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Procedure for creating digital Baylor coverages in ARC/INFO

Gary F. Anderson
Virginia Institute of Marine Science

J. Berchman Smithson
Virginia Institute of Marine Science

Anna K. Kenne
Virginia Institute of Marine Science

PROCEDURE FOR CREATING DIGITAL BAYLOR GROUND COVERAGES IN ARC/INFO

by

Gary F. Anderson, J.Berchman Smithson and Anna K. Kenne

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Roger L. Mann and Carl H. Hershner, Jr.
Principal Investigators

School of Marine Science
College of William and Mary
Virginia Institute of Marine Science

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Contents

INTRODUCTION

Baylor Grounds were defined by a survey of the natural oyster beds in Virginia conducted by Lt. J.B. Baylor, USN, and completed in 1894. The original purpose of the survey was to set aside naturally productive oyster beds for protection from private leasing, which was a controversial concept at the time. Hence the commonly used term 'Baylor Grounds' is synonymous with Virginia's public oystering grounds in the present day. Other surveys, conducted later, have added to the original Baylor acreage, resulting in an estimated 243,000 acres of public oyster grounds in Virginia. For further information on the oyster industry of Virginia and the surveys of Lt. Baylor, an extensive bibliography is provided in Hargis and Haven (1988).

This document outlines in detail the steps used to create digital ARC/INFO coverages of the public oyster grounds (Baylor Grounds) in Virginia coastal waters. The base maps used for digitizing were drafted from surveys of the Baylor Grounds conducted in 1977 - 1980 by the Dept. of Applied Biology of the Virginia Institute of Marine Science. The purpose of the VIMS surveys was to assess the productivity of the public grounds in Virginia, and are the most detailed and accurate rendering of bottom characteristics available at the present time. Bottom types were classified into the following primary categories:

Oyster Rocks
Shell and Mud
Shell and Sand
Buried Shell
Sand
Sand and Mud
Clay
Gravel

The maps that resulted were drafted at a range of scales from 1:12,000 to 1:20,000, and published as a series of reports, one for each major river or waterbody (Haven, et al., 1977, 1978, 1981). Based on the field methods used by VIMS, the positional accuracy of all features is estimated to be within 200 ft. of true position (Haven, et al., 1981a). Mylar copies of the original maps were used as the media for digitizing.

In addition to bottom types, legal boundaries and geodetic control points were also charted on the VIMS base maps, and were digitized as part of this project. Because of the positional inaccuracies mentioned above, it should be pointed out that these features ~~should~~ not to be considered an accurate rendering of the true legal limits. The Va. Marine Resources Commission is the agency in Virginia responsible for maintaining the legal boundaries of the public grounds, and, in fact, some areas of Baylor Grounds have been resurveyed by the Commission since the time of the VIMS field work.

STEP-BY-STEP PROCEDURES

The following are the detailed procedures describing the creation of digital ARC/INFO coverages. Three separate coverages are produced from each map, and include the legal boundaries of the public oyster beds, bottom type (oyster rocks, shell-sand, mud, etc.), and geodetic control points established by the Va. Marine Resources Commission. The steps for creating the digital files include map preparation, digitizing, encoding of attribute information, and final proofreading/plotting.

PROCEDURE 1 - Preparation of Maps for Digitizing

Each map will be prepared using a no. 1.5 lead pencil to outline bottom type polygons, identify control points (TICS), identify Va. MRC survey points, and keep a log of activity on the map itself.

Step 1. Establish the Mapname - Every map sheet will be assigned a four character mapname which will be used throughout the procedure for naming the digital files. The mapname consists of a code identifying the report (by river) and the map sheet within the report. The formula is as follows:

mapname = RIVER CODE + MAP NUMBER

where river code is a two character code and map number is a two digit number. For example, the second map from the York River report is named as follows:

mapname = YK02

Table 1. lists the series of published Baylor Ground map reports and the appropriate rivercode to be used in assigning mapnames. Write the mapname in the heading of the log that will be established in the following step.

Step 2. Establish a Log - Create a box in the lower right corner approx. 4x4" square and write the mapname for the map at the top. Begin a table to be used to keep track of each step in the digitizing process as follows:

	Date	Initials
Map preparation		
Digitization		
Coded		
Proofread		
Plotted		

Table 1. List of published Baylor Ground survey map volumes (Haven, et al., 1977, 1978c-f, 1981c-f) and river codes to be used for naming maps and digital files.

Map Volume	Publication Date	River Code	Number of Charts
Rappahannock River	October, 1977	RA	5
Piankatank River	August, 1978	PK	4
Mobjack Bay, East, North Ware and Severn Rivers	September, 1978	MB	3
York and Poquoson Rivers	September, 1978	YK	4
Great Wicomico	September, 1978	GW	3
Potomac River Tributaries	April, 1981	PO	3
James River	April, 1981	JA	5
Seaside of the Eastern Shore	April, 1981	AO	13
Pocomoke and Tangier Sound	April, 1981	PS	11

Step 3. Define Bottom Types - Each bottom type will receive a numeric code as follows. For future reference, number the bottom types on the map legend using these codes.

Code	Type
1	Oyster Rocks
2	Shell and Mud
3	Shell and Sand
4	Buried Shell
5	Sand
6	Sand and Mud
7	Clay
8	Gravel
9	Stones
10	Not Surveyed
11	uncoded (land,water)
12	occupied
13	Barren Bottom

Step 4. Outline Polygons - Trace the boundaries between bottom type polygons using the thinnest pencil line possible. This must be a smooth, unbroken line because it is the line that will be followed by the person operating the digitizing tablet. As each polygon is outlined, write in the code number according to the bottom type.

Step 5. Identify TICS - Each map will have a minimum of four control points, identified by the x-marks showing lat-long position. The points should be as square as possible, and the lat-long position must be known. If one of the four corner TICS is missing, extrapolate a TIC point for the corner in pencil using existing TICS. Identify the TICs by circling them and numbering 1 thru 4. Work clockwise starting at the lower left corner as TIC number 1.

Step 6. Identify VMRC Control points - The Va. MRC control points are shown as open circles (o) on the maps. Circle the ones to be digitized in pencil.

Step 7. Establish a Paper File for Map Plots - During the course of the process, several plots will be produced that need to be saved for future reference. Use an 8 1/2 x 11 manila file folder labelled with the mapname. Store them alphabetically in a file cabinet with all the other Baylor plots.

II. Digitizing Coverages

Each map will be digitized into three separate layers, in the following order:

LEG - The legal boundaries of the extent of public grounds, defined by the dashed line and/or shoreline where appropriate.

BOT - The bottom type attributes as defined by the categories of shell, shell-sand, etc.

CNT - The Va. MRC control points.

The maps must be done in the prescribed order because the legal boundaries of the Baylor Grounds are also contiguous to the boundaries of some of the bottom type polygons, and therefore should not be digitized twice. The procedure uses the finished legal boundaries as the starting point for bottom types, eliminating this problem.

PROCEDURE 2 - Digitizing Legal Boundaries

Step 1. **ADS mapnameLEG**

Enter TICS 1 thru 4, finish with a 0*

Enter map boundary as opposite corners of map sheet outer box.

Enter ADD ARCS option by choosing option (1) from main menu.

Enter nodes (2) and vertices (1) for legal boundaries.

Choose option (9) to exit ADD ARCS subsystem, option (9) again to save and leave.

Step 2. **CLEAN mapnameLEG # 0.5 0** (Creates polygon attribute table)

Step 3. **CREATELA mapnameLEG 0** (Creates label points for polys)

Step 4. **BUILD mapnameLEG LINE** (Creates arc attribute table)

Step 5. Enter TABLES, User Name ARC
SEL mapnameLEG.PAT
CALC mapnameLEG-ID = mapnameLEG#
SEL mapnameLEG.AAT (Sets ID numbers = # numbers)
CALC mapnameLEG-ID = mapnameLEG#

Step 6. **IDEDIT mapnameLEG POLY** (Sets labels = ID numbers)
IDEDIT mapnameLEG LINE

Step 7. Use **EDITPLOT** to check for errors, too many polygons, etc.
Use the coverage name as the annotation (mapnameLEG).
The choices in editplot are:

- o TICS
- o ARCS
- o LABELS
- o DANGLE ERRORS
- o PSEUDO ERRORS

PROCEDURE 2 - (Cont'd)

Step 8. If errors are found, return to Step 1 in the procedure and enter ADS to edit out bad ARCS, insert new ones, etc. Repeat all steps and return to this point.

Step 9. **COPYCOV mapnameLEG mapnameBOT** (Creates copy of legal boundaries as starting point for bottom type (BOT) coverage

At this point, digitization of the legal boundary coverage is complete. The next step for the legal boundaries is attribute coding, **PROCEDURE 5**. The operator may, however, choose to continue digitizing the bottom types, especially if the map sheet is still in place on the digitizing tablet, using **PROCEDURE 3**, which follows on the next page.

PROCEDURE 3 - Digitizing Bottom Types

Step 1. **ADS mapnameBOT** (Use ADS to add additional bottom-type arcs.)

Enter TICS 1 thru 4, finish with a 0*, Note: RMS must be < 0.02

Enter ADD ARCS option by choosing option (1) from main menu.

Enter nodes (2) and vertices (1) for bottom types, overlapping at end points. Digitize each line only once.

Choose option (9) to exit ADD ARCS subsystem, option (9) again to save and leave.

Step 2. **CLEAN mapnameBOT # 0.5 0** (Creates polygon attribute table)

Step 3. **CREATELA mapnameBOT 0** (Creates label points for polys)

Step 4. Enter **TABLES**, User Name **ARC**
SEL mapnameBOT.PAT (Sets ID numbers = # numbers)
CALC mapnameBOT-ID = mapnameBOT#

Step 5. **IDEDIT mapnameBOT POLY** (Sets labels = ID numbers)

Step 6. Use **EDITPLOT** to check for errors, too many polygons, etc. Use the coverage name as the annotation (mapnameBOT). The choices in editplot are:

- o TICS
- o ARCS
- o LABELS
- o DANGLE ERRORS
- o PSEUDO ERRORS

Step 7. If errors are found, return to Step 2 in the procedure and enter ADS to edit out bad ARCS, insert new ones, etc. Repeat all steps and return to this point.

At this point, digitization of the bottom types coverage is complete. The next step for the bottom types is attribute coding, **PROCEDURE 6**. The operator may, however, choose to continue digitizing the Va. MRC control points, **PROCEDURE 4**, which follows on the next page.

PROCEDURE 4 - Digitizing Va. Marine Resources Commission Control Points

Step 1. **CREATE mapnameCNT mapnameLEG** (Creates an empty coverage using the TICS from the legal boundary map.)

Step 2. ADS **mapnameCNT** (Use ADS to add Va.MRC control points.)

Enter TICS 1 thru 4, finish with a 0*, Note: RMS must be < 0.02

Enter ADD LABELS option by choosing option (3) from main menu.

Enter label points simply by pressing a (1) on each point.

Choose option (9) to exit ADD LABELS subsystem, option (9) again to save and leave.

Step 3. *BUILD* **mapnameCNT POINT**

Step 4. Enter TABLES, User Name ARC
SEL mapnameCNT.PAT (Sets ID numbers = # numbers)
CALC **mapnameCNT-ID = mapnameCNT#**

Step 5. **IDEDIT mapnameCNT POINT** (Sets labels = ID numbers)

Step 6. Produce an EDITPLOT of mapnameCNT showing label points.

At this point, digitization of <u>all three</u> layers should be complete. Procede to the appropriate procedure for attribute coding.

PROCEDURE 5 - Encoding Legal Boundary Attributes

The legal boundary coverages are encoded for polygons and individual arcs. The appropriate codes are shown below. See also Appendix X. for a more detailed description of the attribute tables for legal boundaries.

Step 1. Use a blank coding form to write in the appropriate LEGCODEs for each LABEL POINT. This should be done on separate sheets, one for polygons and one for ARCS. Use the last full size PLOT made with EDITPLOT showing label point ID's for both ARCS and POLYGONS, along with the mylar map sheet that was prepared in Section I. The numbers on the blank sheet represent the record number in the attribute table, and correspond to the LABELS on the plot. Blank coding forms are provided for xeroxing in Appendix X.

Encode POLYGONS as follows:

Encode ARCS as follows:

Step 2. ADDITEM mapnameLEG.PAT mapnameLEG.PAT LEGCODE 1 1 I
ADDITEM mapnameLEG.AAT mapnameLEG.AAT LEGCODE 1 1 I
(Adds Item LEGCODE to attribute tables)

Step 3. Use TABLES to UPDATE **polygon** attribute values as follows:
TABLES
ARC
SEL mapnameLEG.PAT
UPDATE

Update LEGCODE by record number, inserting the appropriate code values, for example:

Record Number?> **10**
?> **LEGCODE = 1** (Sets the value of LEGCODE to 1 for record number 10)

Step 4. Repeat Step 3, using **SEL mapnameLEG.AAT** to UPDATE attribute values for **arcs**.

Step 5. Once all attributes have been added, LIST or PRINT them and check against the original coding form.

PROCEDURE 6 - Encoding Bottom Type Attributes

The appropriate codes for the bottom type polygons are shown below. See also Appendix X. for a more detailed description of the attribute tables for bottom types.

Step 1. Use a blank coding form to write in the appropriate BOTTYPEs for each LABEL POINT. Use the last full size PLOT made with EDITPLOT showing label point ID's for POLYGONS, along with the mylar map sheet that was prepared in Section I. The numbers on the blank sheet represent the record number in the attribute table, and correspond to the LABELS on the plot. Blank coding forms are provided for xeroxing in Appendix X.

Encode POLYGONS as follows:

Step 2. ADDITEM mapnameBOT.PAT mapnameBOT.PAT BOTTYPE 1 1 I
(Adds Item BOTTYPE to attribute tables)

Step 3. Use TABLES to UPDATE polygon attribute values as follows:

```
TABLES
ARC
SEL mapnameBOT.PAT
UPDATE
```

Update BOTTYPE by record number, inserting the appropriate code values, for example:

```
Record Number?> 62
?> BOTTYPE = 5        (Sets the value of BOTTYPE to 5 (Sand)
                       for record number 62)
```

Step 4. Once all attributes have been added, LIST or PRINT them and check against the original coding form.

PROCEDURE 7 - Encoding Va. Marine Resources Commission Control Points

Step 1. Use the PLOT of label points to write the number of the label point onto the original mylar sheet. Then you can work directly from the mylar map to update the point attribute table. The updating involves simply entering the name of the Va. MRC control point as it appears on the map.

Step 2. **ADDITEM mapnameCNT.PAT mapnameCNT.PAT NAME 20 20 C**
(Adds Item NAME to attribute tables)

Step 3. Use TABLES to UPDATE point names as follows:

```
TABLES
ARC
SEL mapnameCNT.PAT
UPDATE
```

Update BOTTYPE by record number, inserting the appropriate code values, for example:

```
Record Number?> 27
?> NAME = 'FISHING POINT'   (Sets the NAME to FISHING POINT for
                             record number 27. Use all upper
                             case, enclosed in single quotes)
```

Step 4. Once all NAMES have been added, LIST or PRINT them and check against the original mylar map.

PROCEDURE 8 - Creating Lat-Lon TICS for TRANSFORMING Coverages

Step 1. Write down in a tabular form the Latitude and Longitude of the four TICS that were used to register the map. Remember, LON=X and LAT=Y. For example:

TIC-ID	(lon) XTIC	(lat) YTIC
1	76.7500	38.1333
2	76.7500	38.1500
3	76.7166	38.1500
4	76.7166	38.1333

Step 2. **CREATE mapnameTIC mapnameLEG** (Creates an empty coverage using the TICS from the legal boundary map.)

Step 3. Enter TABLES and **SEL mapnameTIC.TIC**
UPDATE
Record Number?> 1 (Selects TIC-ID 1)
XTIC = 76.7500 (Latitude in decimal degrees)
YTIC = 38.1333 (Longitude in decimal degrees)

(In the same way, enter additional TICS 2, 3, and 4)

Step 4. **PROJECT mapnameTIC F:\SPF\BYL\mapnameTIC** (PROJECTS empty TIC coverage to State Plane Feet directory for transforming.)

PROCEDURE 9 - Transforming coverages to Va. State Plane Feet

Step 1. **A F:\SPF\BYL** (Attach to directory containing State Plane Feet coverages.

Step 2. **COPYCOV mapnameTIC mapnameLEG** (Create an empty State Plane
COPYCOV mapnameTIC mapnameBOT Feet coverage for each layer)
COPYCOV mapnameTIC mapnameCNT

Step 3. Attach back to the working directory and transform each coverage to the State Plane Feet coverages as follows:

TRANSFORM mapnameLEG F:\SPF\BYL\mapnameLEG
TRANSFORM mapnameBOT F:\SPF\BYL\mapnameBOT
TRANSFORM mapnameCNT F:\SPF\BYL\mapnameCNT

Step 4. Copy the original working files to the RAW area for permanent storage.

COPYCOV mapnameLEG F:\RAW\BYL\mapnameLEG
COPYCOV mapnameBOT F:\RAW\BYL\mapnameBOT
COPYCOV mapnameCNT F:\RAW\BYL\mapnameCNT
COPYCOV mapnameTIC F:\RAW\BYL\mapnameTIC

This procedure ends here. At the end, the coverages reside in the following MASTER directories:

F:\RAW\BYL (Contains coverages in PAGE UNITS)
F:\SPF\BYL (Contains coverages in State Plane Feet)

The MASTER directories named above may reside on a PC other than the one used to digitize, encode, and proofread the coverages. In this case, the files will need to be transferred on a floppy disk or copied over a network to the PC containing the MASTER using COPYCOV.

Step 5. Only after coverages have been copied to the two master directories can the user clean his workspace using the KILL command as follows:

KILL mapnameLEG
KILL mapnameBOT
KILL mapnameCNT
KILL mapnameTIC

REFERENCES CITED

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Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1978c. The present and potential productivity of Baylor Grounds in Virginia. Phase 2, The Piankatank River. Grant Report, VIMS, August 1978, 4 charts.

Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1978d. The present and potential productivity of Baylor Grounds in Virginia. Phase 2, The Mobjack Bay & the East, North, Ware & Severn Rivers. Grant Report, VIMS, September 1978, 3 charts.

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Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1978f. The present and potential productivity of Baylor Grounds in Virginia. Phase 2, The Great Wicomico River. Grant Report, VIMS, September 1978, 3 charts.

Haven, D. S., J. P. Whitcomb and P. C. Kendall. 1981a. The present and potential productivity of the Baylor Grounds in Virginia. Vol. I. Rappahannock, Corrotoman, Great Wicomico, Piankatank, York and Poquoson Rivers and Mobjack Bay and its tributaries. Special Report in Applied Marine Science and Ocean Engineering (SRAMSOE) No. 243 of the Virginia Institute of Marine Science (VIMS), 167 pp.

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Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1981b. The present and potential productivity of the Baylor Grounds in Virginia. Volume II. (James River, Pocomoke and Tangier Sounds, the Bayside and Seaside of the Eastern Shore, and the Virginia Tributaries of the Potomac River/Coan and Yeocomico Rivers, the Lower Machodoc and Nomini Creeks). Special Report in Applied Marine Science and Ocean Engineering (SRAMSOE) No. 243 of the Virginia Institute of Marine Science (VIMS), 154 pp., with 52 charts.

Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1981c. The present and potential productivity of Baylor Grounds in Virginia. Phase 3, Potomac River Tributaries. Grant Report, VIMS, April 1981, 3 charts.

Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1981d. The present and potential production of Baylor Grounds in Virginia. Phase 3, The Seaside of the Eastern Shore of Virginia. Grant Report, VIMS, April 1981, 13 charts.

Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1981e. The present and potential production of Baylor Grounds in Virginia. Phase 3, Pocomoke and Tangier Sound. Grant Report, VIMS, April 1981, 11 charts.

Haven, D.S., J. P. Whitcomb and P. C. Kendall. 1981f. The present and potential production of Baylor Grounds in Virginia. Phase 3, The James River. Grant Report, VIMS, April 1981, 5 charts.

APPENDIX A. Attribute Table Definitions

ATTRIBUTE TABLE DESCRIPTION

VIMS GIS Lab Prefix **rv##BOT**

Data Layer **Va. Baylor Grounds - Bottom Types**

FEATURE ATTRIBUTE TABLE **rv##BOT.PAT**

Cols	Name	Definition	Description
	BOTTYPE	2,2,I	Bottom Type

CODE DESCRIPTIONS

ITEMS	VALUES	DESCRIPTION
BOTTYPE	0	Universal Polygon
	1	Oyster Rocks
	2	Shell and Mud
	3	Shell and Sand
	4	Buried Shell
	5	Sand
	6	Sand and Mud
	7	Clay
	8	Gravel
	9	Stones
	10	Not Surveyed
	11	uncoded (land,water)
	12	occupied
	13	Barren Bottom

ATTRIBUTE TABLE DESCRIPTION

VIMS GIS Lab Prefix rv##LEG

Data Layer Va. Baylor Grounds - Legal Boundaries

FEATURE ATTRIBUTE TABLE rv##LEG.AAT

Cols	Name	Definition	Description
	LEGCODE	1,1,I	Arc Identifier

CODE DESCRIPTIONS

ITEMS	VALUES	DESCRIPTION
LEGCODE	0	Not a Baylor Ground boundary
	1	Surveyed Baylor Ground boundary
	2	Baylor Ground boundary contiguous to mapped shoreline
	3	Closure Line
	2	Not a Baylor Ground

NOTE: The legal boundaries and control points contained in these digital coverages are derived from an historical sketch of the original Baylor Grounds, and are not to be used as reference points for survey or legal purposes.

ATTRIBUTE TABLE DESCRIPTION

VIMS GIS Lab Prefix rv##LEG

Data Layer Va. Baylor Grounds - Legal Boundaries

FEATURE ATTRIBUTE TABLE rv##LEG.PAT

Cols	Name	Definition	Description
	LEGCODE	1,1,I	Polygon Identifier

CODE DESCRIPTIONS

ITEMS	VALUES	DESCRIPTION
LEGCODE	0	Universal Polygon
	1	Baylor Ground
	2	Not a Baylor Ground

NOTE: The legal boundaries and control points contained in these digital coverages are derived from an historical sketch of the original Baylor Grounds, and are not to be used as reference points for survey or legal purposes.

ATTRIBUTE TABLE DESCRIPTION

VIMS GIS Lab Prefix rv##CNT

Data Layer Va. Baylor Grounds - Geodetic Control Points

FEATURE ATTRIBUTE TABLE rv##CNT.PAT

Cols	Name	Definition	Description
	NAME	30,30,C	Control Point Name

CODE DESCRIPTIONS

ITEMS	VALUES	DESCRIPTION
(none)		

APPENDIX B. Baylor Grounds Coverage Summary Description

GEOGRAPHIC DATA SET DESCRIPTION

VIMS GIS Lab Suffix **BYL**

Data Layer Name VIMS Baylor Ground Survey (Va. Public Oyster Grounds)

Description Inventory of public oyster grounds in Virginia, by Haven, et als., Dept. of Applied Biology. Field work was conducted 1977 - 1980, delineating legal boundaries and bottom types of public grounds originally surveyed by Lt. J.B. Baylor, USN and completed in 1896.

Year(s) Collected Various, 1977 - 1980

Base Maps used for Digitizing Mylar Baylor Charts published by VIMS

Digitizing Scale 1:12,000 - 20,000 Map Projection UTM Zone 18

Geographic Extent All Virginia Coastal Waters

How Collected (Describe):

Legal boudaries were obtained from an historical sketch of original Baylor grounds, and may not include more recent areas. Bottom types determined by hydrophone sounding and grab sampling. Results drafted at various scales, mylar masters used for digitizing.

Actual/Intended Use or Purpose:

The BYL coverages were created as an additional alternative method for archiving this important set of natural resource information.

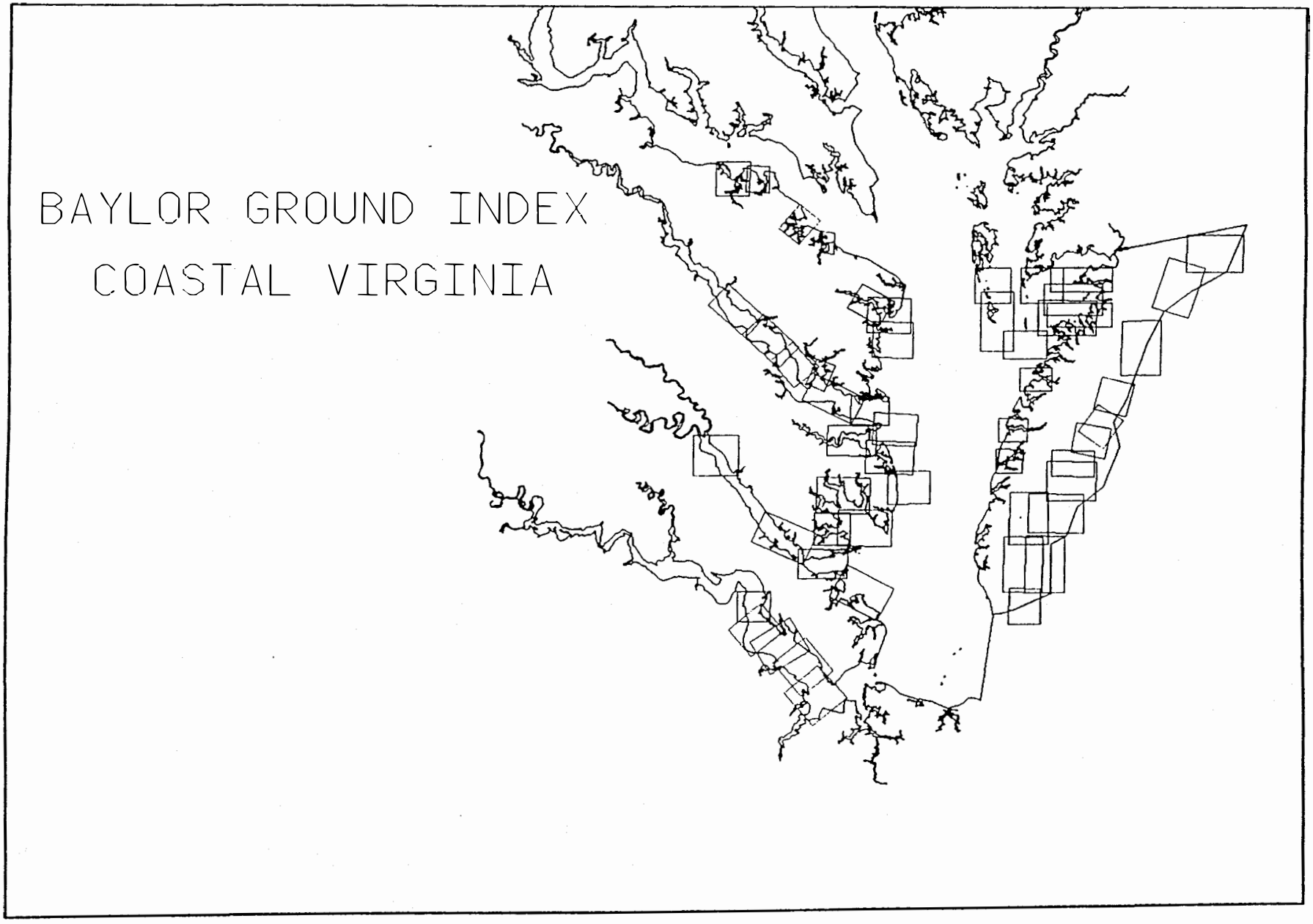
APPENDIX C. Blank Attribute Encoding Sheets

1 - 100

1-	26-	51-	76-
2-	27-	52	77-
3-	28-	53-	78-
4-	29-	54-	79-
5-	30-	55-	80-
6-	31-	56-	81-
7-	32-	57-	82-
8-	33-	58-	83-
9-	34-	59-	84-
10-	35-	60-	85-
11-	36-	61-	86-
12-	37-	62-	87-
13-	38-	63-	88-
14-	39-	64-	89-
15-	40-	65-	90-
16-	41-	66-	91-
17-	42-	67-	92-
18-	43-	68-	93-
19-	44-	69-	94-
20-	45-	70-	95-
21-	46-	71-	96-
22-	47-	72-	97-
23-	48-	73-	98-
24-	49-	74-	99-
5-	50-	75-	100-

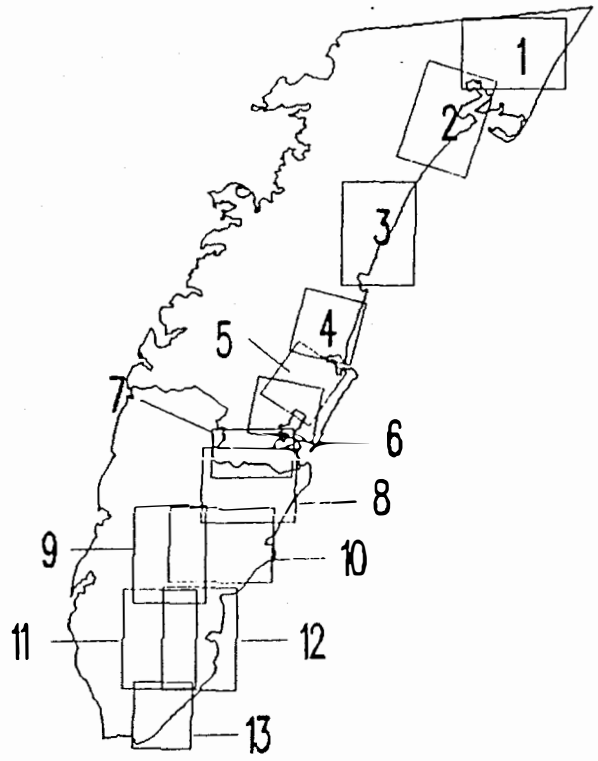
BAYLOR GROUND INDEX

COASTAL VIRGINIA

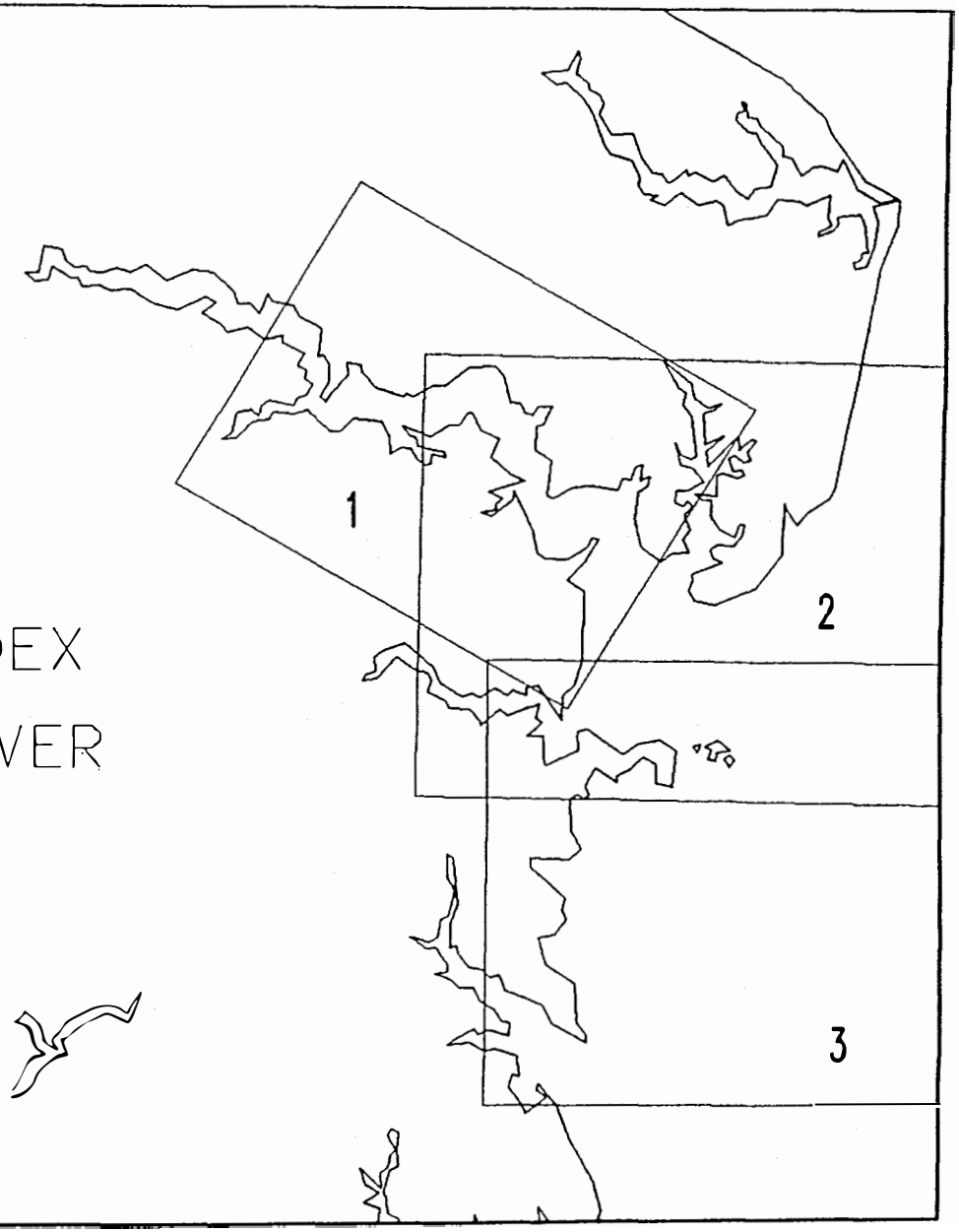


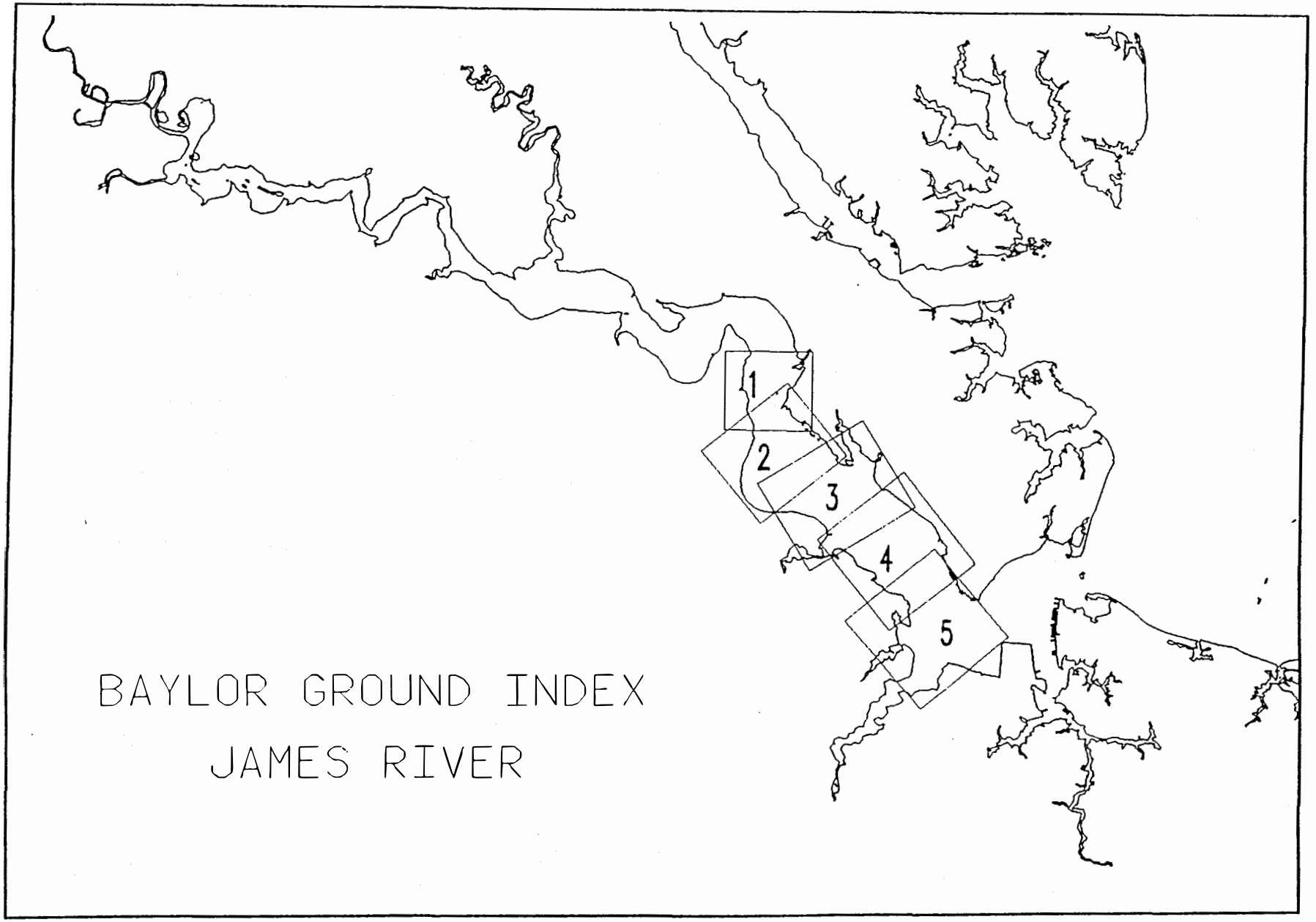
BAYLOR GROUND INDEX

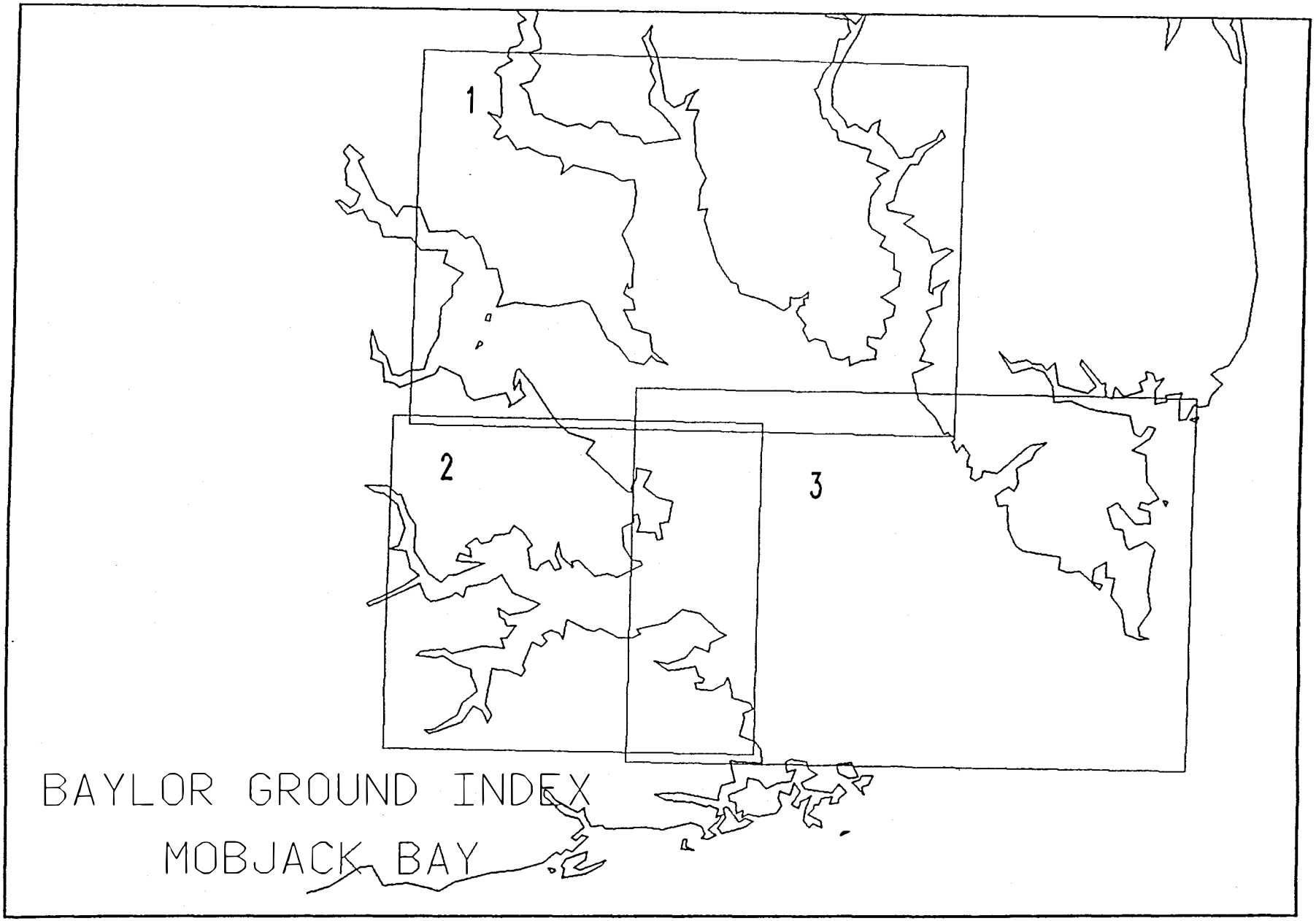
ATLANTIC OCEAN



BAYLOR GROUND INDEX
GREAT WICOMICO RIVER

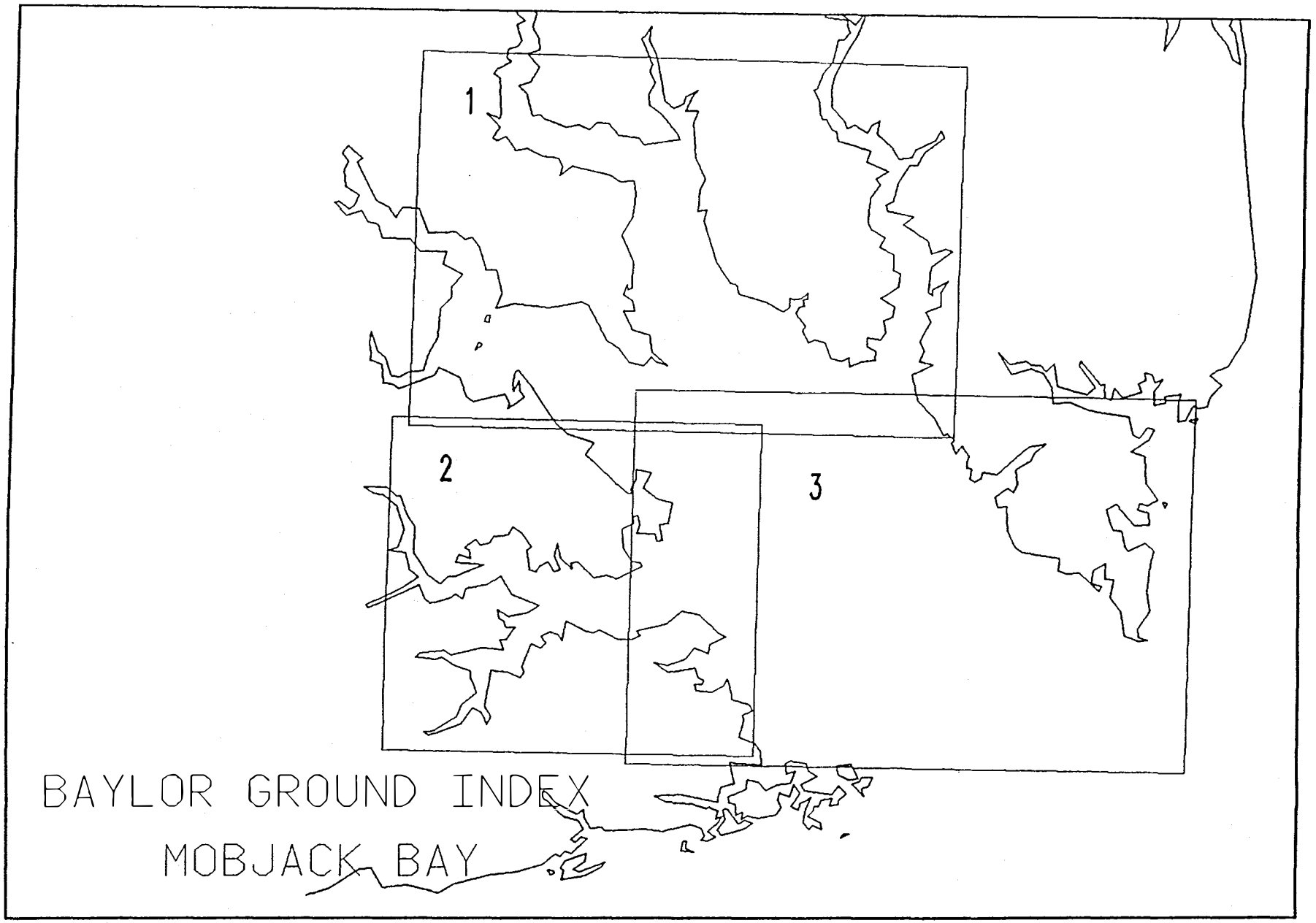


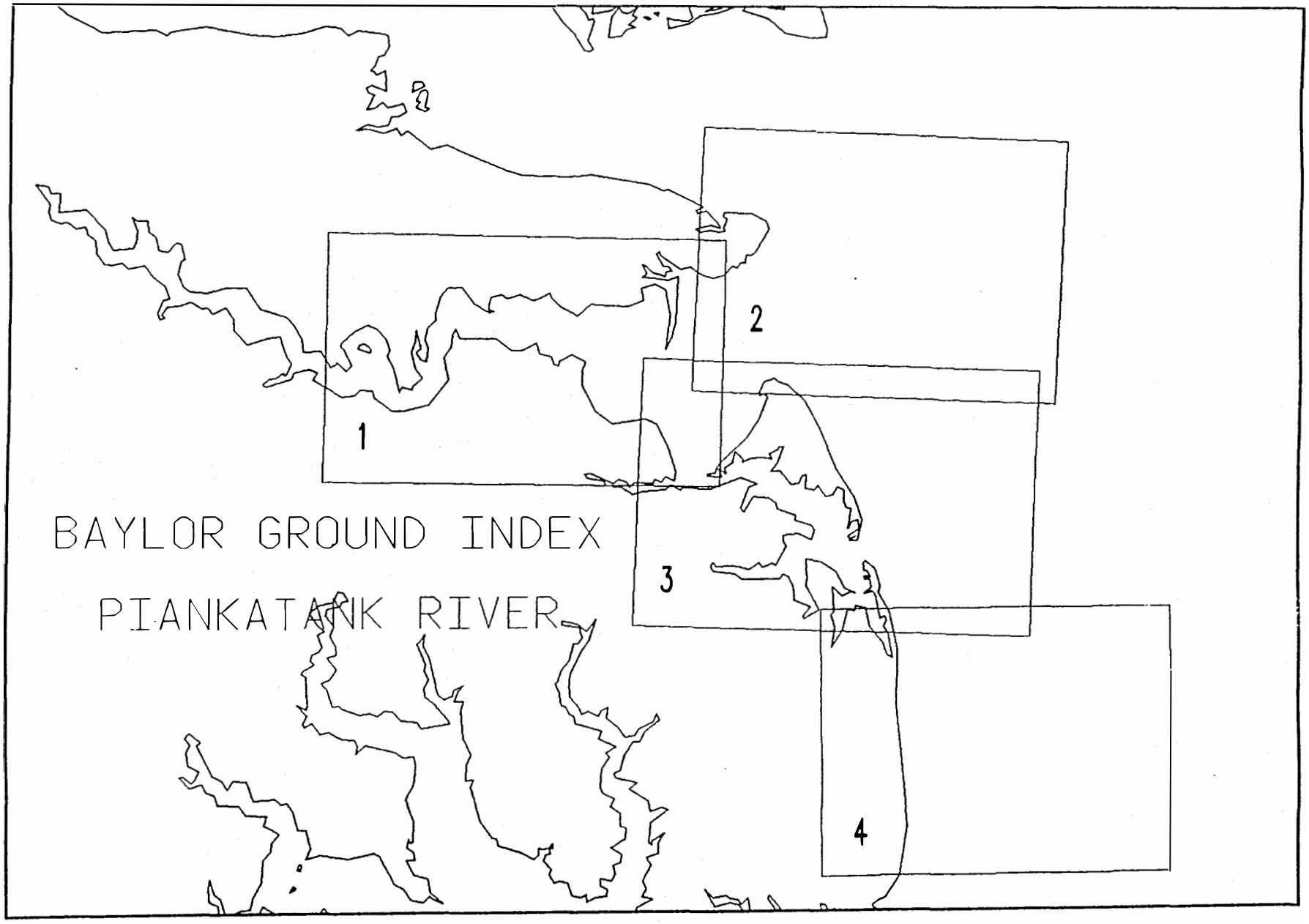

1
2
3
4
5
BAYLOR GROUND INDEX
JAMES RIVER



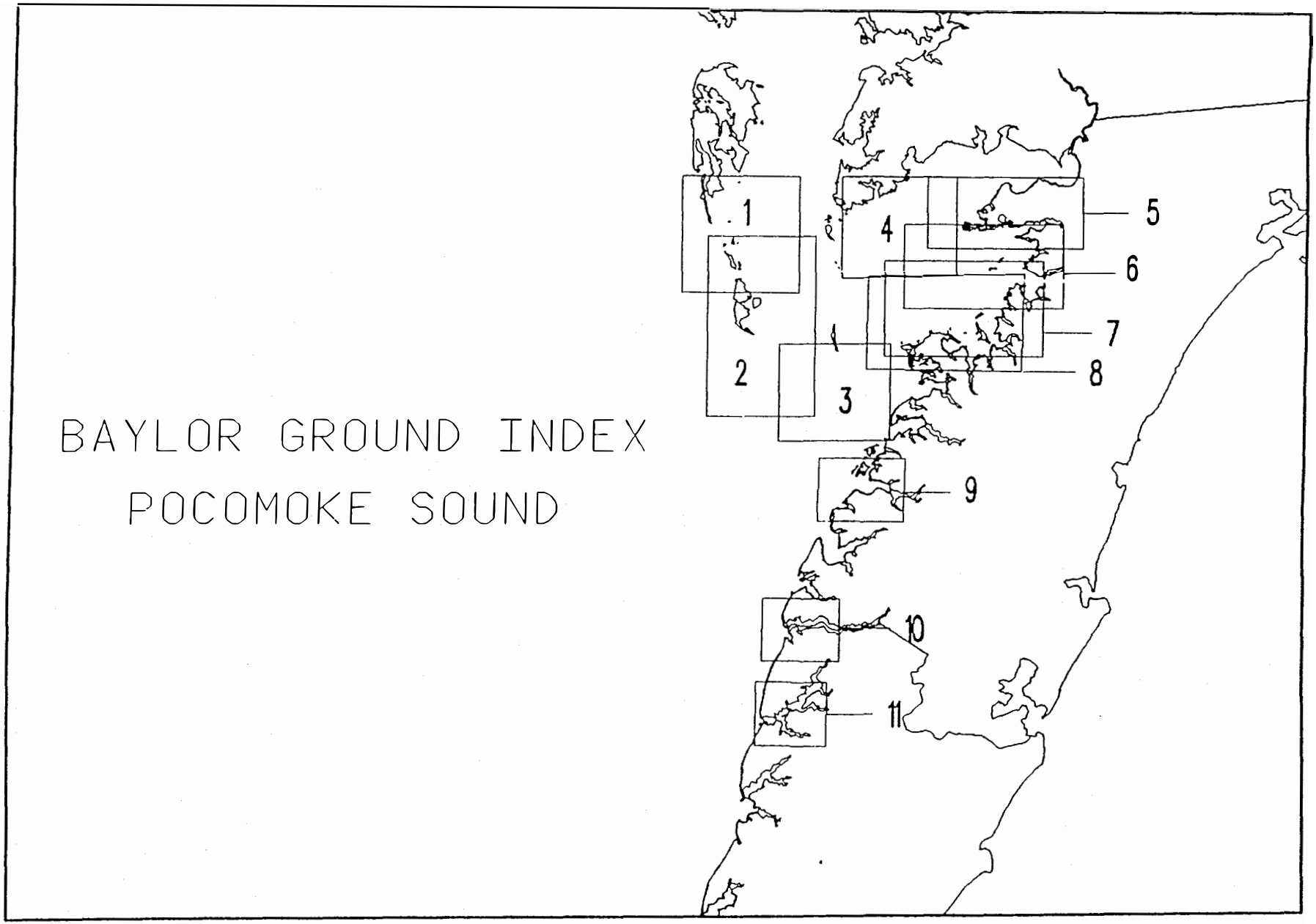
BAYLOR GROUND INDEX

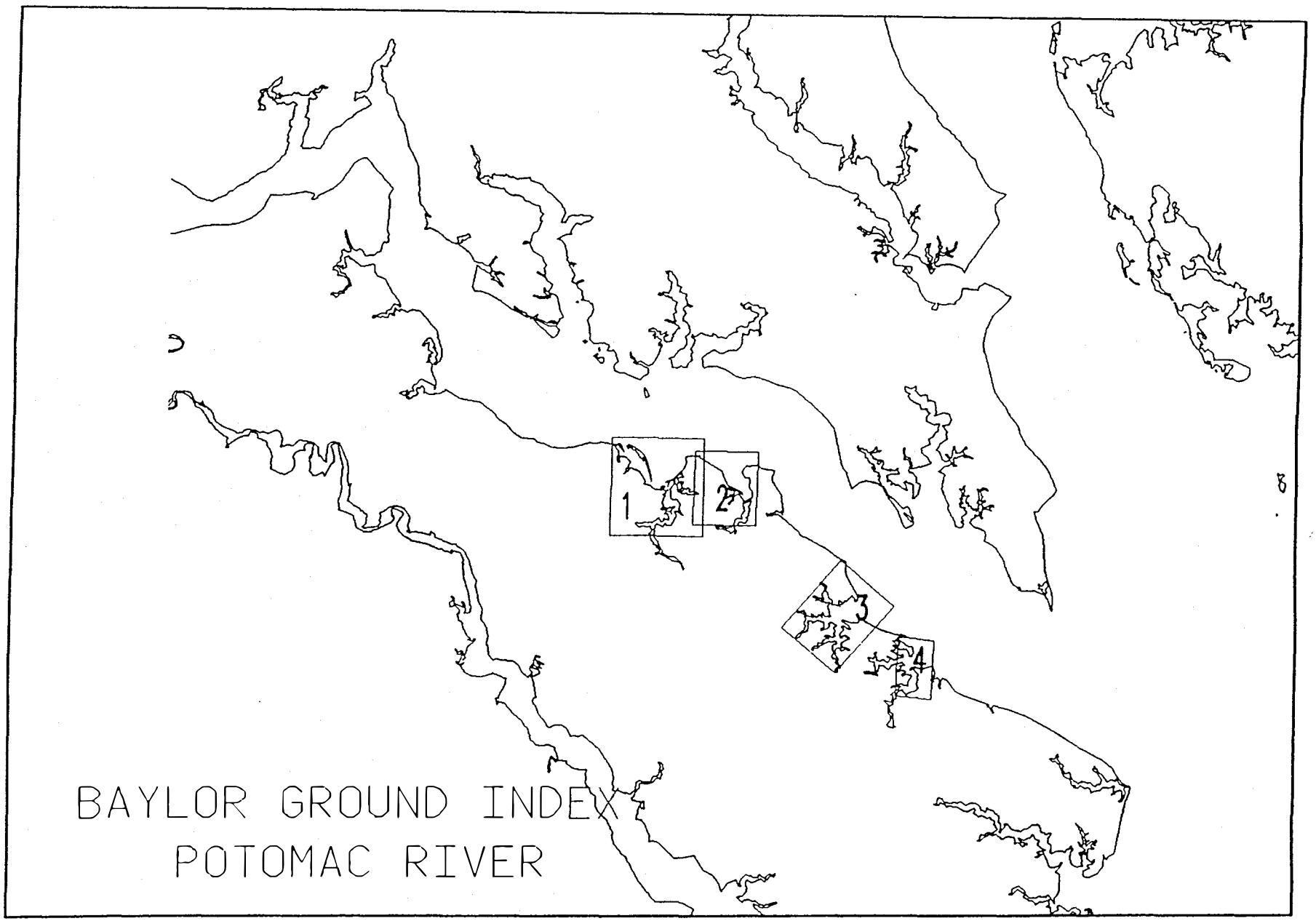
MOBJACK BAY


1
2
3
BAYLOR GROUND INDEX
MOBJACK BAY


1
2
3
4
BAYLOR GROUND INDEX
PIANKATANK RIVER

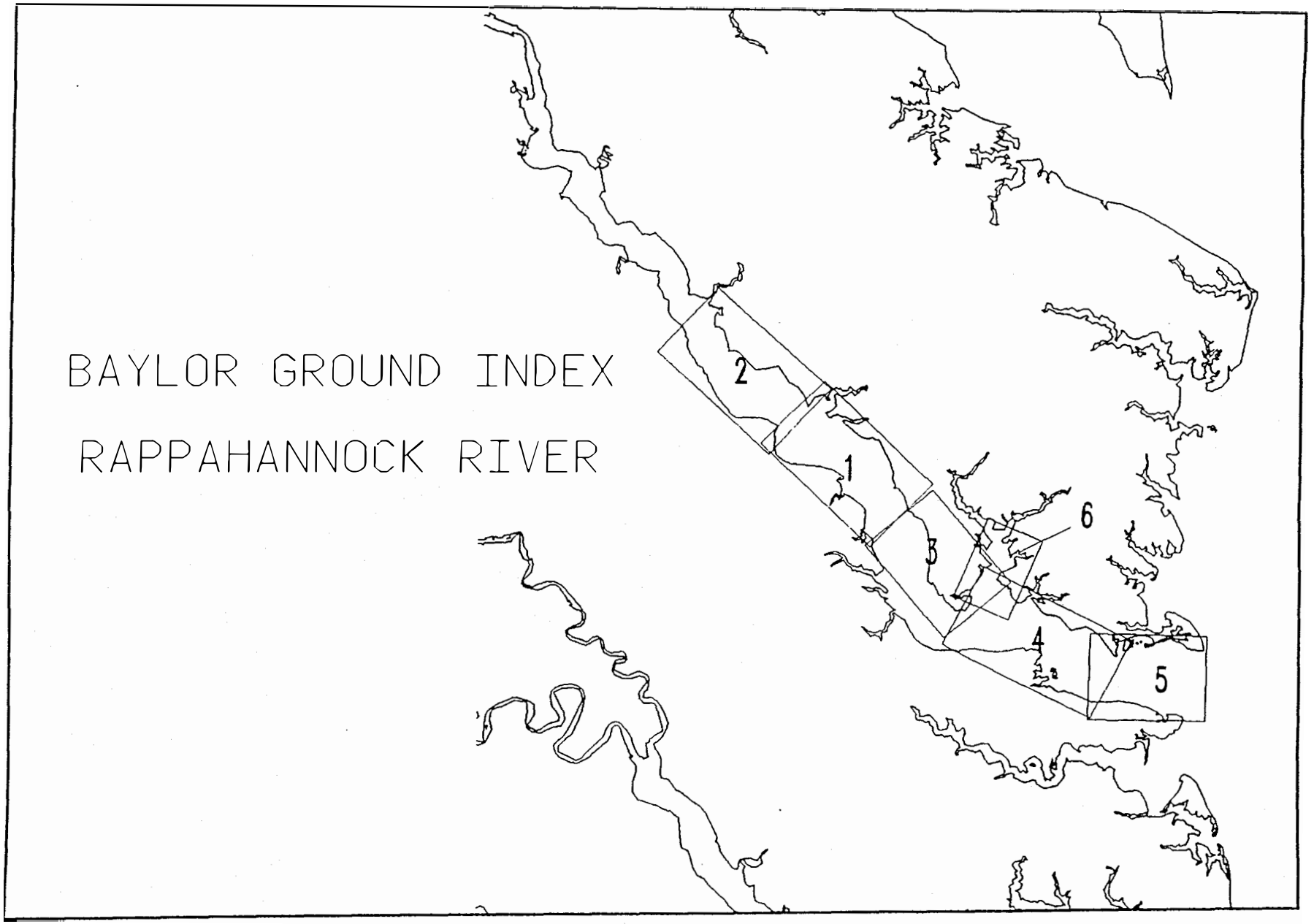
BAYLOR GROUND INDEX
POCOMOKE SOUND

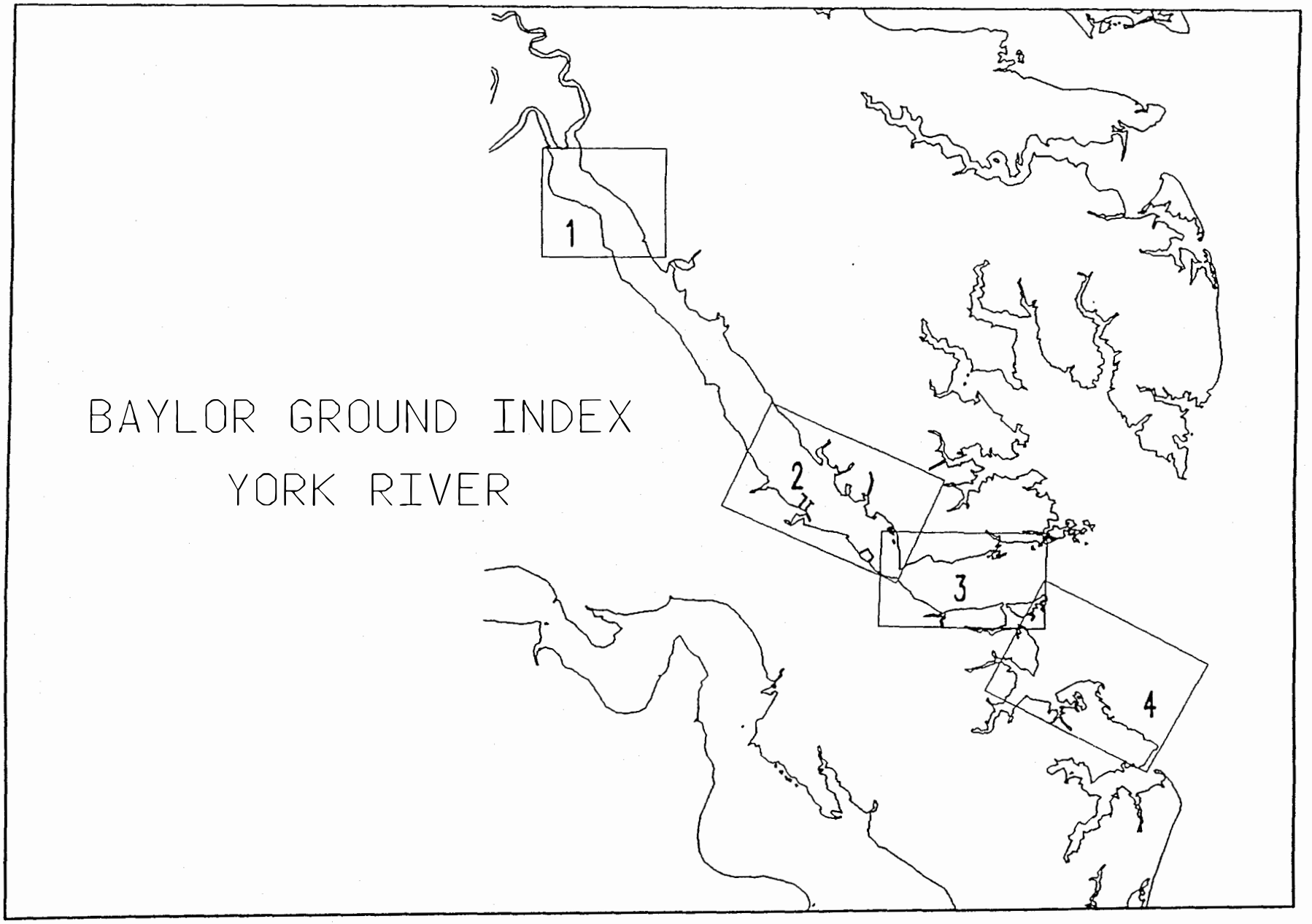


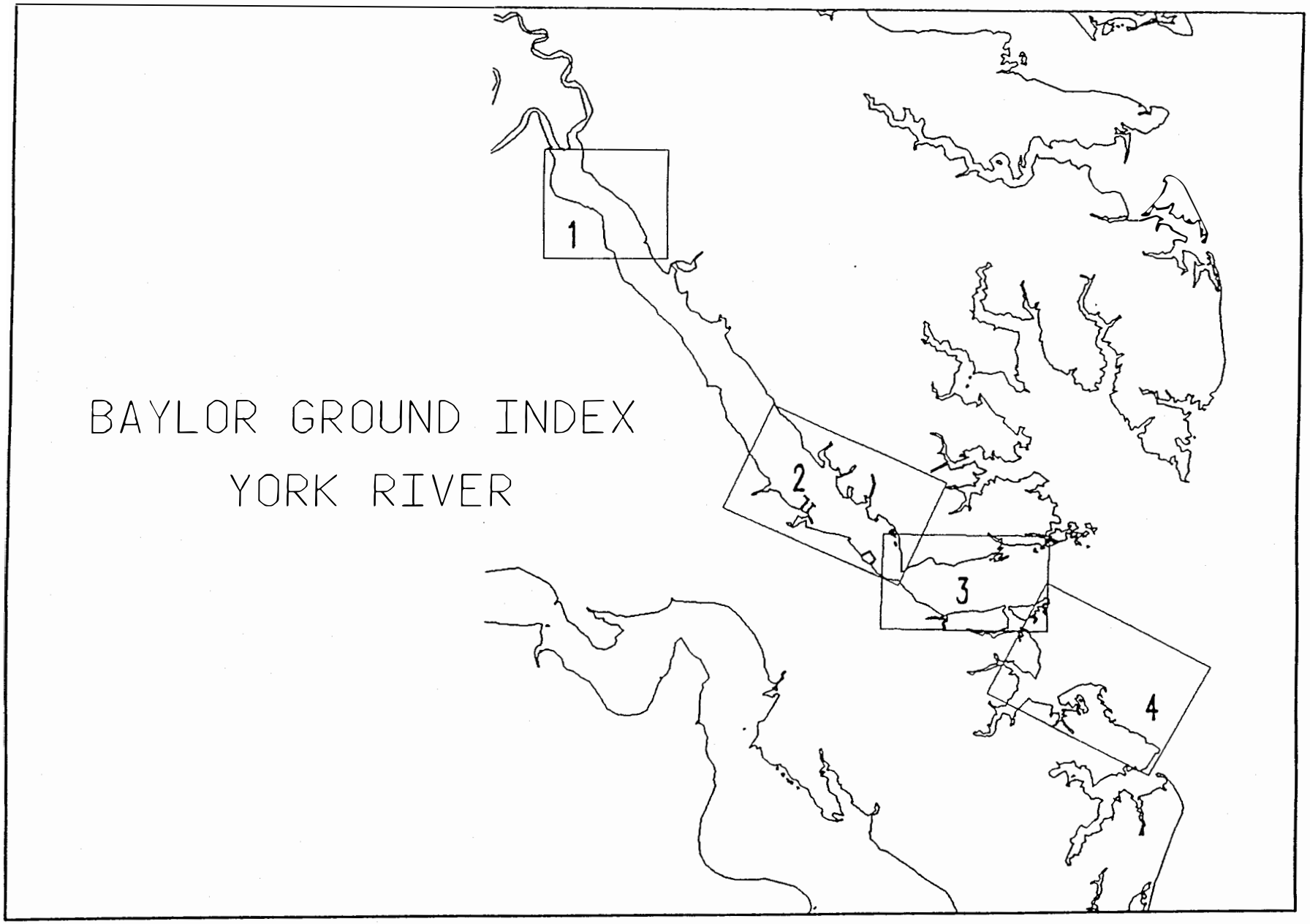

1
2
3
4
BAYLOR GROUND INDEX
POTOMAC RIVER

BAYLOR GROUND INDEX

RAPPAHANNOCK RIVER




BAYLOR GROUND INDEX
YORK RIVER
1
2
3
4


BAYLOR GROUND INDEX
YORK RIVER
1
2
3
4