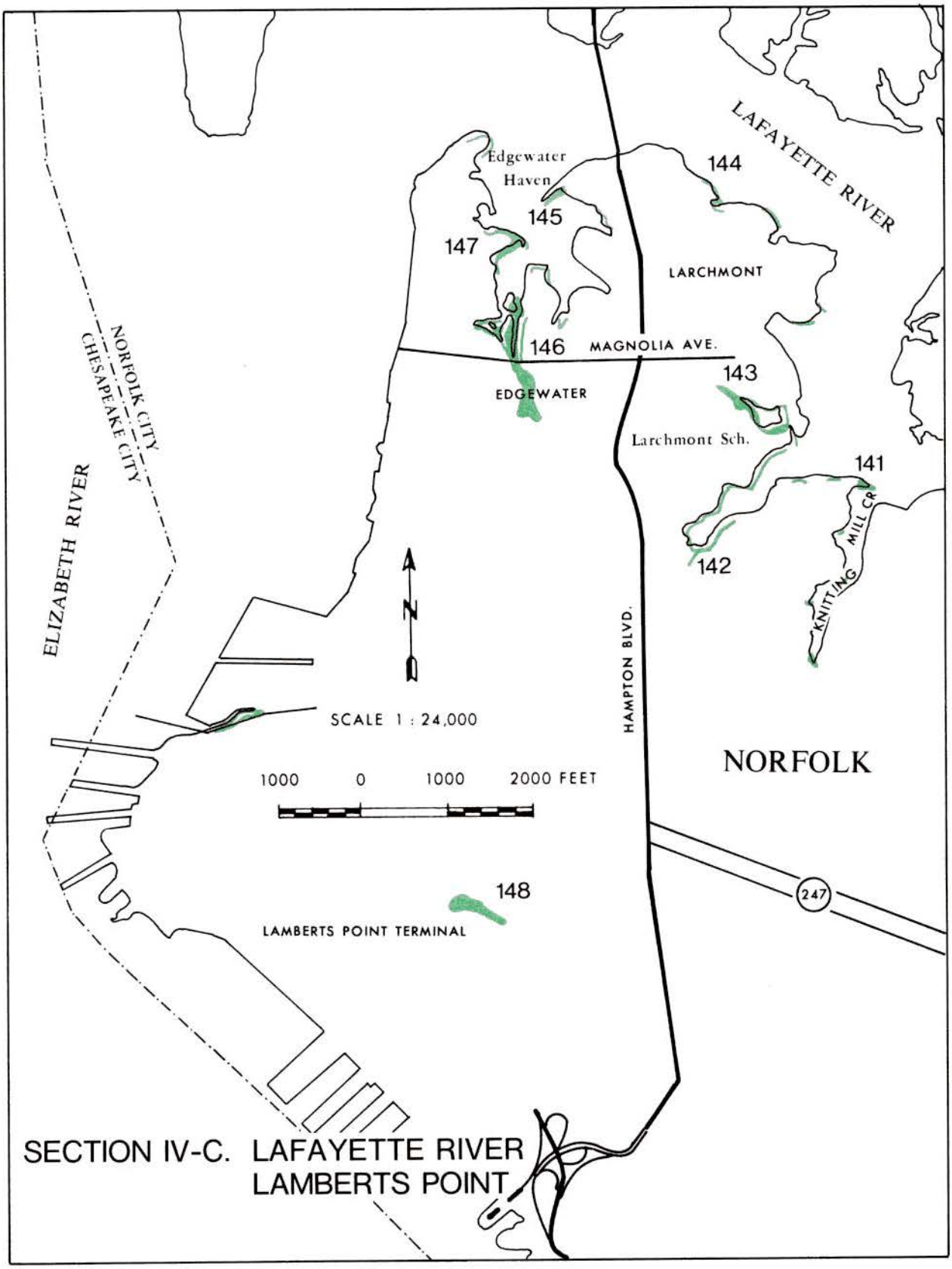

SECTION IV-C. LAFAYETTE RIVER
LAMBERTS POINT

Section IV-C: Lafayette River and Lamberts Point Area

#	Marsh Location	Acres	Sa		Jr		Md		Sb		Sc		Pa		Others		Observations	Marsh Type
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres		
141	Knitting Mill Creek	2.0	60	1.20	10	.02	–	–	30	.60							spit marsh	I
142	Larchmont School	1.38	80	1.10					20	.28			–	--	i -	–	fringe marsh	I
143	Larchmont	2.0	90	1.8			–	–	10	.20					f - d -	-- --	pocket marsh	I
144	Larchmont	.56	80	.44	–	–	–	–	20	.12							fringe marsh	I
145	Edgewater Haven	1.0	80	.80					20	.20							spit marsh	I
146	Edgewater	9.4	80	7.52					20	1.88							embayed marsh and islands	I
147	Edgewater Haven	5.0	80	4.00					20	1.00							fringe/point marsh	I
148	Lamberts Pt. Terminal	3.2	85	2.72					–	--	–	--	15	.48			embayed marsh - tidal connection throughout box culvert	I
	Total Section IV-C	24.54		19.58		.02				4.28				.48				
	Total Section IV	362.4		193.48		.54		11.59		104.04		10.93		37.25		3.99		

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Jr = Black Needlerush
Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
Pa = Reed Grass
a = Cattails
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
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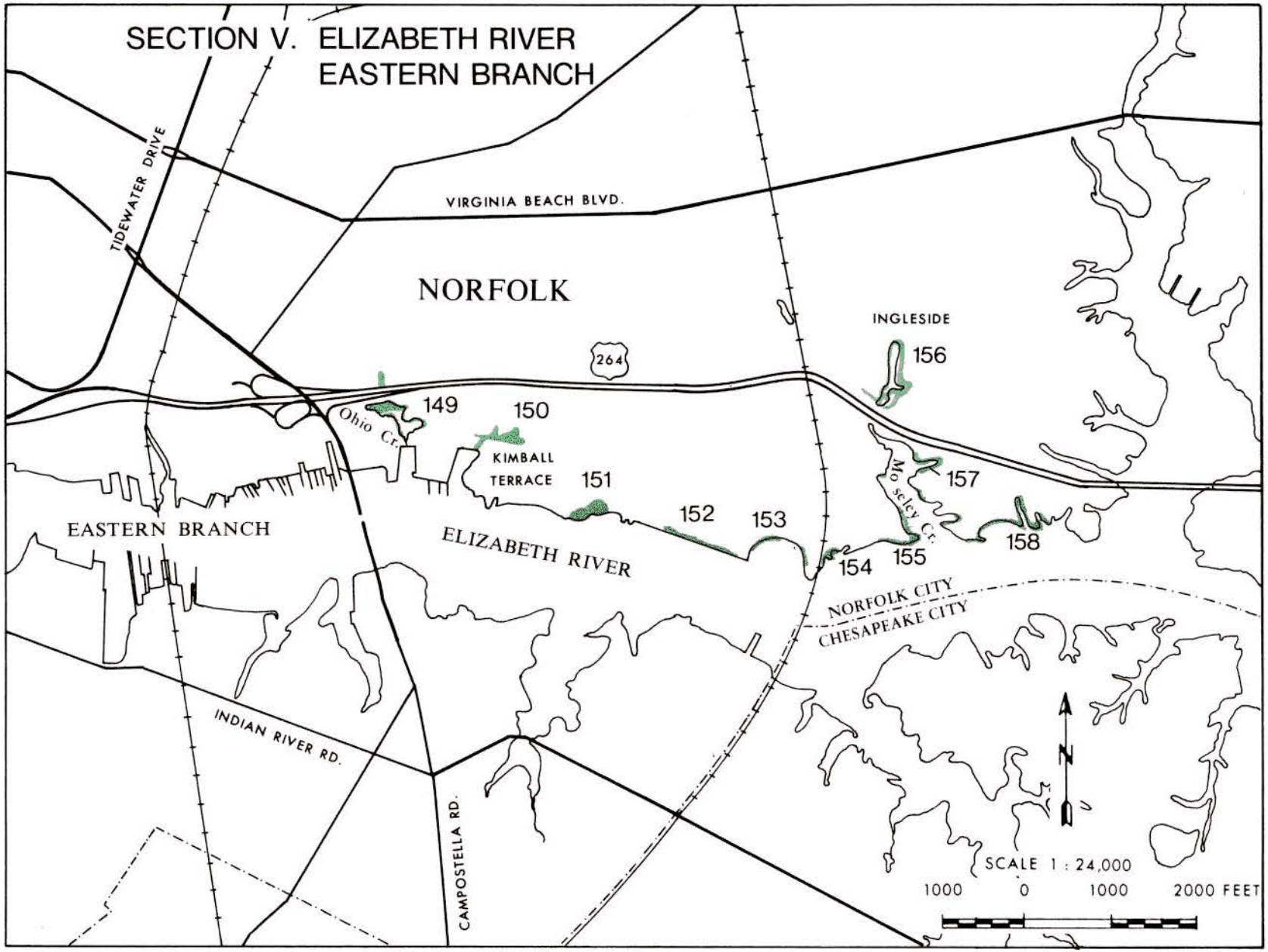
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

SECTION V

EASTERN BRANCH OF THE ELIZABETH RIVER (NORTHERN SHORELINE)

A total of ten marshes, summing slightly over 10 acres, is found in this section. The largest marsh, 2.2 acres (no. 156), is located on Moseley Creek. The marsh is contiguous with the river via a culvert under a railway. Two other marshes (nos. 149-150) have been partially impacted by fill and solid waste. All of the other marshes in this section, however, are relatively undisturbed and dominated by saltmarsh cordgrass, a highly productive tidal marsh grass.

Six small marshes (nos. 151-155 and 158) are found along the Eastern Branch shoreline and are largely characterized as fringe marshes. Although they are narrow in width, they buffer the shoreline against low to moderate energy waves.


SECTION V. ELIZABETH RIVER
EASTERN BRANCH
TIDEWATER DRIVE
VIRGINIA BEACH BLVD.
NORFOLK
INGLESIDE
264
156
149
150
Ohio Cr.
KIMBALL
TERRACE
151
152
153
154
155
157
158
Mo seley Cr.
EASTERN BRANCH
ELIZABETH RIVER
NORFOLK CITY
CHESAPEAKE CITY
INDIAN RIVER RD.
CAMPOSTELLA RD.
N
SCALE 1 : 24,000
1000 0 1000 2000 FEET

Section V: Eastern Branch of the Elizabeth River (Northern Shoreline)

#	Marsh Location	Acres	Sa		Jr		Md		Sb		Sc		Pa		Others		Observations	Marsh Type
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres		
149	Ohio Creek	1.5	85	1.27			–	–	10	.15			5	.15	f -	–	marsh partially filled	I
150	Kimball Ter.	1.5	80	1.20	–	–	–	–	10	.15			10	.15			marsh partially filled	I
151	Eastern Branch	1.73	70	1.21			10	.17	10	.17	5	.08	5	.08			embayed marsh	I
152	Eastern Branch	.40	50	.20			10	.04	25	.10	5	.02	10	.04			fringe marsh	I
153	Eastern Branch	.25	85	.21					10	.03			5	.01			fringe marsh	I
154	Eastern Branch	.25	90	.23			–	–	5	.01					i 5	.01	fringe marsh	I
155	Moseley Creek	1.30	80	1.04			10	.13	10	.13							point marsh	I
156	Ingleside	2.2	80	1.76					10	.22			10	.22			culvert, fringe marsh with island	I
157	Moseley Creek	.27	80	.22					10	.03			10	.03			cove, fringe marsh	I
158	Eastern Branch	.75	80	.60					15	.11			5	.04			fringe marsh	I
	Total Section V	10.15		7.94				.34		1.10		.10		.72		.01		

Sa = Saltmarsh Cordgrass
Jr = Black Needlerush
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Pa = Reed Grass
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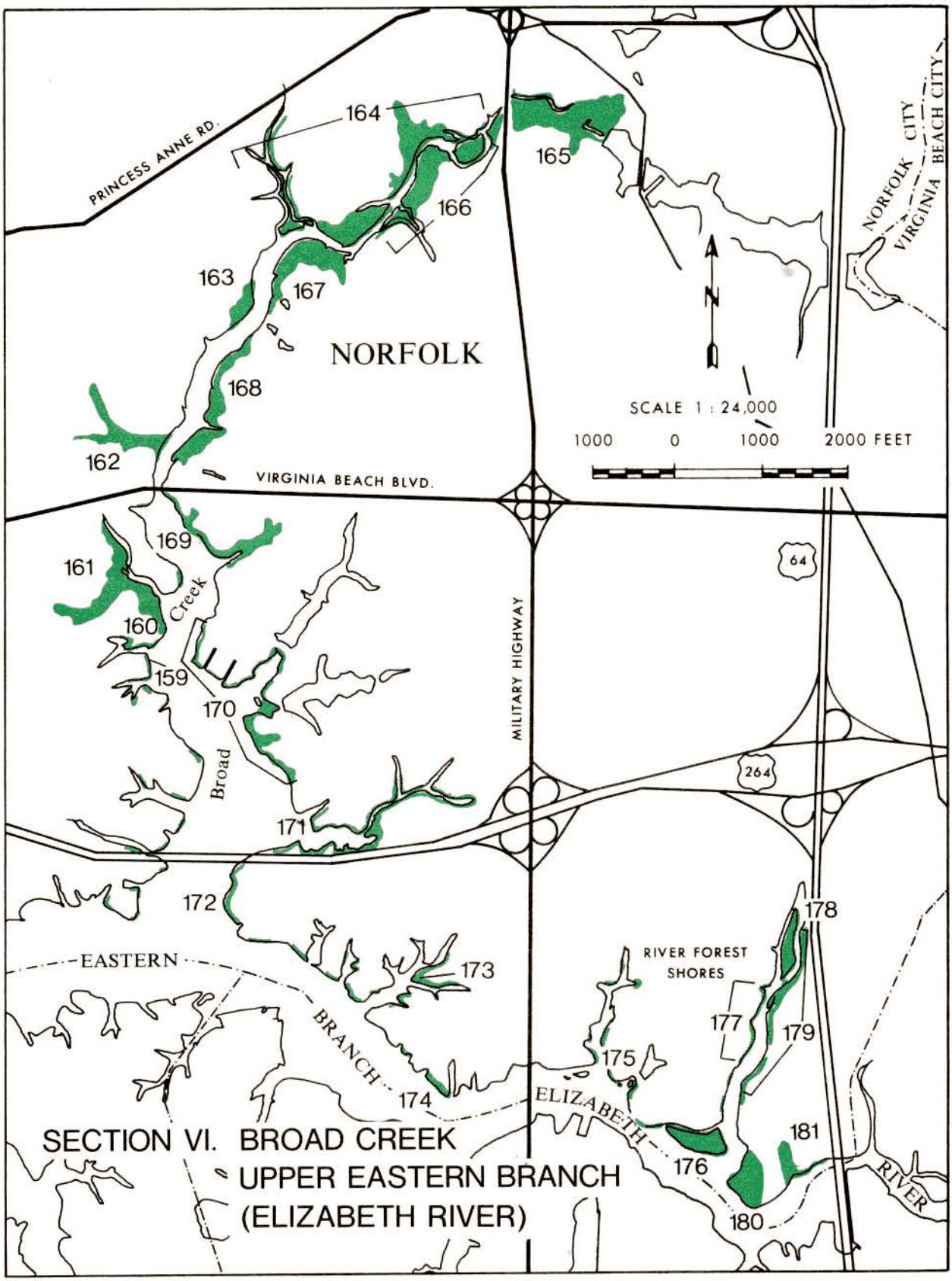
b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

SECTION VI

BROAD CREEK AND THE UPPER EASTERN BRANCH (ELIZABETH R.)

There are 23 tidal marshes in this section, thirteen of which are located in Broad Creek. Of the 134 acres of marshes, 111 are found in Broad Creek, which also contains the largest marshes. Many of the larger marshes are dominated by saltbushes, *Iva frutescens* and *Baccharis halimifolia*, which typically occupy the higher parts of the marsh, above mean high water. Broad Creek becomes quite shallow, especially at low tide, above Virginia Beach Boulevard, and tidal action is restricted above Military Highway. It is in this zone that the largest expanse of marshes is located. The largest marsh (no. 164) with 25.5 acres is dominated by saltbushes with a fringe of saltmarsh cordgrass along the marsh/creek interface.



SECTION VI. BROAD CREEK
UPPER EASTERN BRANCH
(ELIZABETH RIVER)

Section VI: Broad Creek and Upper Eastern Branch (Elizabeth River)

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
159	Broad Creek	.25	90	.23					10	.03					k -	k -	narrow fringe marsh	I
160	Broad Creek	.50	80	.40					20	.10							fringe marsh	I
161	Broad Creek	10.00	40	4.0					60	6.0							creek marsh	IV
162	Broad Creek	9.5	40	3.8					30	2.85	30	2.85					creek marsh	XII
163	Broad Creek	3.3	10	.33					80	2.64	10	.33					fringe marsh	IV
164	Broad Creek	25.5	10	2.55					80	20.4	10	2.55						IV
165	Broad Creek	17.4							30	5.22	20	3.5	20	3.5	a 5 c 10 o 15	.9 1.74 2.61	scattered hummocks of trees	XII
166	Broad Creek	14.2	10	1.4					90	12.8							broad fringe marsh	IV
167	Broad Creek	9.2	10	.92					80	7.36	10	.92					broad fringe marsh	IV
168	Broad Creek	8.2	10	.82					90	7.4							broad fringe marsh	IV
169	Broad Creek	5.75	85	4.90					15	.86							creek marsh	I
170	Broad Creek	4.3	70	3.0			5	.22	20	.86			5	.22			fringe marsh	I
171	Broad Creek	3.3	50	1.65			–	–	20	.66	–	--	30	1.0	f -	–	fringe marsh	I
172	Broad Creek	.28	95	.27					5	.01							narrow, fringe marsh	I

Sa = Saltmarsh Cordgrass
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b = Saltmarsh Fimbristylis
c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp
o = Marsh Hibiscus

Section VI: Broad Creek and Upper Eastern Branch (Elizabeth River)

#	Marsh Location	Acres	Sa		Jr		Md		Sb		Sc		Pa		Others		Observations	Marsh Type
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres		
173	Elizabeth Park	1.50	90	1.35					5	.08					k 5	k .08	fringe marsh	I
174	Eastern Branch	.28	50	.14	30	.08			20	.06							fringe marsh	I
175	Eastern Branch	.25	85	.21					15	.04					k -	k -	fringe marsh	I
176	River Forest Shores	4.60	30	1.38	5	.23	3	.14	60	2.76	2	.09			g -	g -	large marsh island	IV
177	River Forest Shores	.68	70	.48					30	.20							fringe marsh	I
178	River Forest Shores	3.44	10	.34					80	2.75	10	.34					marsh island	IV
179	River Forest Shores	1.80	40	.72	10	.18			40	.72	10	.18					fringe marsh	XII
180	River Forest Shores	7.33	5	.37					90	6.60	5	.37			f - k -	f - k -	large point marsh	IV
181	River Forest Shores	2.50	60	1.50					30	.75	10	.25	–	–	g -	g -	fringe and pocket marsh	I
	Total Section VI	134.06		30.76		.49		.36		81.15		11.38		4.72		5.33		

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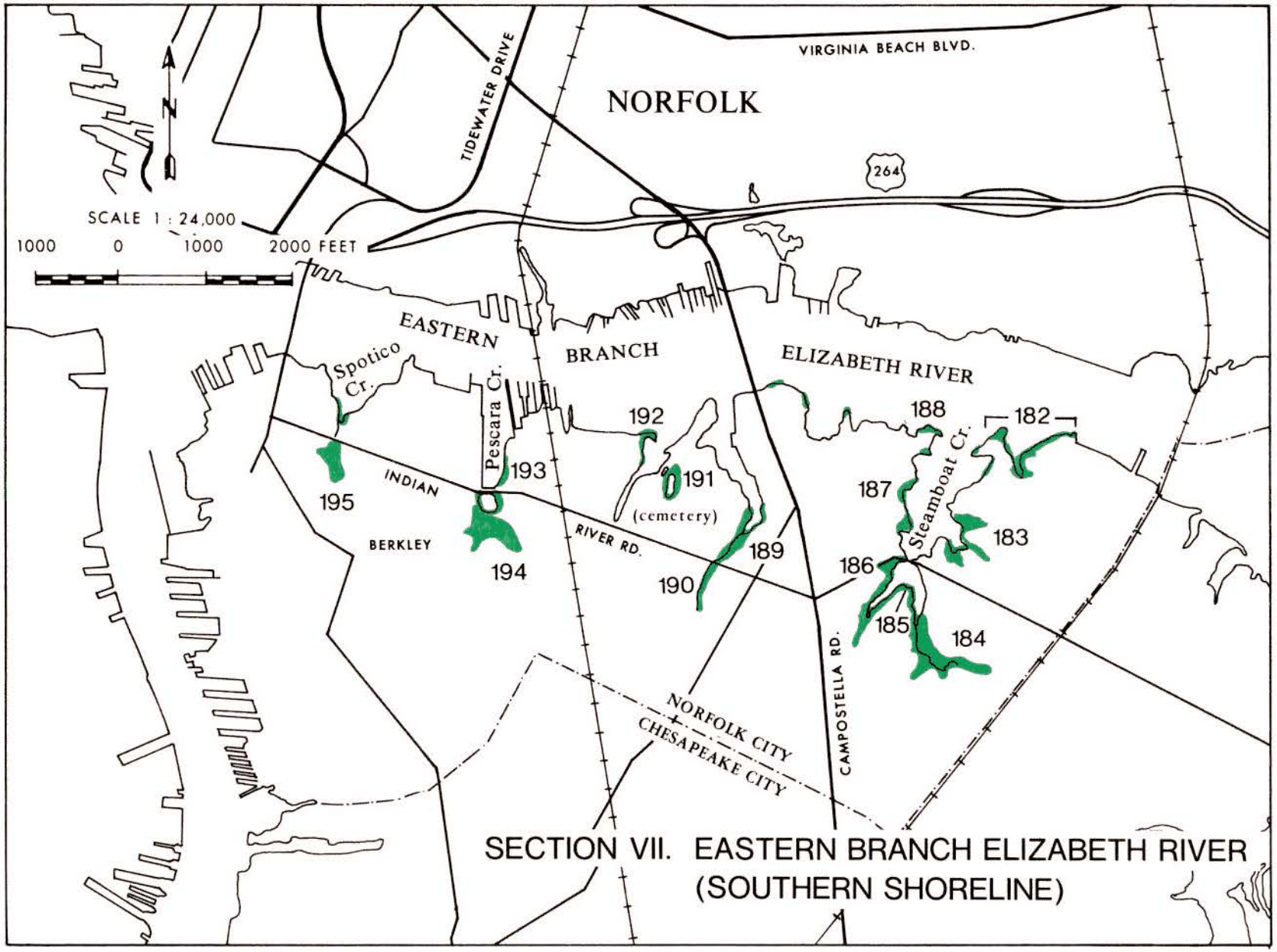
SECTION VII

EASTERN BRANCH ELIZABETH RIVER - SOUTHERN SHORELINE

At first glance, this section of Norfolk's shoreline ostensibly appears to be a classic urban/industrial area. Along the riverfront proper, extensive modification of the shoreline through dredging, filling and bulkheading has occurred over the years, leaving little of the natural estuarine system intact. However, the creeks draining into the river along this reach, eg. Steamboat, Pescara and Spotico, especially their headwaters, have remained surprisingly unaffected.

These creek and fringe marshes totaling 25 acres are primarily dominated by saltmarsh cordgrass, *Spartina alterniflora*. They continue to provide the ecological functions of detritus production, fish and wildlife habitat, filtering of upland runoff, shoreline erosion protection and flood buffering even in their highly developed surroundings. In fact, they are probably all the more important as oases of a natural environment in an urban setting.


N
SCALE 1 : 24,000
1000 0 1000 2000 FEET
VIRGINIA BEACH BLVD.
TIDEWATER DRIVE
NORFOLK
264
EASTERN BRANCH
ELIZABETH RIVER
Spotico Cr.
Pescara Cr.
Steamboat Cr.
INDIAN RIVER RD.
BERKLEY
(cemetery)
CAMPOSTELLA RD.
NORFOLK CITY
CHESAPEAKE CITY
182
183
184
185
186
187
188
189
190
191
192
193
194
195
SECTION VII. EASTERN BRANCH ELIZABETH RIVER
(SOUTHERN SHORELINE)

Section VII: Eastern Branch of the Elizabeth River (Southern Shoreline)

#	Marsh Location	Acres	Sa		Jr		Md		Sb		Sc		Pa		Others		Observations	Marsh Type
			%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres	%	Acres		
182	Elizabeth River	1.0	70	.70			2	.02	25	.25	2	.02			k /	.01	fringe marsh and cove	I
183	Steamboat Creek	3.5	80	2.80					16	.56	2	.07	2	.07			embayed marsh	I
184	Steamboat Creek	6.0	60	3.6			20	1.2	10	.60			10	.60			creek marsh	I
185	Steamboat Creek	1.50	40	.60					20	.30			40	.60			creek marsh	XII
186	Steamboat Creek	.25	90	.22					10	.02							embayed marsh	I
187	Steamboat Creek	1.65	90	1.49					10	.17							fringe marsh	I
188	Steamboat Creek	.30	80	.24					20	.06							fringe marsh	I
189	Riverside Memorial Park	4.2	98	4.1					1	.04			1	.04	a -	--	creek marsh	I
190	Riverside Memorial Park	.82	80	.65			5	.04	14	.11			1	.01	a -	--	creek marsh	I
191	Riverside Memorial Park	.25	60	.15			--	--	35	.09			5	.01			cove marsh	I
192	Riverside Memorial Park	.25	90	.22					10	.20							spit marsh	I
193	Pescara Cr.	.36	100	.36													fringe marsh	I
194	Pescara Cr.	3.4	85	2.9					5	.17			10	.34	a -	--	extensive creek marsh	I
195	Spotico Cr.	1.6	90	1.44					9	.14			1	.02			creek marsh	

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c = Giant Foxtail Grass
d = Marsh-fleabane
e = Marsh Mallow
f = Orach
g = Saltmarsh Aster
h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

Section VII: Eastern Branch of the Elizabeth River (Southern Shoreline)

#	Marsh Location	Acres	Sa %	Sa Acres	Jr %	Jr Acres	Md %	Md Acres	Sb %	Sb Acres	Sc %	Sc Acres	Pa %	Pa Acres	Others %	Others Acres	Observations	Marsh Type
	Total Section VII	25.08		19.47				1.26		2.7				1.69		.01		
	Grand Total	722.07		364.37		10.08		31.57		226.37		23.0		56.52		10.44		

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Md = Saltgrass Meadow
Sb = Saltbushes
Sc = Big Cordgrass
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b = Saltmarsh Fimbristylis
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d = Marsh-fleabane
e = Marsh Mallow
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h = Sea Oxeye
i = Switch Grass
j = Water Dock
k = Water Hemp

SUMMARY OF MARSH TYPE DISTRIBUTION

Section	Saltmarsh I	Saltmeadow II	Needlerush III	Saltbush IV	Common Reed VIII	Mixed Brackish XII	Total
I. Little Creek	124.72		.25	2.0		.25	127.22
II. Willoughby Bay	7.64						7.64
III. Mason Creek	4.83	5.45		30.6	8.4	6.2	55.48
IV. Lafayette River							
Part A	73.56				.5	4.78	78.84
Part B	119.56	1.0		99.45	34.05	5.0	259.06
Part C	24.54						24.54
V. Elizabeth River (North Shoreline)	10.15						10.15
VI. Broad Creek + Upper Elizabeth River	19.59			85.77		28.7	134.06
VII. Elizabeth River (South Shoreline)	23.58					1.5	25.08
TOTAL	408.17	6.45	.25	217.82	42.95	46.43	722.07

Index to Marsh Locations