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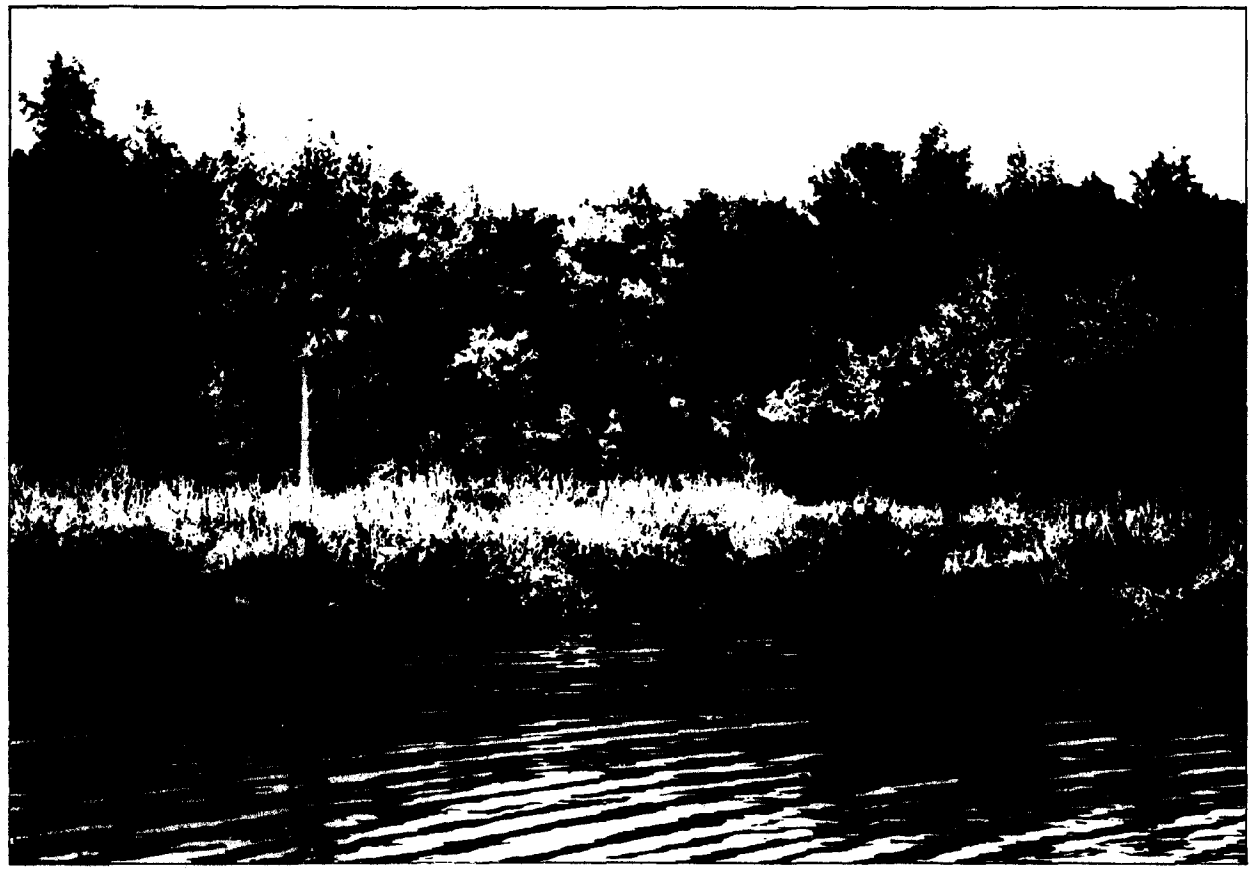
CITY OF VIRGINIA BEACH MARSH INVENTORY

Volume 1. North Landing River and Tributaries

Special Report No. 118 in Applied Marine Science and Ocean Engineering

Damon G. Doumlele



VIRGINIA INSTITUTE OF MARINE SCIENCE
Gloucester Point, Virginia 23062

SEPTEMBER 1976

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Damon G. Doumlele
G. M. Silberhorn, Project Leader

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Dr. William J. Hargis, Jr., Director

SEPTEMBER 1976

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CITY OF VIRGINIA BEACH MARSH INVENTORY
Vol. 1. North Landing River and Tributaries

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Introduction

This publication is the first of three volumes of the Virginia Beach Marsh Inventory and describes the wetlands of the North Landing River and its tributaries. Volumes 2 and 3, which describe the wetlands of Lynnhaven Bay - Broad Bay - Rudee Inlet and Back Bay, respectively, will be published later. A list of previously published marsh inventory reports is presented on page 13.

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 assist wetlands boards and other local, state and federal agencies which have responsibilities in managing wetlands. Its results are also of interest to scientists and other concerned citizens.

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.

The reader is also referred to Tidal Wetland Plants of Virginia, Silberhorn, 1976, VIMS Educational Series No. 19, a recently published manual describing each of the wetland plants listed in the Act. Both of the above documents are available from the VIMS library.

Although tidal action in the North Landing River and Back Bay is negligible, the marshes of these areas have been included in the Wetlands Act because of their large acreage, their high value to wildlife and their close similarity to tidal marshes. Because of this similarity the values listed on pages 4-10 can be applied to these marshes, with the realization that those contributions which are most correlated with tidal flushing will be somewhat reduced.

The wetlands area found along the North Landing River and its tributaries between the State Route 165 causeway at North Landing and the Virginia-North Carolina state line totals approximately 15,461 acres. Of this total only one-third (3856 acres) are marshes, with the rest (11,605 acres) consisting of wooded swamp. Although the swamps comprise the bulk of the wetlands in this system, a detailed inventory would necessitate surveying techniques and is beyond the scope of this report. These areas are indicated, however, on the sectional maps. Trees observed in the swamps include Red Maple, Acer rubrum; Pine, Pinus spp.; Wax Myrtle, Myrica cerifera; Black Willow, Salix nigra and Bald Cypress, Taxodium distichum.

Plant species composition of the marshes of this area often differs considerably from that of other marshes in Virginia. The North Landing River - Back Bay area is located in the extreme southeast corner of the state and constitutes the northernmost range of many plant species found in abundance farther south. As a result, many marshes in this area are composed of species common to Virginia tidal marshes in addition to species such as Sawgrass, Cladium jamaicense, a sedge very common in the Everglades and other southern swamps.

Another unusual aspect of these marshes is the abundance of salt and brackish water species in a freshwater environment. Although the highest salinity recorded during this investigation was 0.8 o/oo at the Route 190 crossing, such brackish-water species as Black Needlerush and Big Cordgrass were found in abundance. The river has a history of significant salinity changes, resulting from the closing of a Back Bay connection with the ocean in the last century and the operations of canal locks farther upstream. It is thus possible that the present community structure is related to a past period of higher salinity.

This unusual correlation with salinity has presented problems in classifying many of the marshes according to the types listed on pages 6 - 8. For example, any mixed community of the river theoretically, because of the low salinity, should be classified as a Freshwater Mixed Community (Type XI). However, in the case of a marsh such as marsh no. 51, where the community composition is typical of a Brackish Water Mixed Community (Type XII), it seems more appropriate to classify the marsh as a Type XII community rather than Type XI, even though fresh or only slightly brackish water is present.

Methods

Topographic maps (U.S.G.S.) were consulted in order to obtain wetland locations and patterns of marsh vegetation. Marsh community zones and patterns were substantiated by ground truth methods, including observations on foot and by boat. Acreages and wetland boundaries were also estimated by these methods.

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. Small marshes (less than one acre) are exaggerated and are not indicated to scale. Information such as individual marsh acreage, plant community percentage and acreage, marsh type and other observations are recorded in tabular form. Plant community percentages are recorded to the nearest percent, and acreages to the nearest tenth of an acre. In those instances where an individual plant species is estimated to amount to less than 0.5 percent or 0.05 acre, 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 Wetlands 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 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 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 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 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

Published Tidal Marsh Inventories

City of Hampton	Mathews County
Fairfax County	Northumberland County
Gloucester County	Prince William County
King George County	Stafford County
Lancaster County	York County and Town of Poquoson

Available From: Library
Virginia Institute of Marine Science
Gloucester Point, Virginia 23062

MARSH PLANTS

Common Names and Scientific Names as Found in the Data Tables

Arrow Arum	*Peltandra virginica* (L.) Kunth
Arrowhead	*Sagittaria* spp.
Aster*	*Aster* spp.
Bald Cypress	*Taxodium distichum* (L.) Richard
Beak Rush*	*Rhynchospora macrostachya* Torr.
Beggar Ticks	*Bidens* spp.
Big Cordgrass	*Spartina cynosuroides* (L.) Roth.
Black Needlerush	*Juncus roemerianus* Scheele
Black Willow*	*Salix nigra* Marsh.
Cardinal Flower*	*Lobelia cardinalis* L.
Cattail	*Typha* spp.
Climbing Hempweed*	*Mikania scandens* (L.) Willd.
Common Threesquare	*Scirpus americanus* Pers.
Dodder*	*Cuscuta* spp.
Eryngo*	*Eryngium aquaticum* L.
Fimbristylis*	*Fimbristylis castanea* (Michx.) Vahl
Fragrant Water Lily*	*Nymphaea odorata* Ait.
Galingale*	*Cyperus strigosus* L.

* Marsh species not included in the Virginia Wetlands Act of 1972

MARSH PLANTS (cont.)

Goldenrod*	*Solidago* spp.
Great Lobelia*	*Lobelia siphilitica* L.
Loosestrife*	*Lythrum* spp.
Marsh Fern*	*Thelypteris palustris* Schott
Marsh Fleabane	*Pluchea purpurascens* (Sw.) DC.
Marsh Hibiscus	*Hibiscus moscheutos* L.
Marsh Iris*	*Iris versicolor* L.
Marsh Mallow*	*Kosteletzkya virginica* (L.) Presl.
Marsh Orchid*	*Spiranthes odorata* (Nutt.) Lindl.
Pickerel Weed	*Pontederia cordata* L.
Pine*	*Pinus* spp.
Plume Grass*	*Erianthus giganteus* (Walt.) Muhl.
Red Maple*	*Acer rubrum* L.
Reed Grass	*Phragmites australis* (Cav.) Trin. ex Steud.
Rice Cutgrass	*Leersia oryzoides* (L.) Sw.
Royal Fern	*Osmunda regalis* L. var. *spectabilis* (Willd.) Gray
Rush*	*Juncus scirpoides* Lam.

* Marsh species not included in the Virginia Wetlands Act of 1972

MARSH PLANTS (cont.)

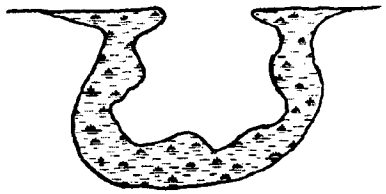
Saltbush	Baccharis halimifolia L.
Saltmarsh Cordgrass	Spartina alterniflora Loisel.
Sawgrass*	Cladium jamaicense Crantz
Sedge*	Carex stricta Lam.
Smartweed	Polygonum punctatum Ell.
Sneezeweed*	Helenium autumnale L.
Soft Rush*	Juncus effusus L.
Spikerush	Eleocharis spp.
Swamp Rose*	Rosa palustris Marsh.
Sweet Bay*	Magnolia virginiana L.
Sweetflag	Acorus calamus L.
Switchgrass	Panicum virgatum L.
Tearthumb*	Polygonum spp.
Walter's Millet*	Echinochloa walteri (Pursh) Nash
Water Parsnip*	Sium suave Walt.
Water Pennywort*	Hydrocotyle spp.
Wax Myrtle	Myrica cerifera L.
Woolgrass*	Scirpus cyperinus (L.) Kunth

* Marsh species not included in the Virginia Wetlands Act of 1972

Glossary of Descriptive Terms

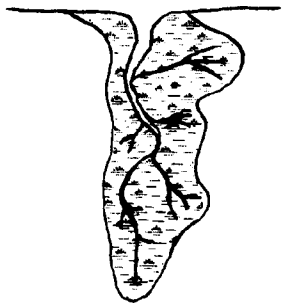
cove marsh

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.



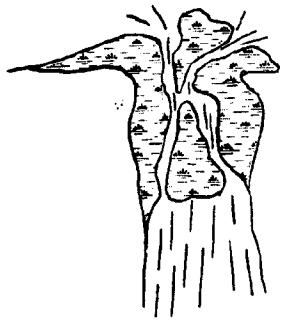
creek or embayed marsh

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.

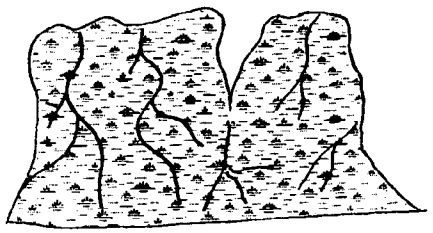


delta marsh

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.

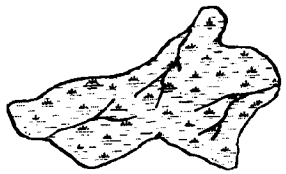
low marsh

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

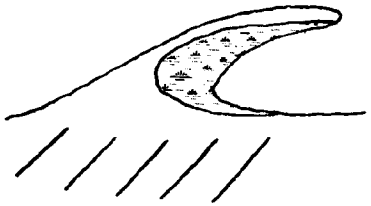


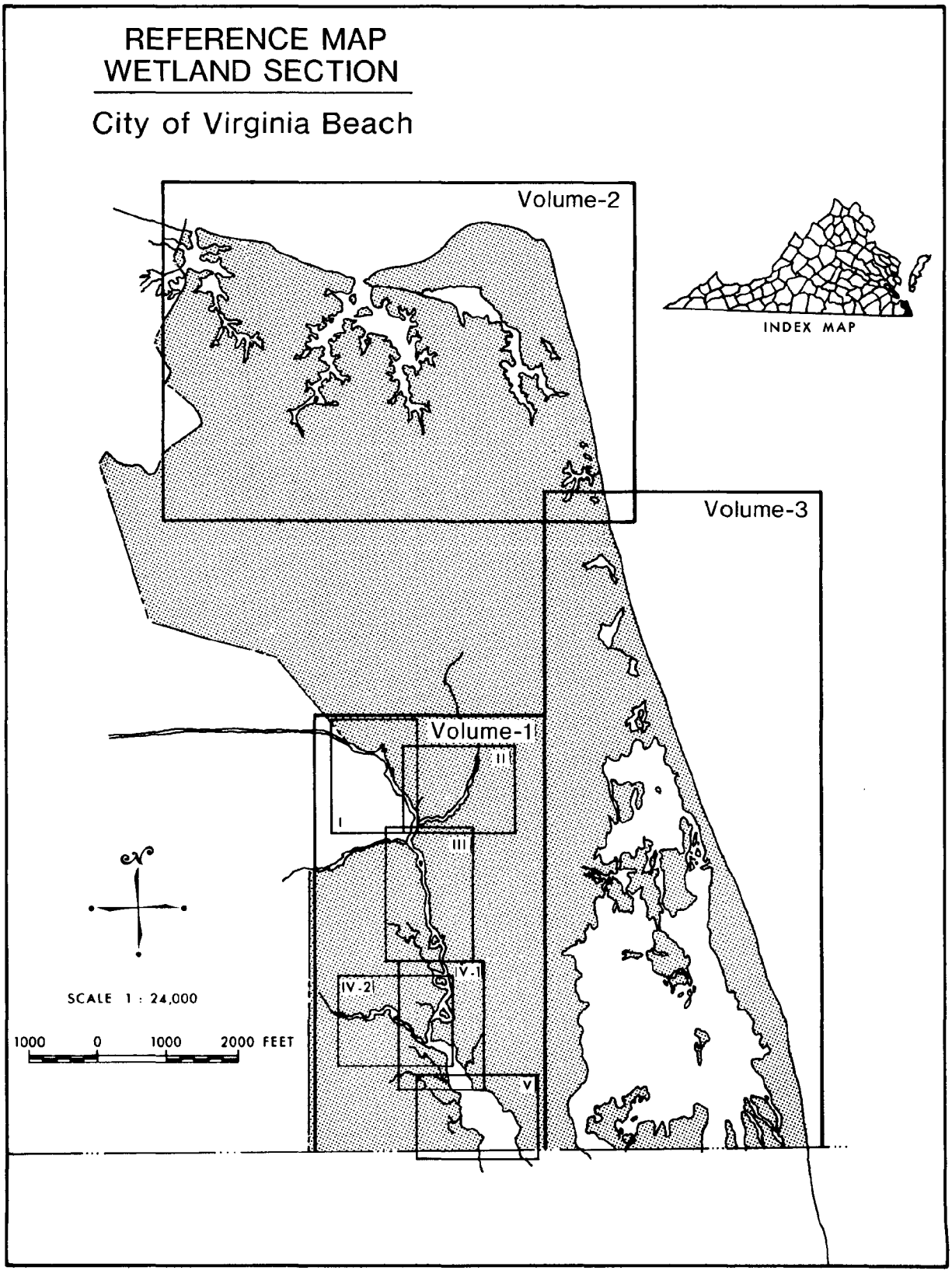
pocket marsh

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
WETLAND SECTION
City of Virginia Beach
Volume-2
Volume-3
Volume-1
INDEX MAP
I
II
III
IV-1
IV-2
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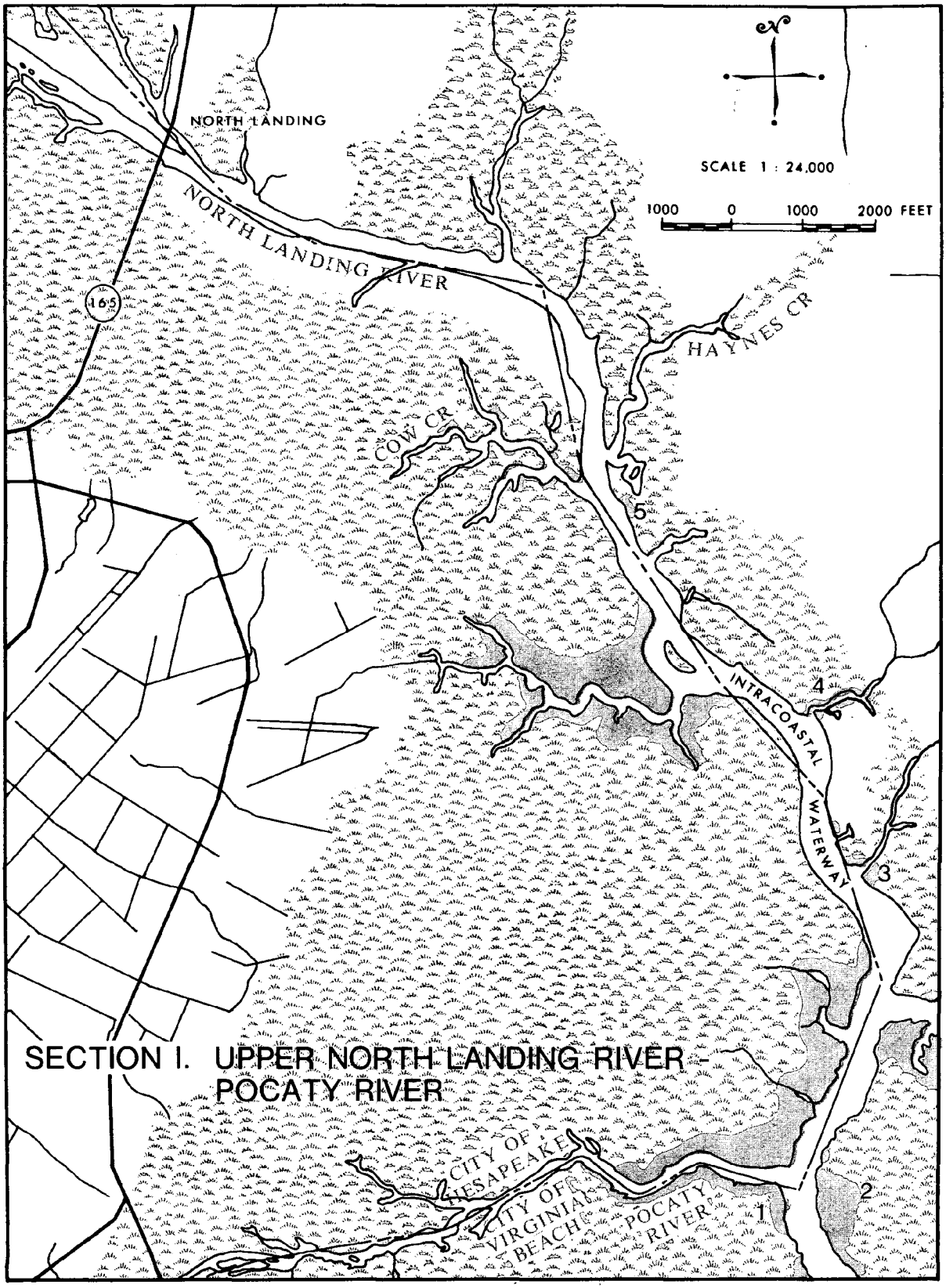


SECTION I. UPPER NORTH LANDING RIVER - POCATY RIVER

Section I. Upper North Landing River-Pocaty River

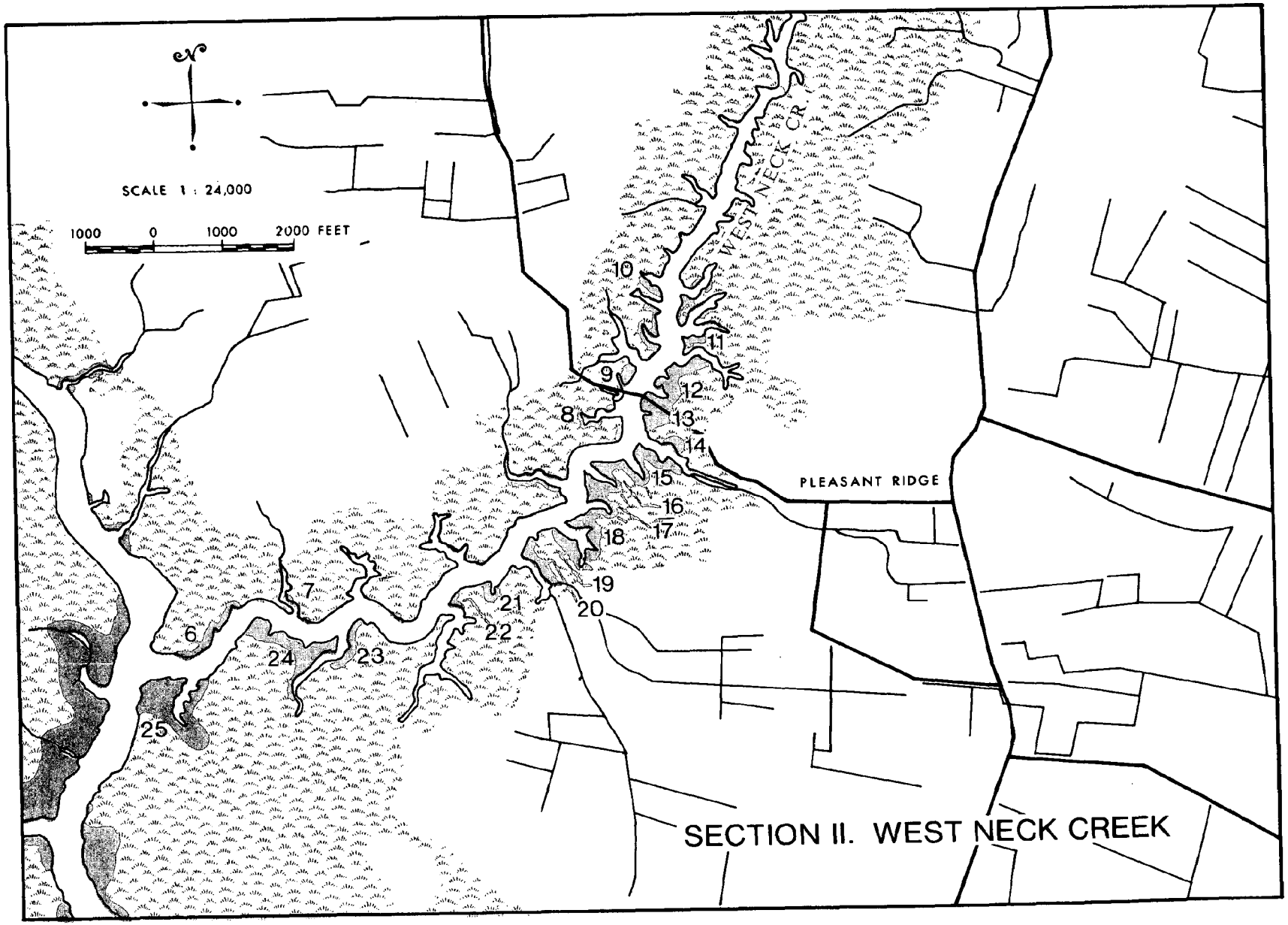
Most of the wetlands of this section of the river (124.5 acres) are located within the Chesapeake City limits and are therefore not discussed here, although they are indicated on the accompanying maps. The marshes of the section within Virginia Beach are fairly representative of the more extensive marshes downstream, except that the latter contain large stands of Black Needlerush, Juncus roemarianus, and Cattail, Typha spp., which are not found here in large amounts.

The typical high diversity of many of the marshes of the North Landing River is exemplified by marsh no. 1, in which at least 16 species are found. Such high diversity of plants is usually an asset to a marsh, since a wide variety of wildlife foods is provided. However, even though many of these marshes are quite diverse, Big Cordgrass, Spartina cynosuroides, is usually very dominant. This grass, a producer of detritus in tidal marshes, may have greater value in the non-tidal marshes of the North Landing River system as shelter for wildlife, a deterrent to erosion and an assimilator of flood waters.

Section I. Upper North Landing River-Pocaty River

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
1	Pocaty River	5	%	80	3	-	-		-	-	-	10	-	-	5	-	-	-	-								d,-		V
			acres	4.0	0.2	-	-		-	-	-	0.5	-	-	0.3	-	-	-	-								d,-		
2	North Landing River	11	%	95	-	2		-	-	-	-	-				-		3				-					o,- p,-		V
			acres	10.4	-	0.2		-	-	-	-	-				-		0.3				-					o,- p,-		
3	North Landing River	3	%	90						1	6	1							1		1								V
			acres	2.7						-	0.2	-							-		-								
4	North Landing River	2	%	90	-	-			-	-		5		-	3				-	-						-		Series of Big Cordgrass fringes.	V
			acres	1.8	-	-			-	-		0.1		-	0.1				-	-						-			
5	North Landing River	0.25	%	80	1		15		1									1									g,l j,l		V
			acres	0.2	-		0.04		-									-									g,- j,-		
	Total Section 1	21.25	%	90	1	1	-	-	-	-	1	3	-	-	2	-	-	1	-	-	-	-		-		-	d,- g,- j,-	o,p	
			acres	19.1	0.2	0.2	0.04	-	-	-	0.2	0.6	-	-	0.4	-	-	0.3	-	-	-	-		-		-	d,- g,- j,-		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
m-Woolgrass
n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip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WEST NECK CR.
PLEASANT RIDGE
SECTION II. WEST NECK CREEK

Section II. West Neck Creek

The marshes of this section differ noticeably in plant community composition from the other marshes described in this report. The most obvious difference is the abundance of Rice Cutgrass, Leersia oryzoides, which is virtually confined to West Neck Creek. Also, high amounts of Royal Fern, Osmunda regalis, Cattail and Soft Rush, Juncus effusus, are found.

The presence of many diving ducks, fishes and snakes, as well as fishermen, suggests a heavy utilization of this relatively undisturbed creek by wildlife; thus, from an environmental viewpoint, these marshes should not be unnecessarily disturbed.

Section II. West Neck Creek

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
6	West Neck Creek	3	%	5		1	75		2		15		2																	VI
			acres	0.2		-	2.2		0.1		0.4		0.1																	
7	West Neck Creek	1	%				65				20	2	10	2												1				VI
			acres				0.6				0.2	-	0.1	-												-				
8	West Neck Creek	0.5	%				95							1	-		-											q,- w,-	Marsh composed largely of dead Cattail.	VI
			acres				0.5							-	-		-											q,- w,-		
9	West Neck Creek	2	%	45	-		20							5	-	-			20		-	-						b,5		XII
			acres	0.9	-		0.4							0.1	-	-			0.4		-	-						b,0.1		
10	West Neck Creek	1	%		-		55				-		45	-	-			-							-					VI
			acres				0.6				-		0.4	-	-			-							-					
11	West Neck Creek	1	%	20			30						20	20	10	-			-												XII
			acres	0.2			0.3						0.2	0.2	0.1	-			-											
12	West Neck Creek	6	%	5	-		55		-	20	-			-	10				5		-	-						a,- g,-	Once continuous with marsh No. 13, now separated by causeway.	VI
			acres	0.3	-		3.3		-	1.2	-			-	0.6				0.3		-	-						a,- g,-		
13	West Neck Creek	3	%	5	-		55		-	20	-			-	10				5		-	-						a,- g,-	Once continuous with marsh No. 12, now separated by causeway.	VI
			acres	0.2	-		1.6		-	0.6	-			-	0.3				0.2		-	-						a,- g,-		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
m-Woolgrass
n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

Section II. West Neck Creek

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
14	West Neck Creek	1	%	40	1	1	1		1		1		1	2	1				20	1							a,10 b,5 s,15	Very diverse pocket marsh, large amounts of Royal Fern; some Walter's Millet present.	XII
			acres	0.4	-	-	-		-		-		-	-	-				0.2	-							a,0.1 b,- s,0.2		
15	West Neck Creek	3	%	85		-	10				3										-	-		2			s,-		V
			acres	2.6		-	0.3				0.1										-	-		0.1			s,-		
16	West Neck Creek	3	%	85		-	10				3										-	-		2			s,-		V
			acres	2.6		-	0.3				0.1										-	-		0.1			s,-		
17	West Neck Creek	5	%	75	2	-	-				5		-	-	-				15	-		-							V
			acres	3.8	0.1	-	-				0.2		-	-	-				0.8	-		-							
18	West Neck Creek	5	%	85	-	-		-	-		-			-	-		-		10		-	-		5					V
			acres	4.2	-	-		-	-		-			-	-		-		0.5		-	-		0.2					
19	West Neck Creek	3	%	55	-	-	-				-		-		3			-	2					40			k,-		V
			acres	1.6	-	-	-				-		-		0.1			-	0.1					1.2			k,-		
20	West Neck Creek	3	%	55	-	-	-				-		-		3			-	2					40			k,-		V
			acres	1.6	-	-	-				-		-		0.1			-	0.1					1.2			k,-		
21	West Neck Creek	1	%	20	-	1					5		-	10	1									60			w,-		XII
			acres	0.2	-	-					-		-	0.1	-									0.6			w,-		

a-Switchgrass
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d-Sweetflag
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f-Rush
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h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
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r-Common Threesquare
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x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

Section II. West Neck Creek

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
22	West Neck Creek	1	%	-	-	-	-	-		-	-	-		40	-		-		10					50			aa,-	Unusually high proportions of Soft Rush and Rice Cutgrass.	XI
			acres	-	-	-	-	-		-	-	-		0.4	-		-		0.1					0.5			aa,-		
23	West Neck Creek	1	%	2			1				5		20	70	1								1							XI
			acres	-			-				-		0.2	0.7	-								-						
24	West Neck Creek	7	%	90	-		1		-		1		2	-			-						-		5					V
			acres	6.3	-		0.1		-		0.1		0.1	-			-						-		0.4					
25	West Neck Creek	11	%	95	-	1		1		-	-	-		-														d,- j,-		V
			acres	10.4	-	0.1		0.1		-	-	-		-														d,- j,-		
	Total Section II	44	%	77	-	-	2	-	-	-	1	-	1	3	-		-	-	4	-	-	-		10			s,- s,-	b, d, j, k, w, aa, bb.	
			acres	33.7	0.1	0.1	0.7	0.1	-	-	0.5	-	0.3	1.2	0.2		-	-	1.8	-	-	-		4.3			s,0.1 s,0.2		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
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j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
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v-Black Willow
w-Dodder
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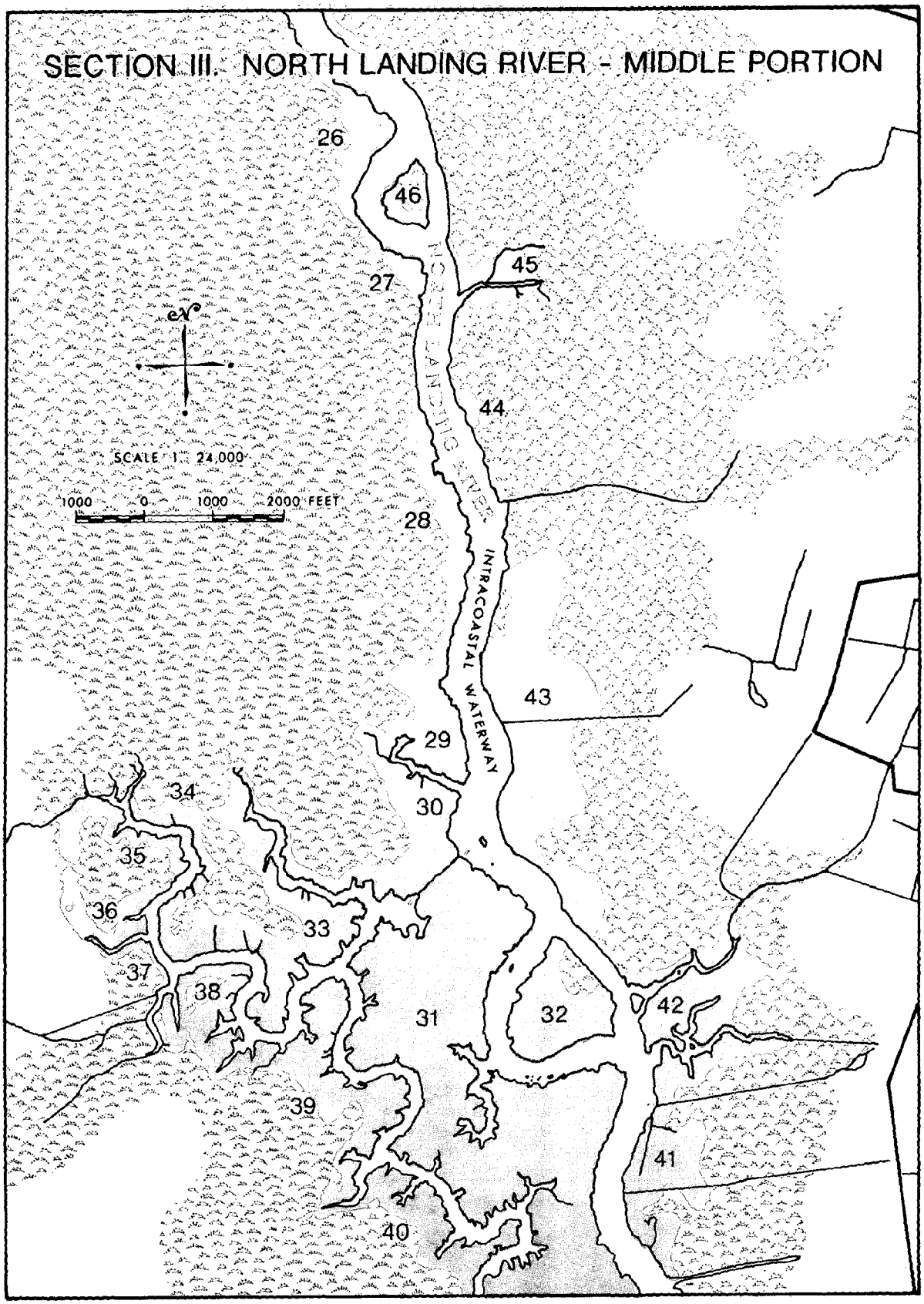
SECTION III. NORTH LANDING RIVER - MIDDLE PORTION
26
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31
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NORTH LANDING RIVER
INTRACOASTAL WATERWAY
SCALE 1" 24,000'
1000 0 1000 2000 FEET

Section III. North Landing River - Middle Portion

The northernmost limit of extensive marshes typical of the lower North Landing River are found in this section. Most of the marsh acreage is located on the west bank, as is the case for the entire river.

The marshes of this section are moderately diverse, ranging from 3 to 16 species per marsh. Big Cordgrass, though still dominant, constitutes a smaller percentage of the total acreage, while Cattail and Black Needlerush are more prevalent than in marshes upstream. The occurrence of needlerush is notable in that this species is normally found only in salt marshes. Its abundance in these freshwater marshes may be attributed to salinity changes in the river resulting from actions of the Chesapeake and Albemarle Canal locks farther upstream and/or the pumping of ocean water into Back Bay to control vegetation.

Section III. North Landing River - Middle Portion

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
26	North Landing River	20	%	95	1	-			1		1	-		-																V
			acres	19.0	0.2	-			0.2		0.2	-		-																
27	North Landing River	9	%	95	3	2																								V
			acres	8.6	0.3	0.2																								
28	North Landing River	16	%	80	5	10		-	4	-	-				-	-				-								b,- i,- j,-	A few Sweet Bay trees present.	V
			acres	12.8	0.8	1.6		-	0.6	-	-				-	-				-								b,- i,- j,-		
29	North Landing River	32	%	10		-		18	-	-		-	-			-			10							-		e,- f,40 r,20	Diverse marsh with scattered individuals of Marsh Fleabane, Marsh Iris and Beak Rush.	XI
			acres	3.2		-		5.8	-	-		-	-			-			3.2							-		e,- f,12.8 r,6.4		
30	North Landing River	43	%	55	10	-	4	15	-	5	-		-				-			-							-	g,- u,4.3	Large stands of Sawgrass.	V
			acres	23.6	4.3	-	1.7	6.4	-	2.2	-		-				-			-							-			
31	North Landing River	282	%	60		-		20		10									10										Marsh contains many pure stands of Black Needlerush.	V
			acres	169.2		-		56.4		28.2									28.2											
32	North Landing River	35	%	55	2	-	25		-		-	-					-			-						15				V
			acres	19.2	0.7	-	8.8		-		-	-					-			-						5.2				
33	North Landing River	55	%	20		-	70	-		9	-															-		u,-	Extensive stands of Cattail.	VI
			acres	11.0		-	38.5	-		5.0	-															-		u,-		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
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j-Marsh Fleabane
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r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

Section III. North Landing River - Middle Portion

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
34	North Landing River	13	%	90			2	-		5						-	-	-											V
			acres	11.7			0.3	-		0.6						-	-	-											
35	North Landing River	11	%	80		-	5	4	-	10				-		-		-									g,-		V
			acres	8.8		-	0.6	0.4	-	1.1				-		-		-									g,-		
36	North Landing River	10	%	80	-			19	-	-			-		-	-						-					k,-		V
			acres	8.0	-			1.9	-	-			-		-	-						-					k,-		
37	North Landing River	2	%	20		-	-	2	-	70			-													5			Fringing marsh dominated by Arrowhead.	XI
			acres	0.4		-	-	-	-	1.4			-													0.1			
38	North Landing River	19	%	40		-	55	3	-	1												-					1,-		VI
			acres	7.6		-	10.4	0.6	-	0.2												-					1,-		
39	North Landing River	45	%	80	2	-	10	1		5								-											V
			acres	36.0	0.9	-	4.5	0.4		2.2								-											
40	North Landing River	46	%	70			20	5	-	-	-			1					1		-	-				-				V
			acres	32.2			9.2	2.3	-	-	-			0.5					0.5		-	-				-				
41	North Landing River	32	%	90	1	2		-	-	-		1				-	3												V
			acres	28.8	0.3	0.6		-	-	-		0.3				-	1.0												

a-Switchgrass
b-Wax Myrtle
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z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

Section III. North Landing River - Middle Portion

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
42	North Landing River	51	%	75	2			20	1	1	-	-		-			-		1	-							-			V
			acres	38.2	1.0			10.2	0.5	0.5	-	-		-			-		0.5	-							-			
43	North Landing River	100	%	95	1	2	-	-	-	-		2		-		-	-			-	-							d,- z,-		V
			acres	95.0	1.0	2.0	-	-	-	-		2.0		-		-	-			-	-							d,- z,-		
44	North Landing River	4	%	95		1		-				2					2													V
			acres	3.8		-		-				0.1					0.1												Pocket marsh.	
45	North Landing River	12	%	90		2		5		-	-	-		1		-	-	-	-		-					1		b,-		V
			acres	10.8		0.2		0.6		-	-	-		0.1		-	-	-	-		-					0.1		b,-	Diverse creek marsh.	
46	North Landing River	3	%	95	2	1					1							1												V
			acres	2.8	0.1	-					-							-												
	Total Section III	840	%	66	1	1	9	10	-	5	-	-	-	-	-	-	-	-	4	-	-	-			1	-	f,2 r,1 u,1	b,d,e,g,i,j,k,l,p,q,z.	
			acres	550.7	9.6	4.6	74.0	85.0	1.3	41.4	0.2	2.4	-	0.6	-	-	1.1	-	32.4	-	-	-			5.4	-	f,128 r,6.4 u,4.3		

a-Switchgrass
b-Wax Myrtle
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e-Eryngo
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y-Spikerush
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bb-Walter's Millet
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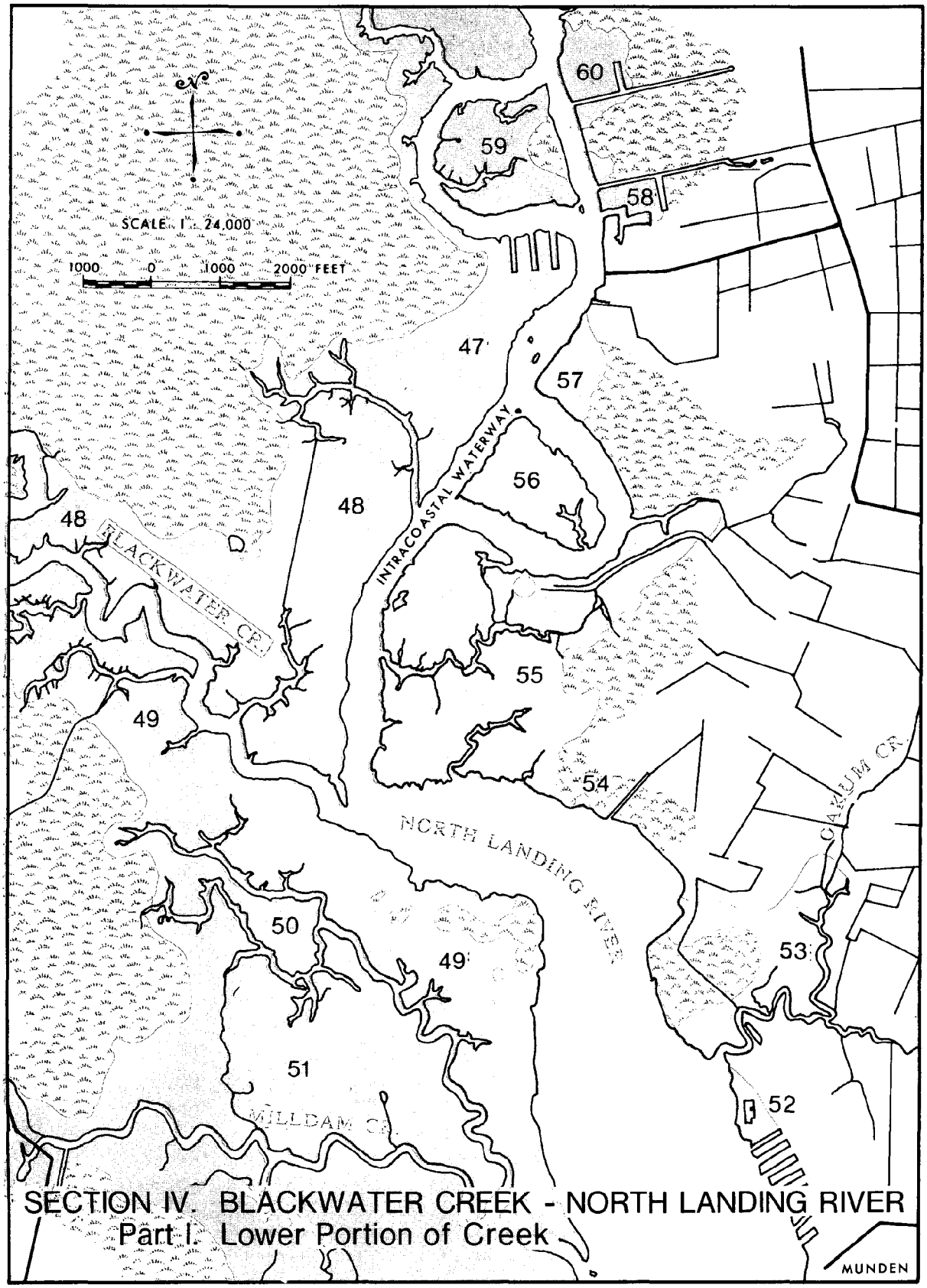


SECTION IV. BLACKWATER CREEK - NORTH LANDING RIVER
Part I. Lower Portion of Creek

Section IV. Blackwater Creek and Adjacent North Landing River

The marshes in this section comprise 1602 acres or 42% of the total marsh acreage in the river system. Although most of the marshes of this section are located on the North Landing River, a small portion (146 acres, Part 2) is found on Blackwater Creek. This waterway, which borders scattered residential and agricultural areas, is nevertheless quite scenic, especially in the upper reaches. Certain shallow portions of the creek are clogged with submerged aquatic plants, often hindering navigation.

The marsh plant composition of Blackwater Creek and the adjacent North Landing River closely parallels the composition of the entire system. Differences include higher proportions of Big Cordgrass and Black Needlerush. Switchgrass, Panicum virgatum, is prevalent along creek banks, but not as much as it is farther downstream.

Section IV. Blackwater Creek and Adjacent North Landing River

Part 1. Lower Portion of Creek and Adjacent North Landing River

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
47	North Landing River	121	%	90	2	1		2		1		-		-	1		-		-							1		b,1 k,-		V
			acres	108.9	2.4	1.2		2.4		1.2		-		-	1.2		-		-							1.2		b,1.2 k,-		
48	Blackwater Creek	294	%	50	-	-		30	-	-		1	-	1	-	-		1			-	-	-			-	b,- m,10 r,5	Switchgrass along creek banks.	V
			acres	147.0	-	-		88.2	-	-		2.9	-	2.9	-	-		2.9			-	-	-			-	b,- m,29.4 r,14.7		
49	North Landing River	278	%	65	-	1	20	10	-	-	1	-	-					-		1	-	-	-			-	j,1 m,1 q,-	Marsh contains Goldenrod, Rush, Eryngo, Sneezeweed and Common Threesquare.	V
			acres	180.7	-	2.8	55.6	27.8	-	-	2.8	-	-					-		2.8	-	-	-			-	j,2.8 m,2.8 q,-		
50	North Landing River	40	%	10		-		90												-						-		Black Needlerush marsh.	III
			acres	4.0		-		36.0												-						-			
51	Milldam Creek	277	%	10	-	1	30	40	1	-		-	5	1	1		-			-			-			-	a,10	Black Needlerush growing in several pure stands.	XII
			acres	27.7	-	2.8	83.1	110.8	2.8	-		-	13.8	2.8	2.8		-			-			-			-	a,27.7		
52	North Landing River	6	%	95												1		1					1				c,2	Marsh has been much reduced by dredging.	V
			acres	5.7												0.1		0.1					0.1				c,0.1		
53	North Landing River	57	%	30			60		2				-		1	5			-				1				h,1	Many submerged aquatic plants growing in creek.	VI
			acres	17.1			34.2		1.1				-		0.6	2.8			-				0.6				h,0.6		
54	North Landing River	2	%	75	5	1		1	-				-		-		15	-			-		-				c,2 e,-	Pocket marsh.	V
			acres	1.5	0.1	-		-	-				-		-		0.3	-			-		-				c,- e,-		

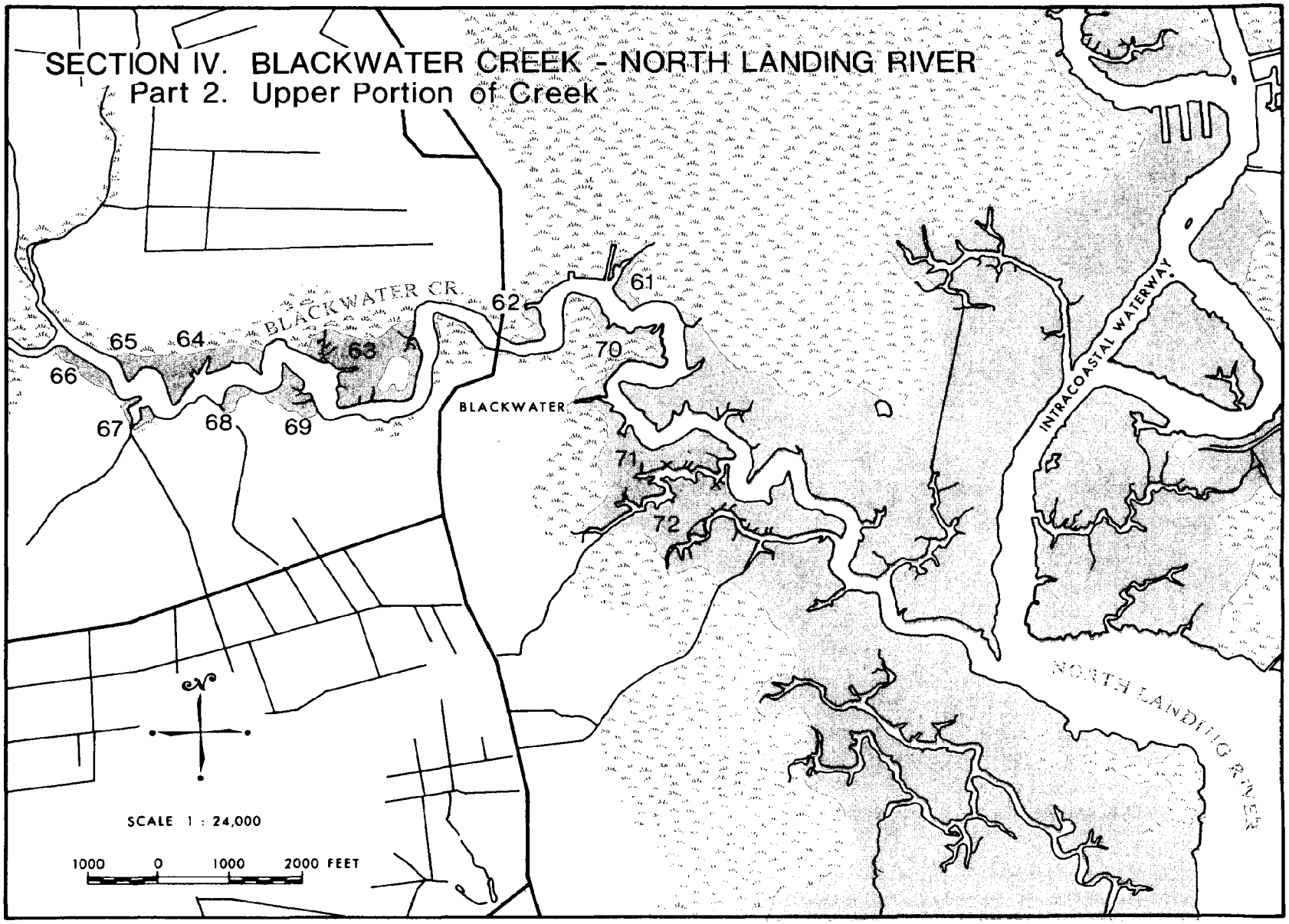
a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
m-Woolgrass
n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh *Orchid*
dd-Water Parsnip

Section IV. Blackwater Creek and Adjacent North Landing River

Part 1. Lower Portion of Creek and Adjacent North Landing River

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
55	North Landing River	224	%	40	-	-	8	50	-				2	-		-							-				c,- t,-		III
			acres	89.6	-	-	17.9	112.0	-				4.5	-		-							-				c,- t,-		
56	North Landing River	46	%	25	2	-	60	1	-				10	-												-		e,- f,- h,-	Marsh island dominated by Cattail.	VI
			acres	11.5	0.9	-	27.6	0.5	-				4.6	-												-		e,- f,- h,-		
57	North Landing River	21	%	90	-			5					5			-	-											c,- h,-		V
			acres	18.9	-			1.0					1.0			-	-											c,- h,-		
58	North Landing River	10	%	20	-							-									-		15					a,5 5 c,10	Disturbed marsh with Switchgrass predominant.	XI
			acres	2.0	-							-									-		1.5					a,5.5 c,1.0		
59	North Landing River	55	%	30			-	15	1	1								1	50	-								h,1	Large stands of Royal Fern.	XI
			acres	16.5			-	8.2	0.6	0.6								0.6	27.5									h,0.6		
60	North Landing River	25	%	95	3	1				-												-						g,-	Marsh divided by dredged canal.	V
			acres	23.8	0.8	0.2				-												-						g,-		
	Total Section IV Part 1	1456	%	45	-	-	15	27	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-			-	-	a,2 b,- c,-	h,1.2a; j,2.8a; h,32.2a (2%); r,14.7a (1%); e,f,g,k,q,t.	
			acres	654.9	4.2	7.0	218.4	386.9	4.5	1.8	2.8	2.9	23.9	5.7	4.6	2.9	0.3	3.6	27.5	2.8	-	-	2.2		1.2	-	a,33.2 b,1.2 c, 1.1		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
m-Woolgrass
n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip


SECTION IV. BLACKWATER CREEK - NORTH LANDING RIVER
Part 2. Upper Portion of Creek
BLACKWATER CR.
BLACKWATER
INTRACOASTAL WATERWAY
NORTH LANDING RIVER
61
62
63
64
65
66
67
68
69
70
71
72
SCALE 1 : 24,000
1000 0 1000 2000 FEET

Section IV. Blackwater Creek and Adjacent North Landing River
Part 2. Upper Portion of Creek

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
61	Blackwater Creek	6	%	40	1	1		15	-	1		-				-		10	30										XII
			acres	2.4	0.1	0.1		0.9	-	0.1		-				-		0.6	1.8										
62	Blackwater Creek	3	%	5			60					10	25		-			-											VI
			acres	0.2			1.8					0.3	0.8		-			-											
63	Blackwater Creek	28	%	50			40	5			-	5				-												Many submerged aquatic plants growing in creek.	V
			acres	14.0			11.2	1.4			-	1.4				-													
64	Blackwater Creek	11	%	75	-	-	20		3		-				-	-	-												V
			acres	8.2	-	-	2.2		0.3		-				-	-	-												
65	Blackwater Creek	3	%	85	-			10	5				-				-												V
			acres	2.6	-			0.3	0.2				-				-												
66	Blackwater Creek	6	%	5	10		10		5			1	10			-	40										p, - , 5 m,10	Marsh Fern common.	XI
			acres	0.3	0.6		0.6		0.3			0.1	0.6			-	2.4										p, - p,0.3 m,0.6		
67	Blackwater Creek	2	%	80	5					-		-	-		-	-											d, - l,10 m, 3		V
			acres	1.6	0.1					-		-	-		-	-											d, - l,0.2 m,0.1		
68	Blackwater Creek	3	%		1	1	75				-	-			1			-									l, 1 v,20		VI
			acres		-	-	2.2				-	-			-			-									l, - v,0.6		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
m-Woolgrass
n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

Section IV. Blackwater Creek and Adjacent North Landing River
Part 2. Upper Portion of Creek

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
69	Blackwater Creek	5	%	55	2		25		5	1		2	3		1	1												1, 5 m, -		V
			acres	2.8	0.1		1.2		0.2	-		0.1	0.2		-	-												1,0.2 m, -		
70	Blackwater Creek	8	%	90	-			5		-	1	1	1			-		-		-								m, -		V
			acres	7.2	-			0.4		-	0.1	0.1	0.1			-		-		-								m, -		
71	Blackwater Creek	32	%	45	-	-		50	-	3		-	2			-		-		-									Large stands of Black Needlerush.	III
			acres	14.4	-	-		16.0	-	1.0		-	0.6			-		-		-										
72	Blackwater Creek	39	%	20	-	2		75	-	1					-			1					-		-		m, -	Black Needlerush predominates.	III
			acres	7.8	-	0.8		29.2	-	0.4					-			0.4					-		-		m, -		
	Total Section IV Part 2	146	%	42	1	1	13	33	1	1	-	1	2		-	-	2	1	1	-			-		-		l, - m, - v, -	d, i.	
			acres	61.5	0.9	0.9	19.2	48.2	1.0	1.5	0.1	2.0	2.3		-	-	2.4	1.0	1.8	-			-		-		l, 0.7 m, 0.7 v, 0.6		
	Total Section IV	1,602	%	45	-	-	15	27	-	-	-	-	2	-	-	-	-	-	2	-	-	-	-		-	-	a, 2 b, - c, -	h,1.2a; j,2.8a; 1,0.7a; m,0.7a; n,32.2a(2%); r,14.7a(1%); v,0.6a; d-g, i, k, q, t.	
			acres	716.4	5.1	7.9	237.6	435.1	5.5	3.3	2.9	4.9	26.2	5.7	4.6	2.9	2.7	4.6	29.3	2.8	-	-	2.2		1.2	-	a, 33.2 b, 1.2 c, 1.1		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
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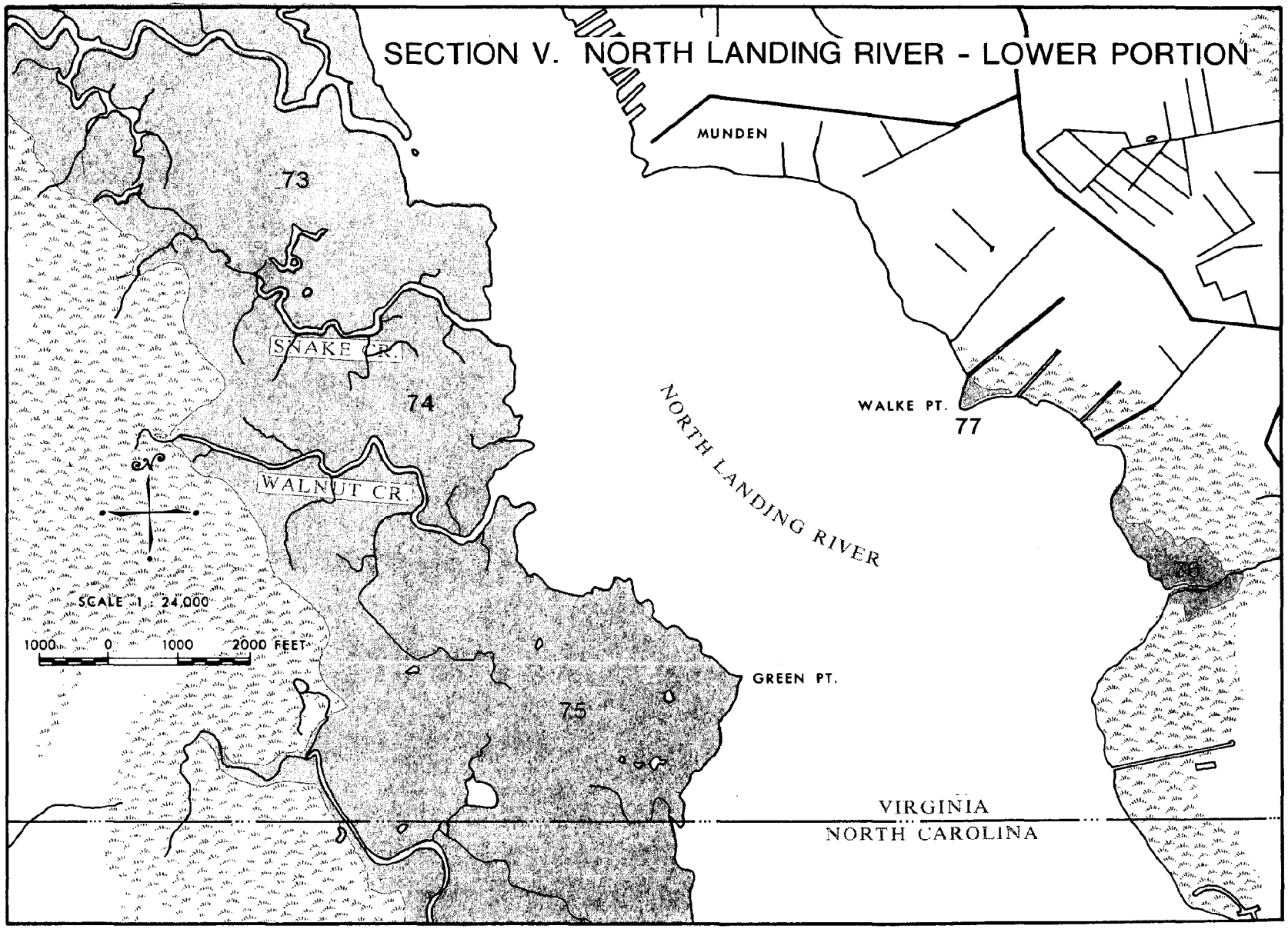
SECTION V. NORTH LANDING RIVER - LOWER PORTION
MUNDEN
73
SNAKE CR
74
WALNUT CR
NORTH LANDING RIVER
WALKE PT.
77
SCALE 1: 24,000
1000 0 1000 2000 FEET
GREEN PT.
75
VIRGINIA
NORTH CAROLINA

Section V. North Landing River - Lower Portion

The section of river from Milldam Creek and Munden southward to the state line is bordered by three extensive marshes on the western shore, one of which extends into North Carolina. However, data from only the Virginia portion of this marsh were recorded.

These three marshes (nos. 73-75) are quite diverse and differ in plant composition from each other, as well as from the total of all marshes in this inventory. Big Cordgrass is far from dominant, with percentages of 3, 15 and 20, respectively. Species such as Black Needlerush, Cattail and Switchgrass are present in relatively high amounts, but their proportions differ greatly among the three marshes. Also, any species uncommon to most tidal freshwater marshes farther north are found here, including Eryngo, Eryngium aquaticum; Water Parsnip, Sium suave; and Marsh Orchid, Spiranthes odorata.

Marshes 76 and 77, on the eastern shore of the river, are significant in that the former has a high concentration of Cattail and the latter is almost completely dominated by Sawgrass, Cladium jamaicense, a sedge more common in marshes and swamps in states south of Virginia.

Section V. North Landing River - Lower Portion

#	MARSH LOCATION	TOTAL ACRES		BIG CORDGRASS	MARSH HIBISCUS	BEGGAR TICKS	CATTAIL	BLACK NEEDLERUSH	PLUME GRASS	ARROWHEAD	CLIMBING HEMPWEED	ARROW ARUM	TEARTHUMB	SOFT RUSH	SMARTWEED	BALD CYPRESS	MARSH FERN	RED MAPLE	ROYAL FERN	GREAT LOBELIA	MARSH MALLOW	PICKERELWEED	SALTBUSH	RICE CUTGRASS	REEDGRASS	WATER PENNYWORT	OTHERS	OBSERVATIONS	MARSH TYPE
73	Milldam Creek	409	%	3	-		10	70	1			-		-	-		1	-		-			-				a,15 e, - f, -	Black Needlerush marsh with Switchgrass growing along creek banks.	III
			acres	12.3	-		40.9	286.3	4.1			-		-	-		4.1	-		-			-				a,614 e, - f, -		
74	North Landing River	244	%	15	-		45	-	2												-		1				a,35 e, - f, -	Switchgrass very common along creek banks.	XI
			acres	36.6	-		109.8	-	4.9												-		2.4				a,854 e, - f, -		
75	North Landing River	538	%	20	2	2	15	-	10			-	5	1			2			-	-		-				a,30 f,10 n, 5	Species present include; Goldenrod, Eryngo, Wax Myrtle, Water Parsnip, Aster, and Marsh Orchid.	XI
			acres	107.6	10.8	10.8	80.7	-	53.8			-	26.9	5.4			10.8			-	-		-				a,161 f,538 n,269		
76	North Landing River	28	%	10			75	10		-		-		-		-			-				-		2		a, - e, - k, - t, -		VI
			acres	2.8			21.0	2.8		-		-		-		-			-				-		0.6		a, - e, - k, - t, -		
77	Walke Point	5	%					4								1		-									u,95	Marsh almost completely dominated by Sawgrass.	XI
			acres					0.2								-		-									u,4.8		
	Total Section V	1,224	%	13	1	1	21	24	5	-		-	2	-	-	-	1	-	-	-	-		-		-		a,25 f, 4 n, 2	u,4.8a; b, c, e, k, t, cc, dd.	
			acres	159.3	10.8	10.8	252.4	289.3	62.8	-		-	26.9	5.4	-	-	14.9	-	-	-	-		2.4		0.6		a,308 f,538 n,269		
	Total North Landing River and Tributaries	3,731	%	40	1	1	15	22	2	1	-	-	1	-	-	-	1	-	2	-	-	-	-	-	-	-	a, 9 b, - c, -	f,66.6a(2%); h,1.2a; j, 2.8a; l,0.7a; m,0.7a; n, 59.1a(2%); r,21.1a(1%); s, 0.2a; u,9.1a; v,0.6a; trace amounts of others.	
			acres	1,479	25.8	23.6	564.7	809.5	69.6	44.7	3.8	7.9	53.4	12.9	5.2	2.9	18.7	4.9	63.5	2.8	-	-	4.6	4.3	7.2	-	a,341 b,1.2 c,1.1		

a-Switchgrass
b-Wax Myrtle
c-Goldenrod
d-Sweetflag
e-Eryngo
f-Rush
g-Marsh Iris
h-Sneezeweed
i-Swamp Rose
j-Marsh Fleabane
k-Fragrant Water Lily
l-Sedge
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n-Galingale
o-Pine
p-Sweet Bay
q-Beak Rush
r-Common Threesquare
s-Water Willow
t-Aster
u-Sawgrass
v-Black Willow
w-Dodder
x-Saltmarsh Cordgrass
y-Spikerush
z-Cardinal Flower
aa--Fimbristylis
bb-Walter's Millet
cc-Marsh Orchid
dd-Water Parsnip

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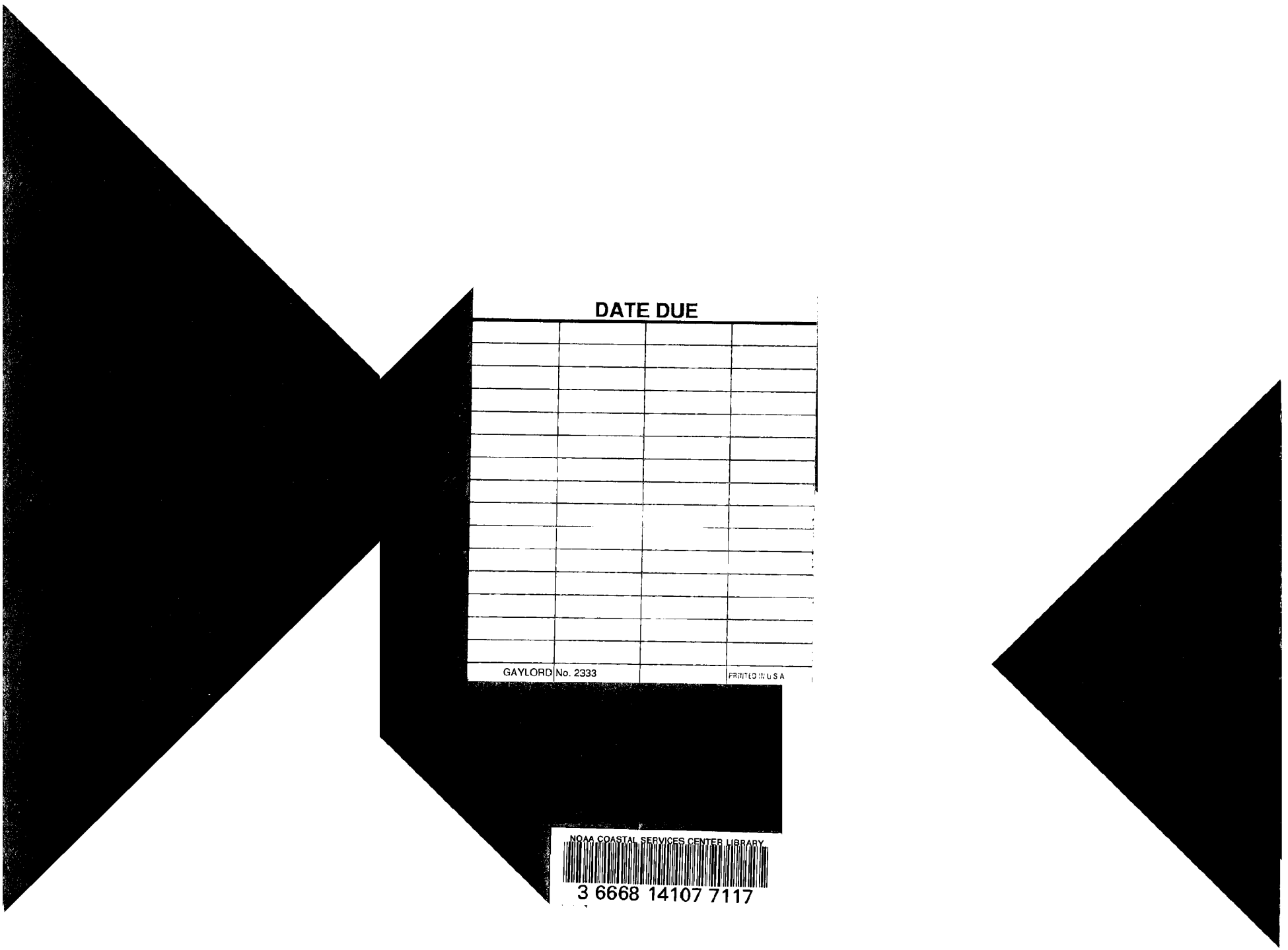
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