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CHESAPEAKE BAY LOW FRESHWATER INFLOW STUDY APPENDIX F
MAP FOLIO 10101 CORPS OF ENGINEERS BALTIMORE MD BALTIMORE
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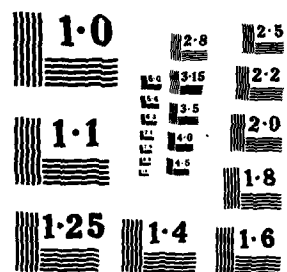
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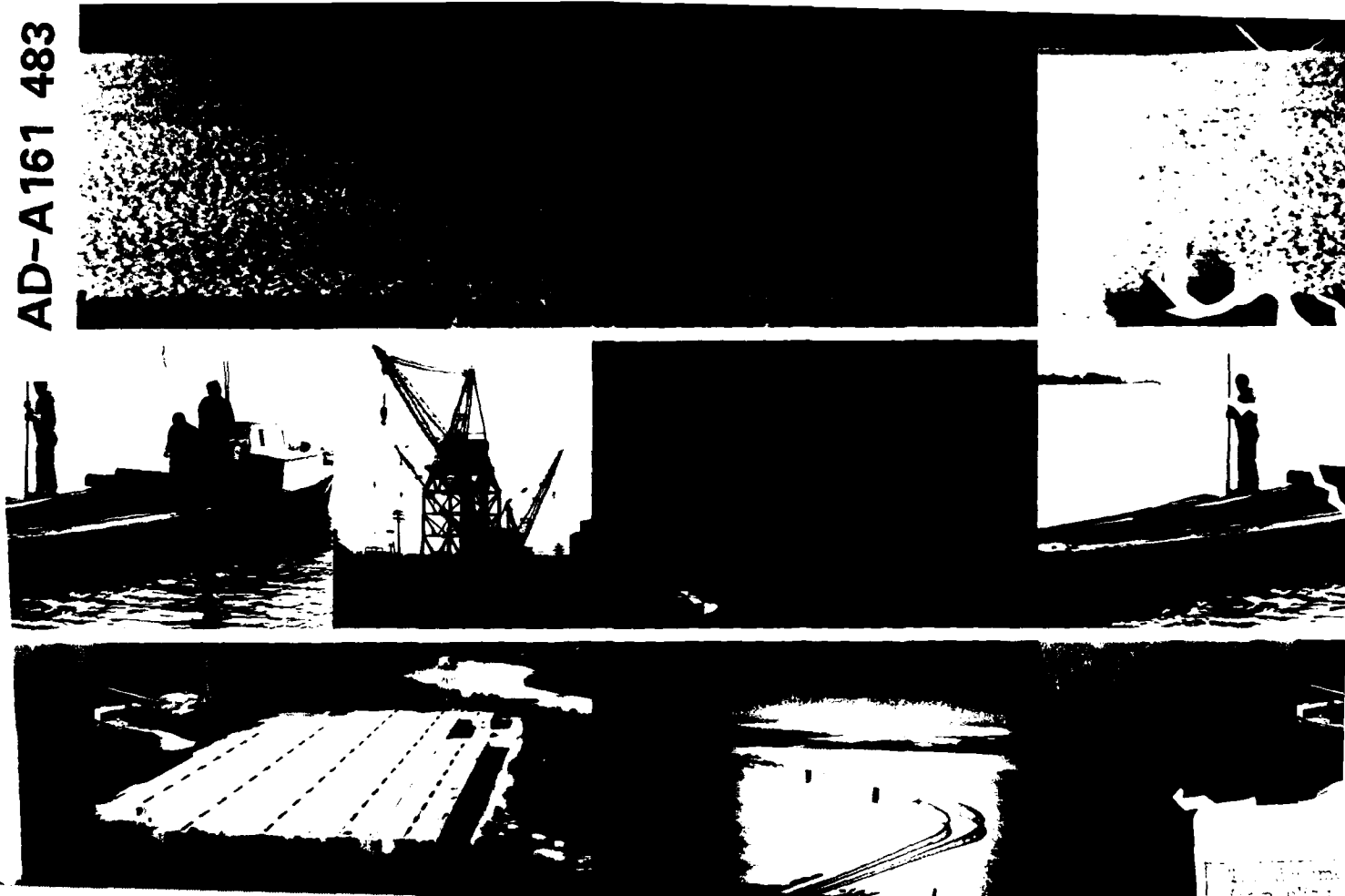
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM	
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20. ABSTRACT (Continue on reverse side if necessary and identify by block number) Chesapeake Bay is a complex estuarine system that is dependent on the freshwater inflow from its tributaries to maintain the salinity regime that characterizes its ecosystem. Increasing population and economic growth in the Bay drainage area is predicted to result in increased water supply demands and attendant increases in the amount of water used consumptively. This will cause a marked reduction in freshwater inflow to the Bay and result in higher salinities throughout the Bay			

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20. ABSTRACT

system. In the long term, salinities would be expected to increase by as much as 2 to 4 ppt.

The Low Freshwater Inflow Study methodology involved selecting representative species for study, mapping potential habitat under various conditions, using expert scientists to interpret the significance of habitat change, and assessing socio-economic and environmental impacts of the changes.

While no specific plan was developed to solve the problems caused by reduced freshwater inflows, several alternatives were identified as "most promising". These include reservoir storage, conservation, growth restriction, oyster bed restoration, and fisheries management.

The final report recommends that a comprehensive water supply and drought management study be conducted that will identify those measures required to optimize the use of existing water supplies in the Bay drainage basin and minimize reductions in freshwater inflow to the Bay.

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Chesapeake Bay Low Freshwater Inflow Study

APPENDIX F - MAP FOLIO

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**US Army Corps
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Baltimore District

Study

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Foreword

This is one of the volumes comprising the final report on the Corps of Engineers' Chesapeake Bay Study. The report represents the culmination of many years of study of the Bay and its associated social, economic, and environmental processes and resources. The overall study was done in three distinct developmental phases. A description is provided below of each study phase, followed by a description of the organization of the report.

The initial phase of the overall program involved the inventory and assessment of the existing physical, economic, social, biological, and environmental conditions of the Bay. The results of this effort were published in a seven volume document titled *Chesapeake Bay Existing Conditions Report*, released in 1973. This was the first publication to present a comprehensive survey of the tidal Chesapeake and its resources as a single entity.

The second phase of the program focused on projection of water resource requirements in the Bay Region for the year 2020. Completed in 1977, the *Chesapeake Bay Future Conditions Report* documents the results of that work. The 12-volume report contains projections for resources categories such as navigation, recreation, water supply, water quality, and land use. Also presented are assessments of the capacities of the Bay system to meet the identified future requirements, and an identification of problems and conflicts that may occur with unrestrained growth in the future.

In the third and final study phase, two resource problems of particular concern in Chesapeake Bay were addressed in detail: low freshwater inflow and tidal flooding. In the Low Freshwater Inflow study, results of testing on the Chesapeake Bay Hydraulic Model were used to assess the effects on the Bay of projected future depressed freshwater inflows. Physical and biological changes were quantified and used in assessments of potential social, economic, and environmental impacts. The Tidal Flooding Study included development of preliminary state-damage relationships and identification of Bay communities in which structural and nonstructural measures could be beneficial.

The final report of the Chesapeake Bay Study is composed of three major elements: (1) Summary, (2) Low Freshwater Inflow Study, and (3) Tidal Flooding Study. The *Chesapeake Bay Study Summary Report* includes a description of the results, findings, and recommendations of all the above described phases of the Chesapeake Bay Study.

The *Low Freshwater Inflow Study* consists of a Main Report and six supporting appendices. The report includes:

- Main Report
- Appendix A—Problem Identification
- Appendix B—Plan Formulation
- Appendix C—Hydrology
- Appendix D—Hydraulic Model Test
- Appendix E—Biota
- Appendix F—Map Folio

The *Tidal Flooding Study* consists similarly of a Main Report and six appendices. The report includes:

- Main Report
- Appendix A—Problem Identification
- Appendix B—Plan Formulation, Assessment, and Evaluation
- Appendix C—Recreation and Natural Resources
- Appendix D—Social and Cultural Resources
- Appendix E—Engineering, Design, and Cost Estimates
- Appendix F—Economics

- Summary Report
- Supplement A—Problem Identification
- Supplement B—Public Involvement
- Supplement C—Hydraulic Model

Introduction

This appendix is a principal product of the Biota Assessment portion of the Corps of Engineers' Chesapeake Bay Low Freshwater Inflow Study. The purpose of the mapping is to portray habitat for selected Chesapeake Bay species under a variety of freshwater inflow conditions. They are based on the results of tests done on the Chesapeake Bay Hydraulic Model simulating four freshwater inflow conditions. These were:

- 1) Base Average—average freshwater inflow conditions;
- 2) Future Average—reflective of average inflow conditions reduced by increased water consumption projected for the year 2020;
- 3) Base Drought—simulating an actual drought in the 1960's;
- 4) Future Drought—simulated 1960's drought inflows, reduced by increased water consumption projected for the year 2020.

Data from the hydraulic model tests were subsequently used to generate seasonal average salinities at various depths from the mouth of the Bay to the head of tide in each tributary. These salinity data, in conjunction with data on depth, substrate, and dependence on other organisms, were used to create the maps of habitat portrayed in this volume. For further discussion of the information presented herein, the reader is referenced to Appendix E, Biota and the Chesapeake Bay Low Freshwater Inflow Study Biota Assessment, Phase II; Final Report, May 1982, prepared by Western Eco-Systems Technology for the Corps of Engineers.

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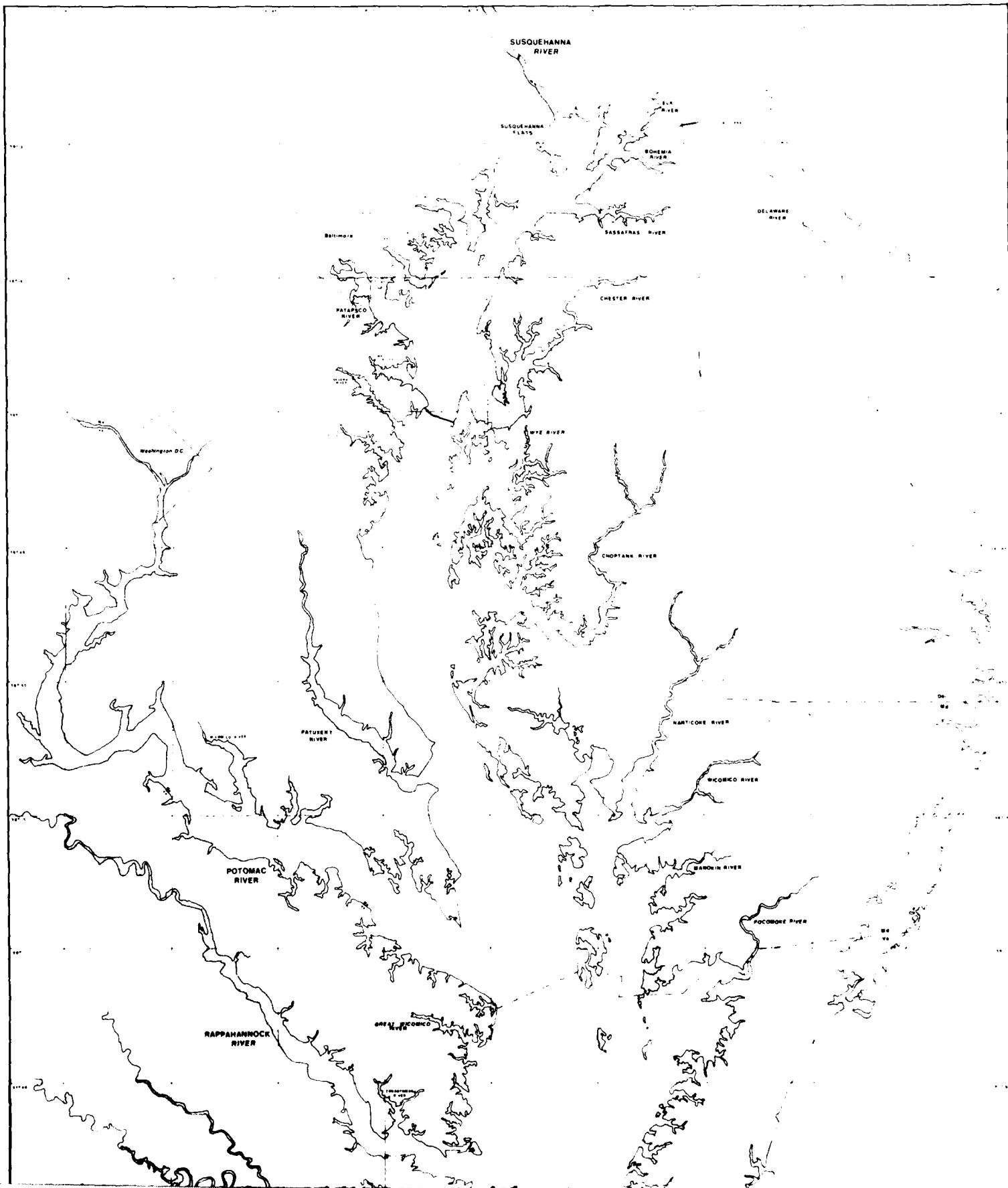
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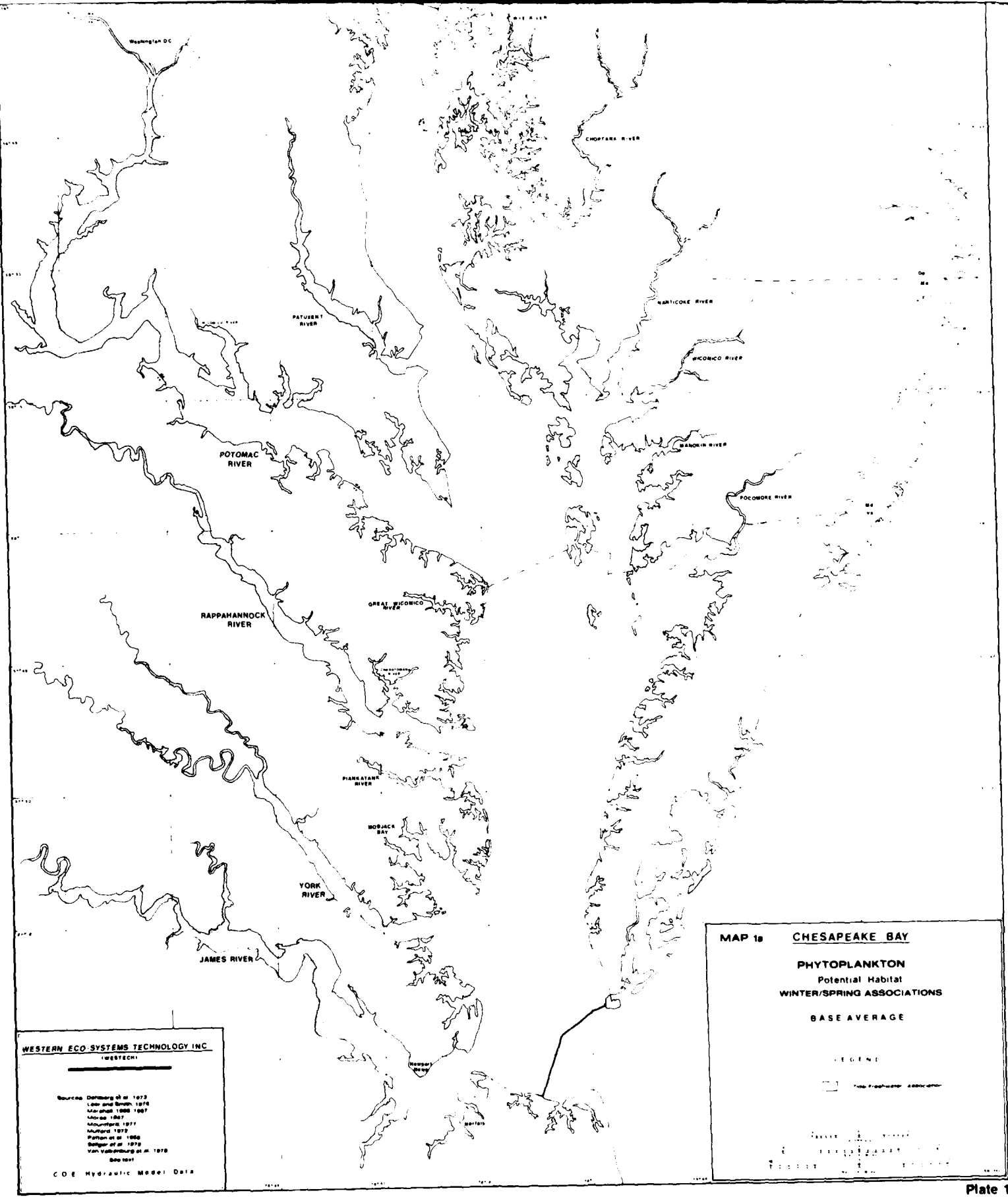
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Sources: Dahm et al. 1973
Lee and Smith 1976
Meador 1980 1987
Meador 1987
Munro et al. 1977
Munro 1977
Patterson et al. 1986
Simpson et al. 1976
Van Vleet et al. 1979
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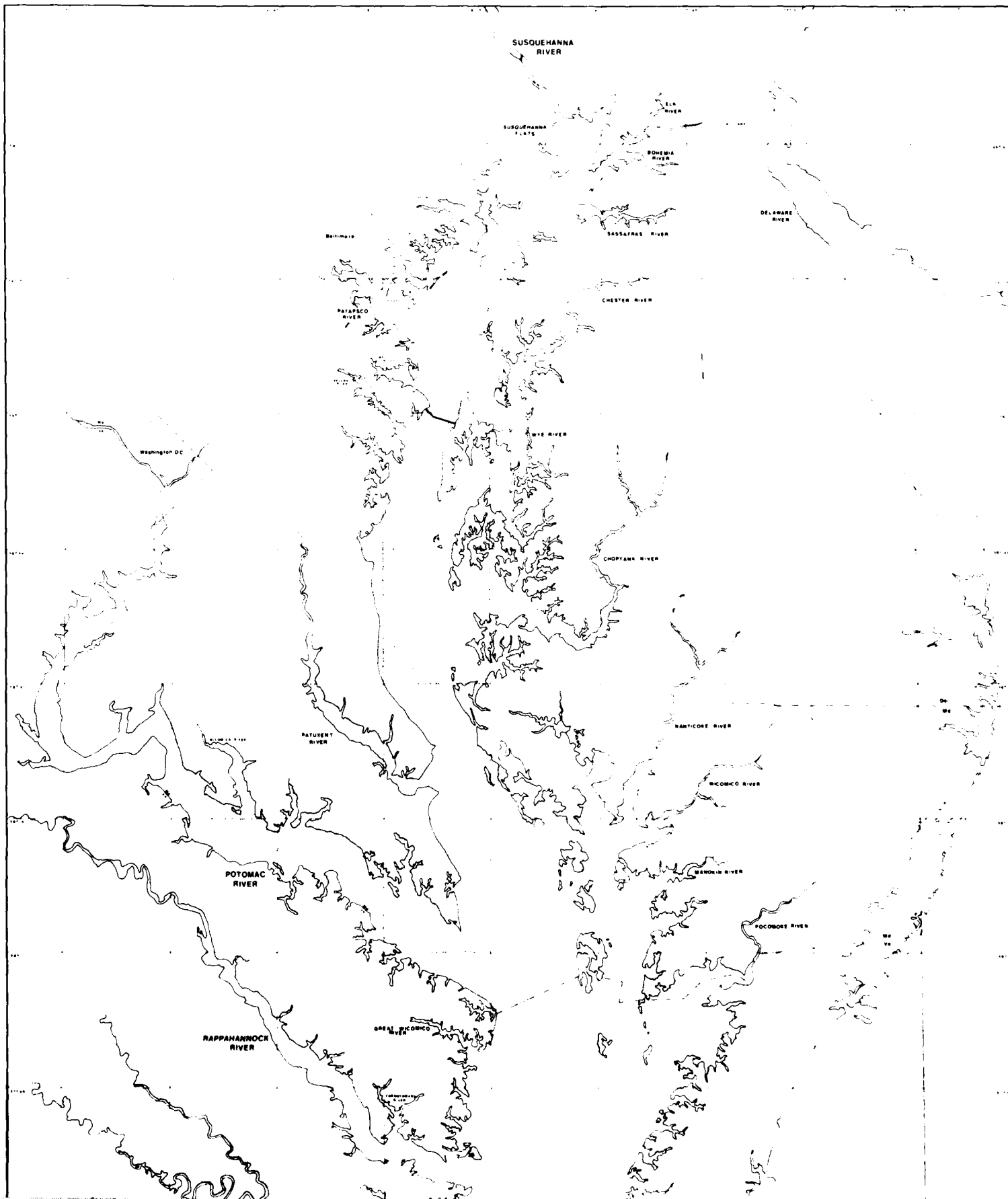
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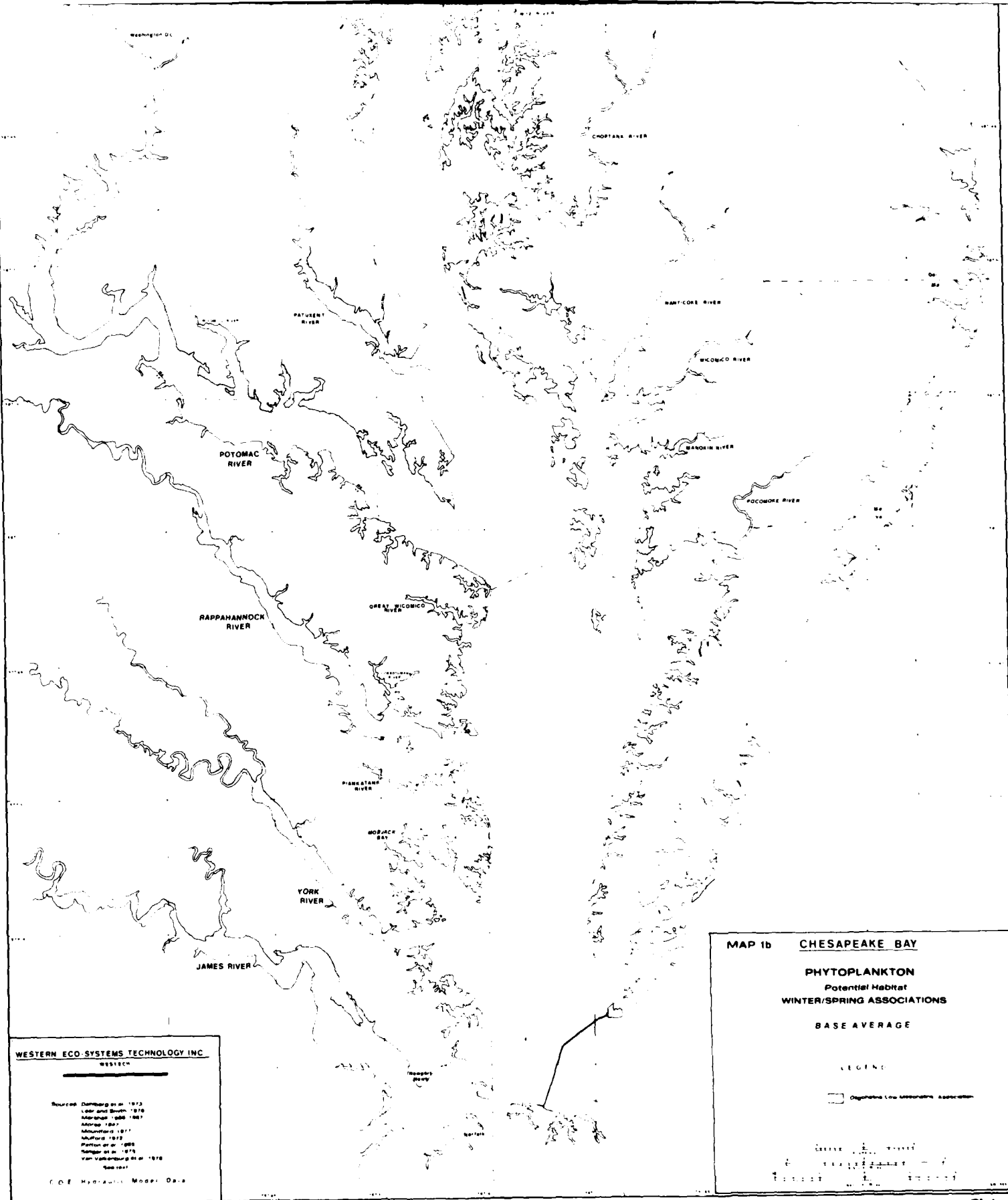
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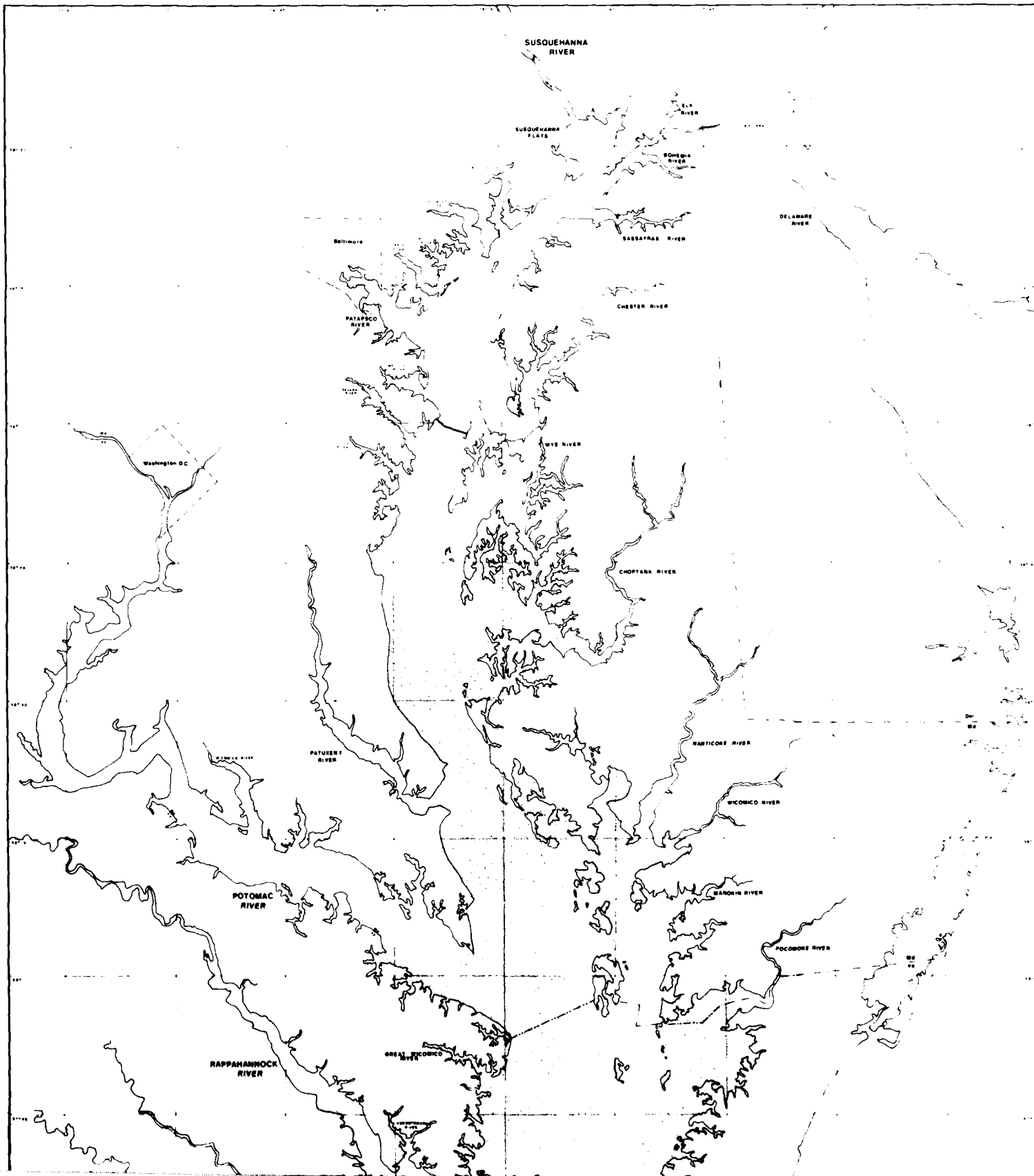
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BASE AVERAGE

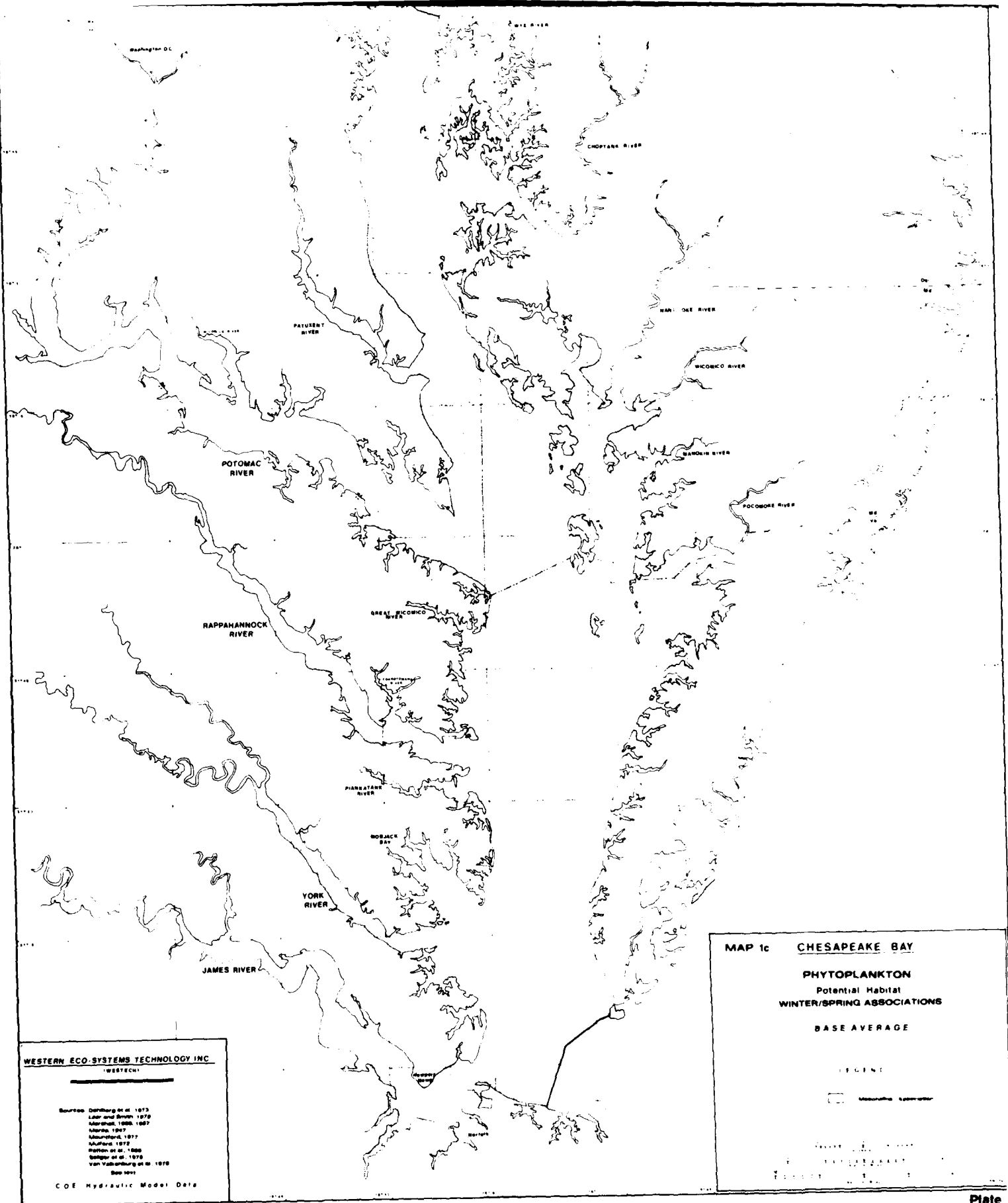
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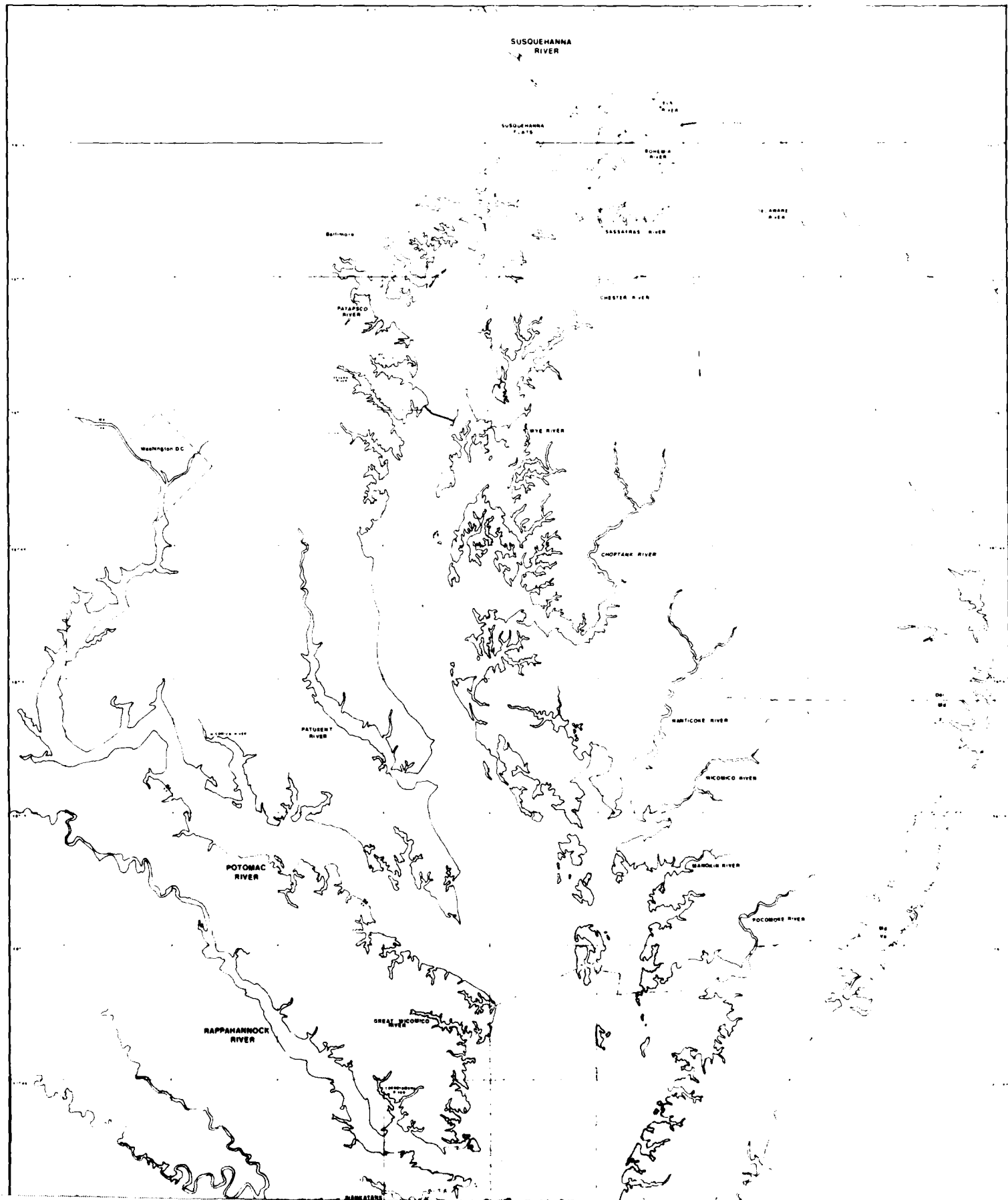
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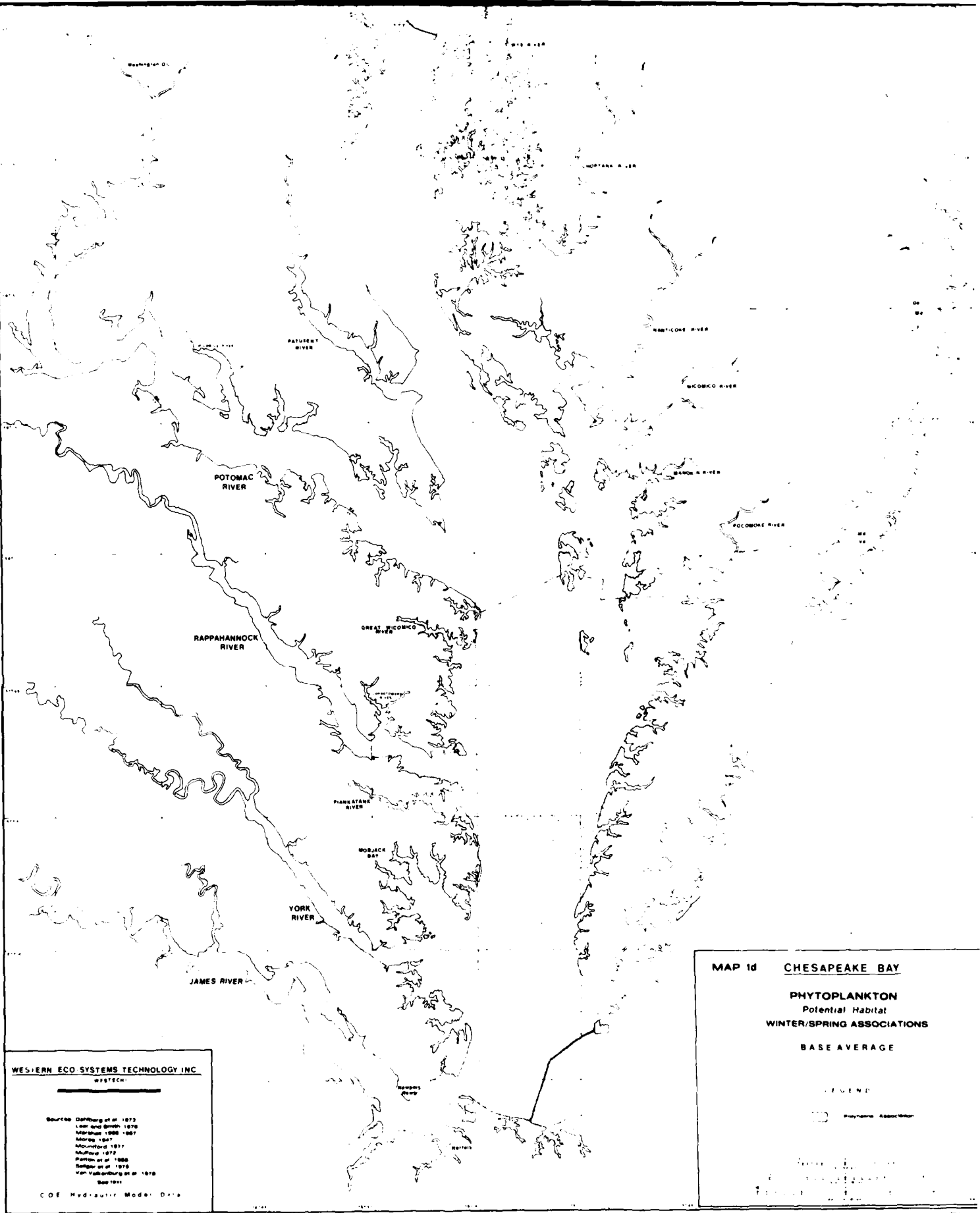


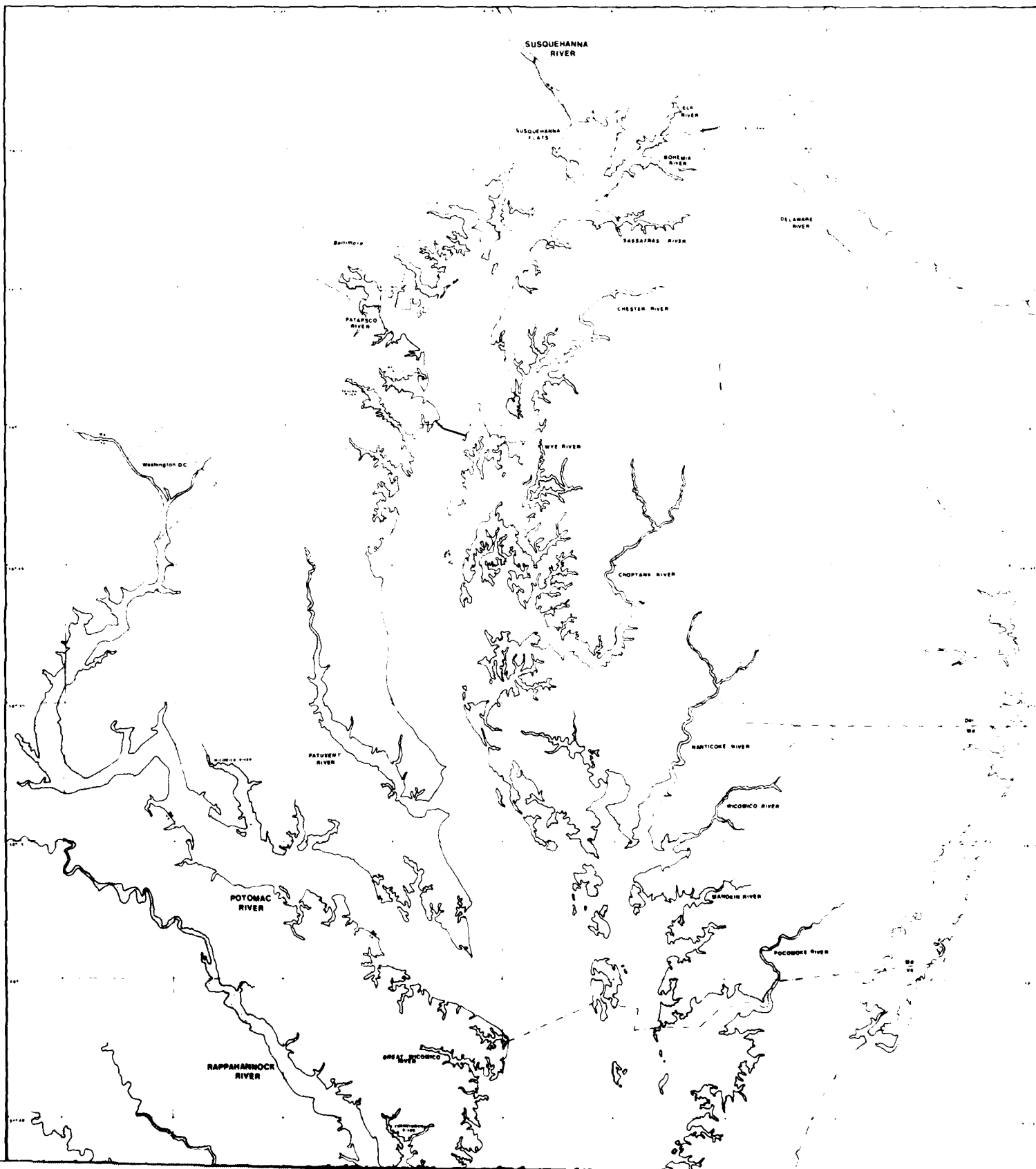


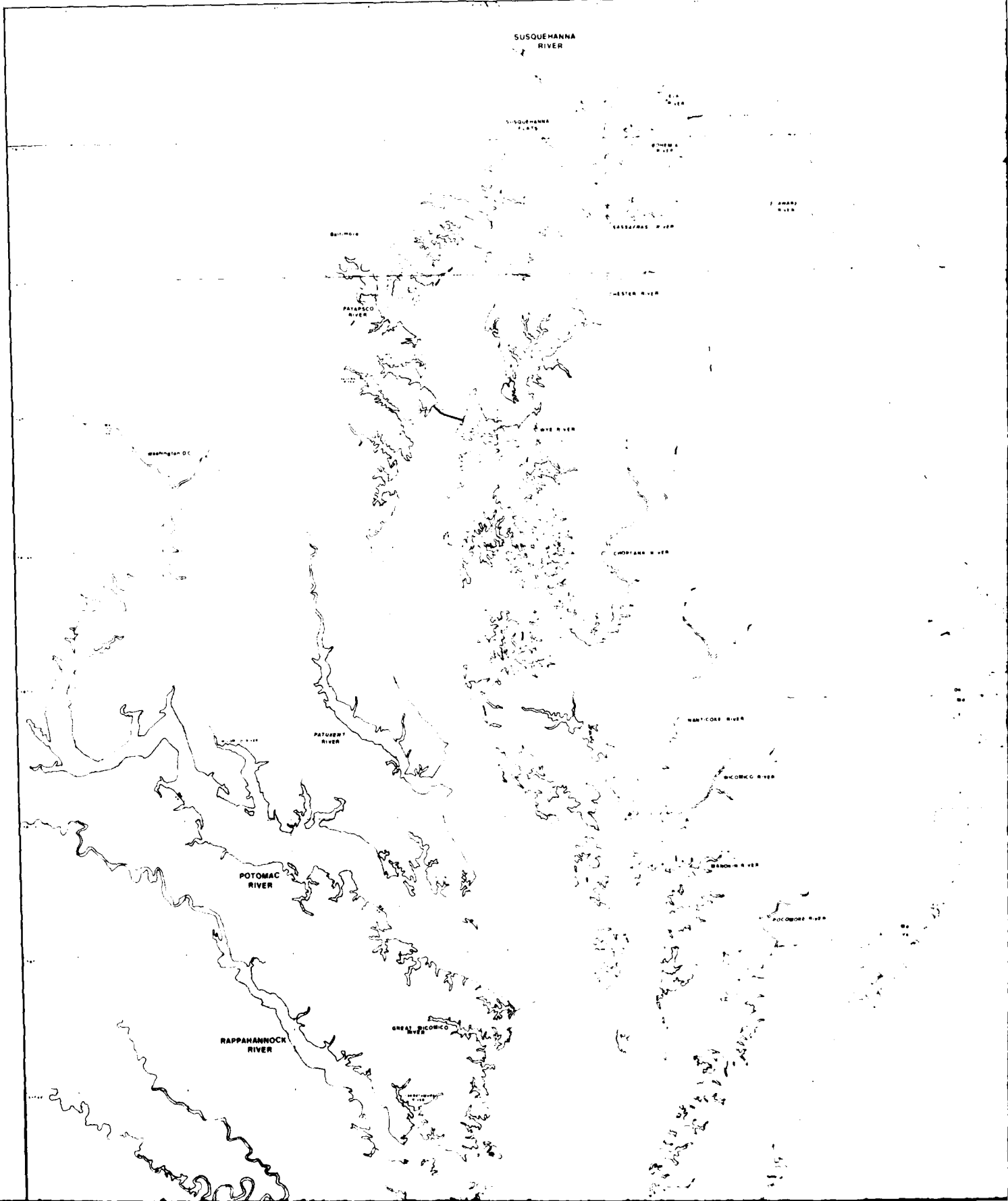












SUSQUEHANNA
RIVER

SUSQUEHANNA
PLATE

ETHAM
RIVER

ANAS
RIVER

CASTLEMAN
RIVER

Baltimore

CHESTER
RIVER

PATAPSCO
RIVER

JOYE
RIVER

WASHINGTON
D.C.

CHESAPEAKE
RIVER

WANTON
RIVER

PATUXENT
RIVER

ROANOKE
RIVER

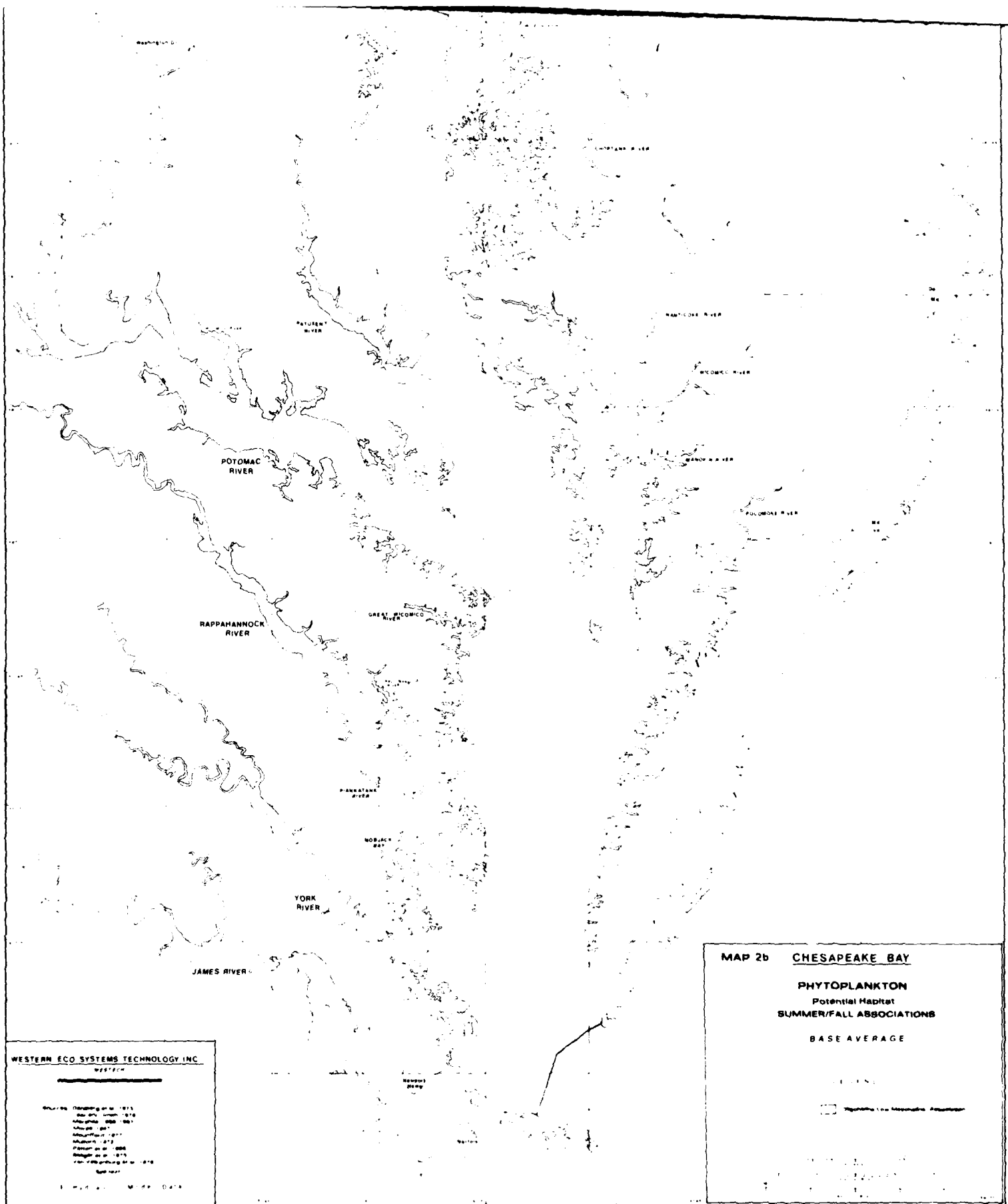
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RIVER

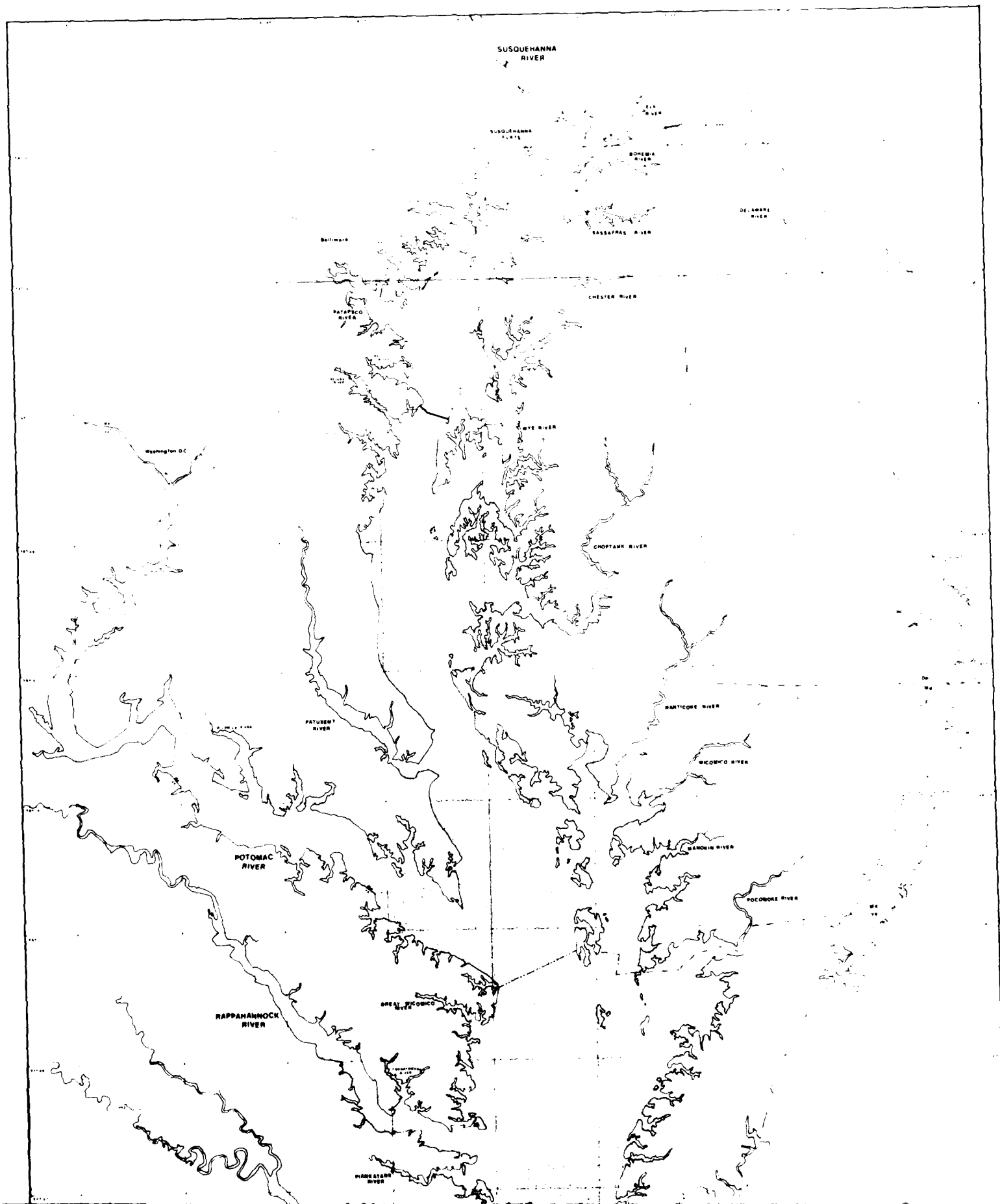
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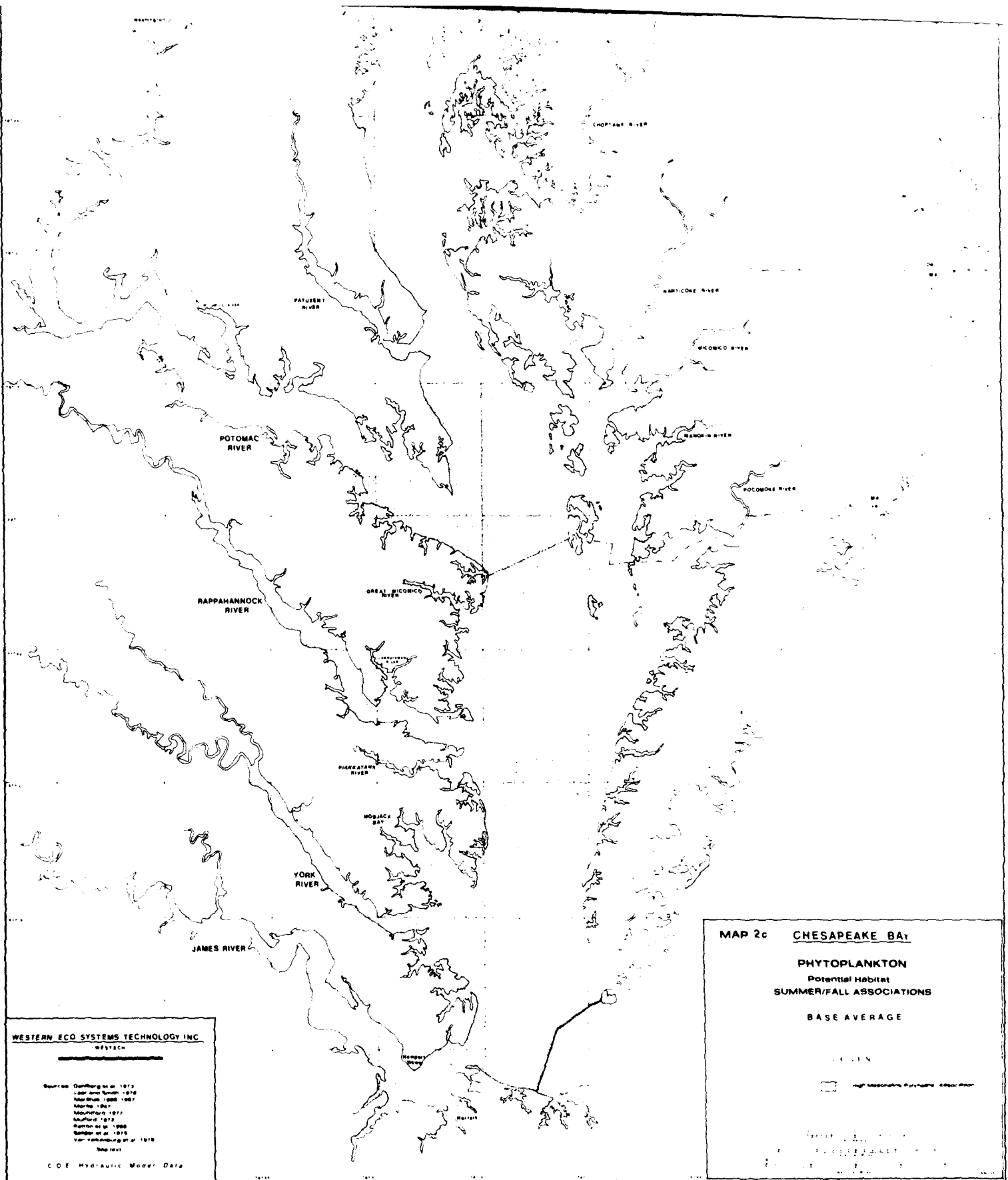
ROANOKE
RIVER

RAPPAHANNOCK
RIVER

ROANOKE
RIVER







SUSQUEHANNA RIVER

SUSQUEHANNA FLATS

BOHEMA RIVER

DELAWARE RIVER

SASSAFRAS RIVER

BALTIMORE

CHESTER RIVER

PATAPSCO RIVER

WYE RIVER

WASHINGTON DC

CHOPTANK RIVER

NANTICONE RIVER

PATUXENT RIVER

WICOMICO RIVER

POTOMAC RIVER

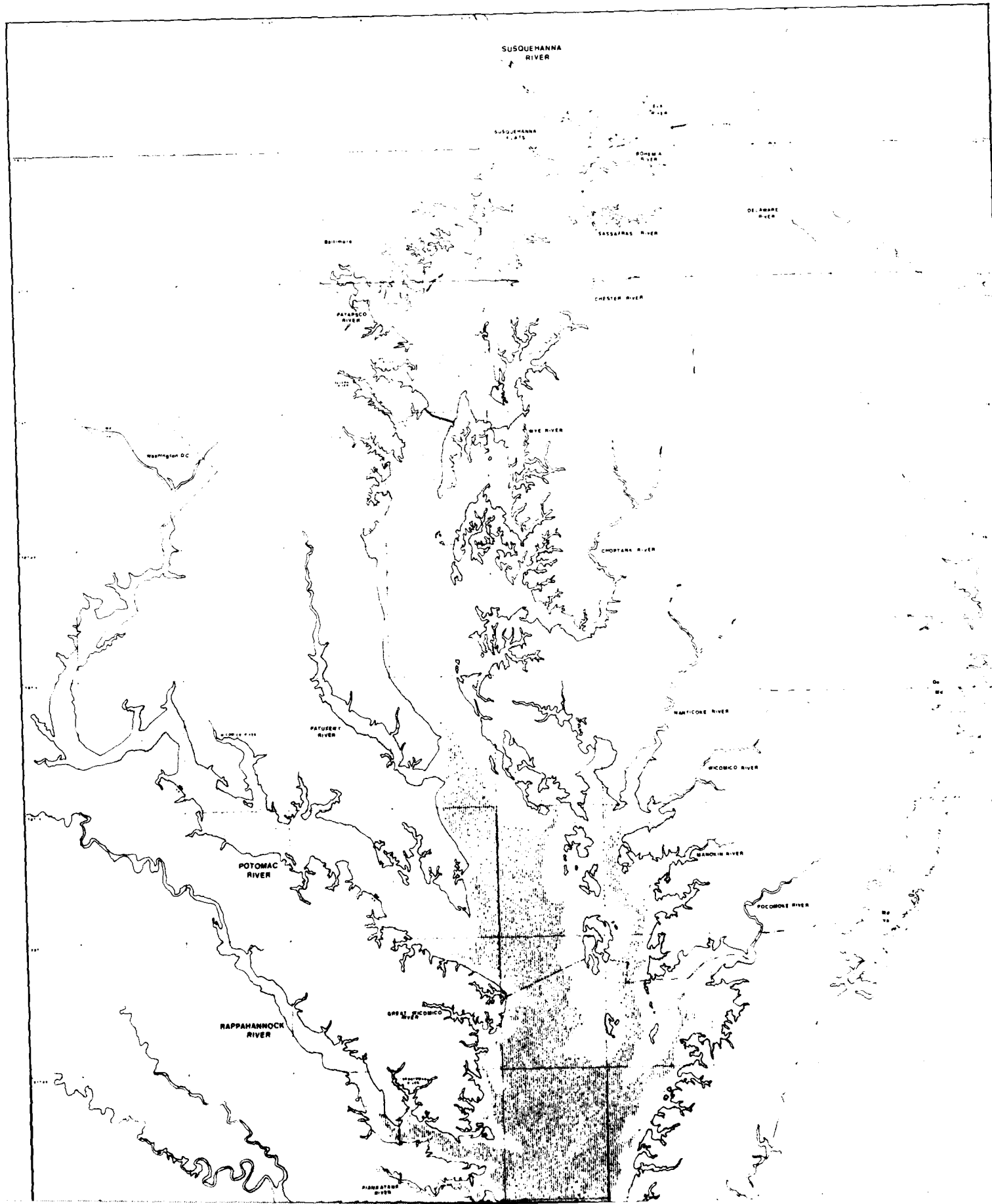
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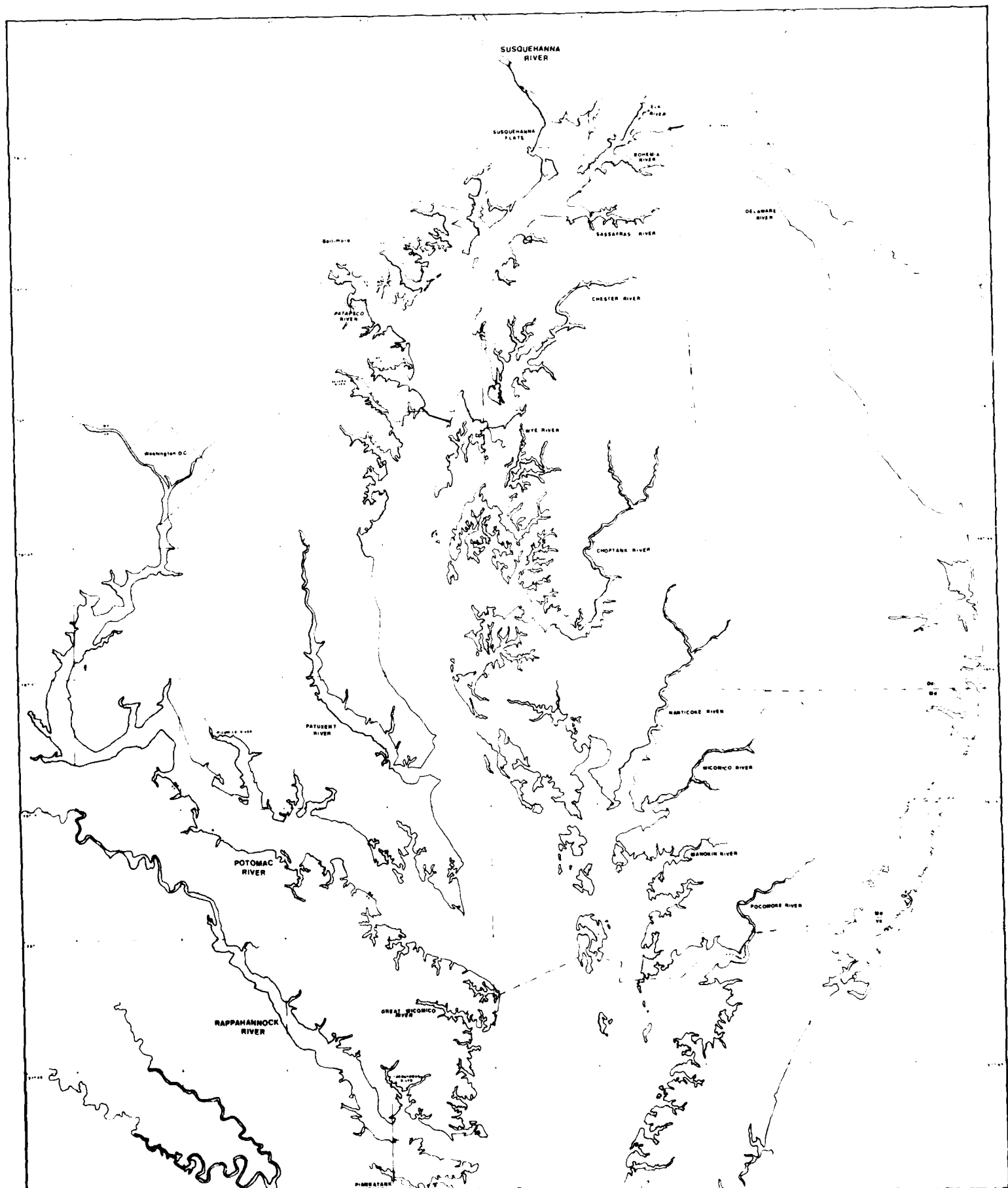
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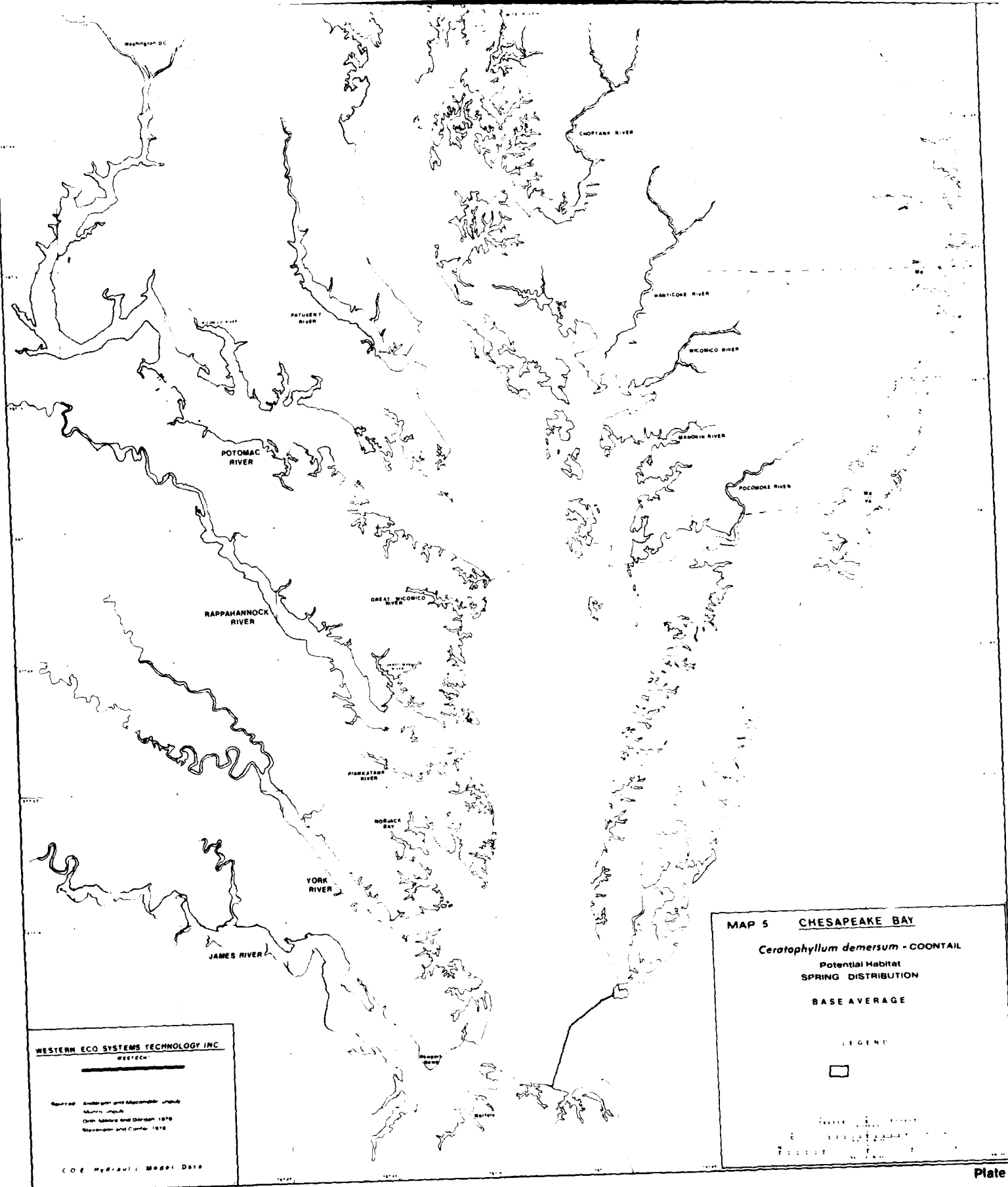
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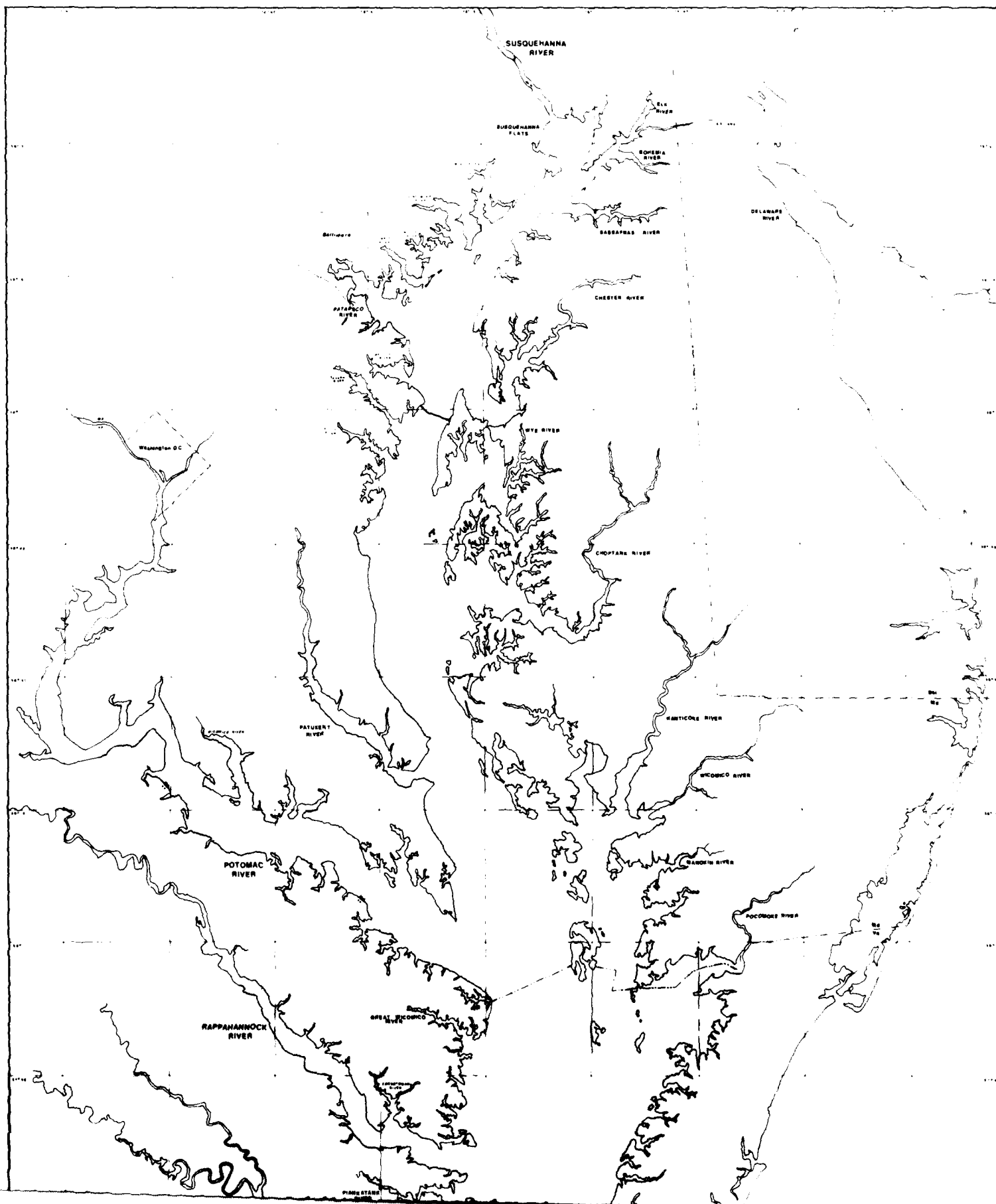
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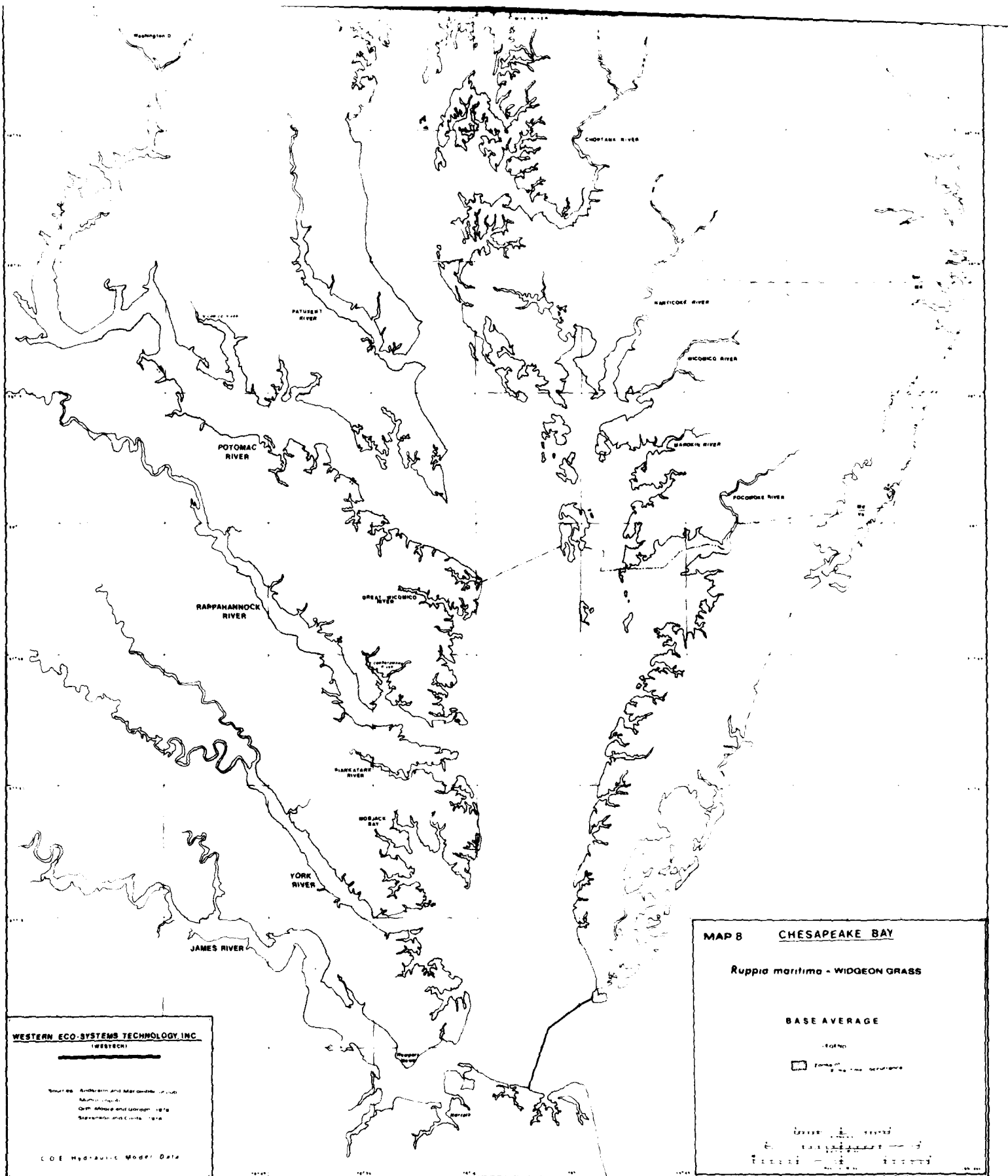
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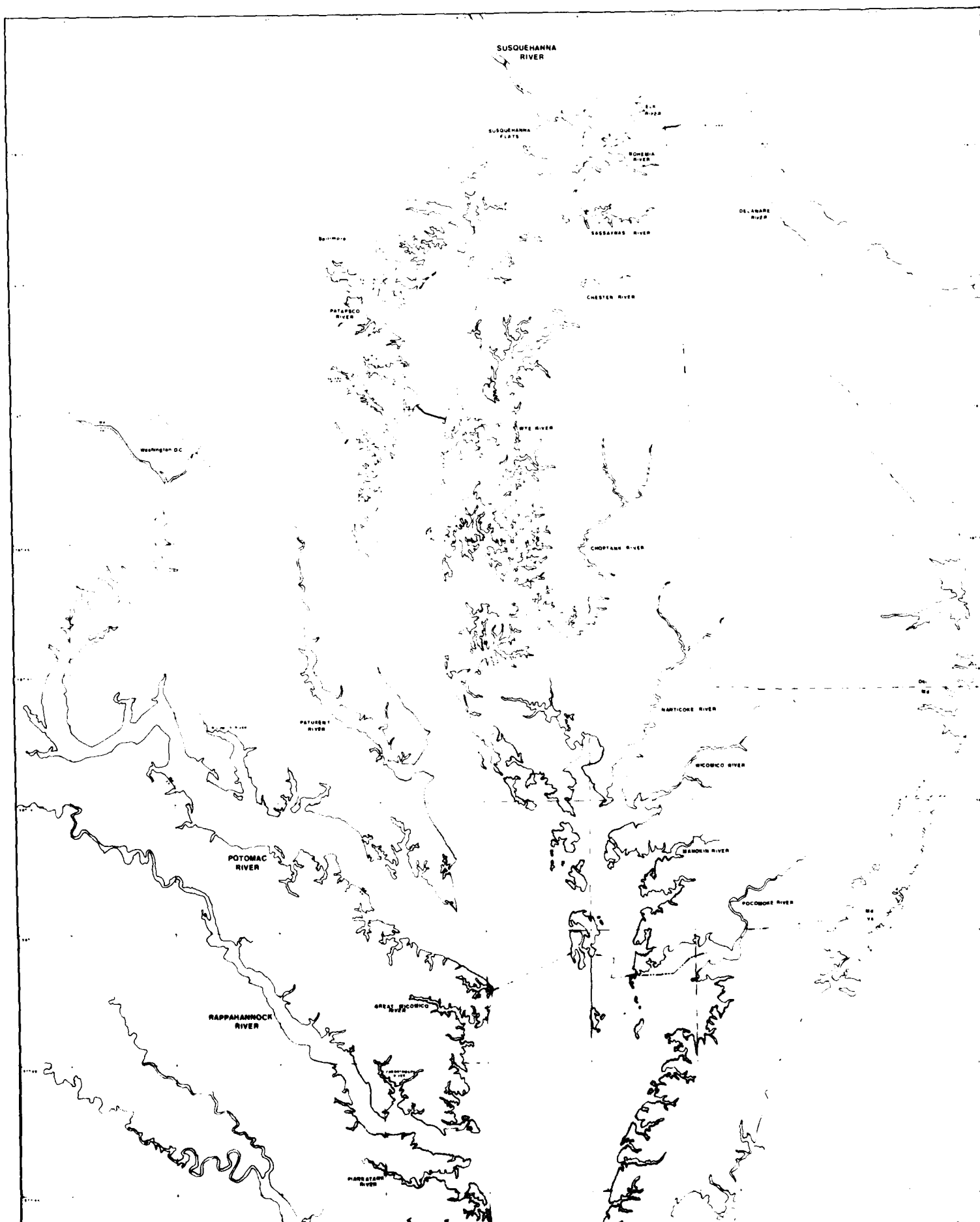


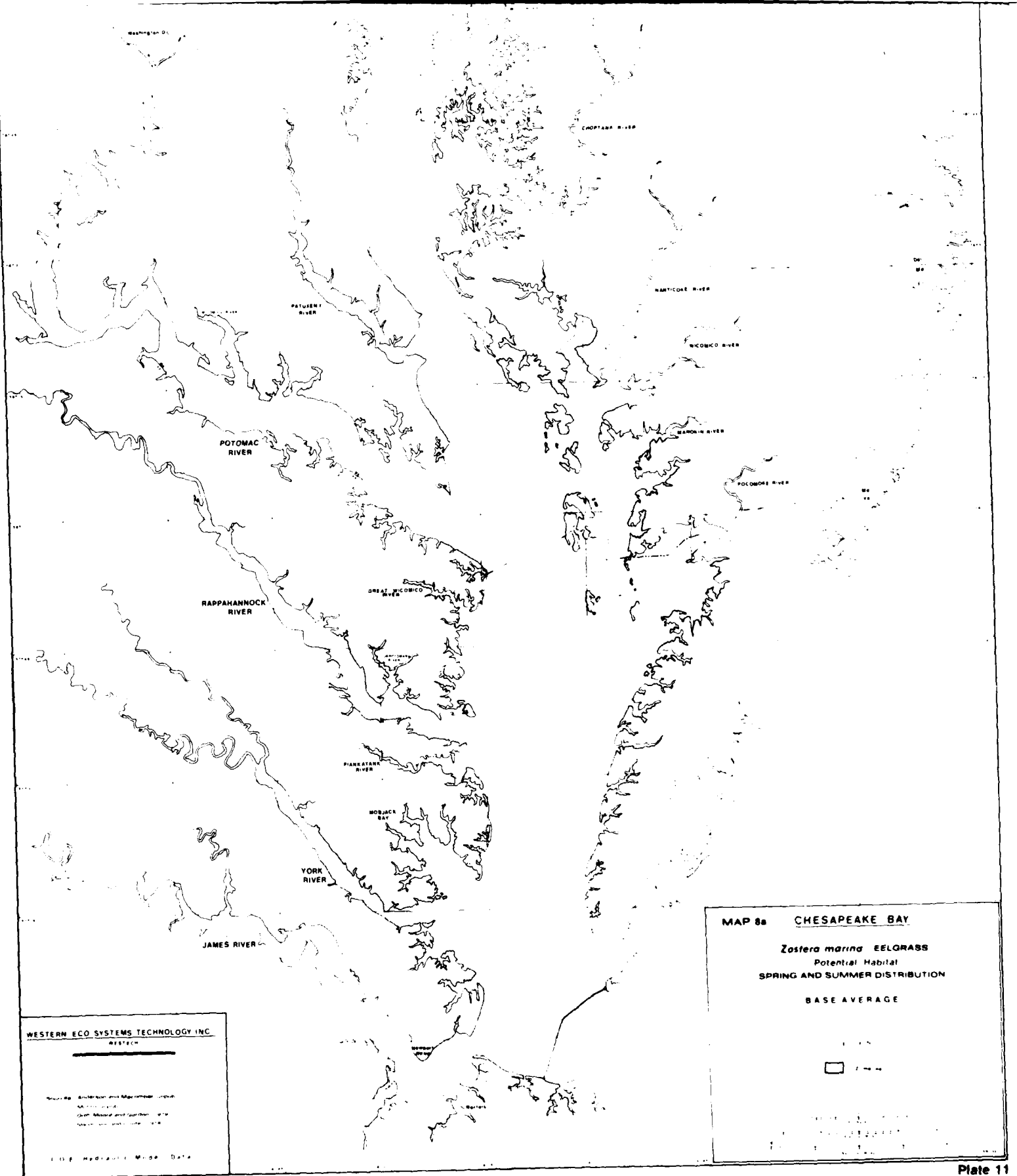


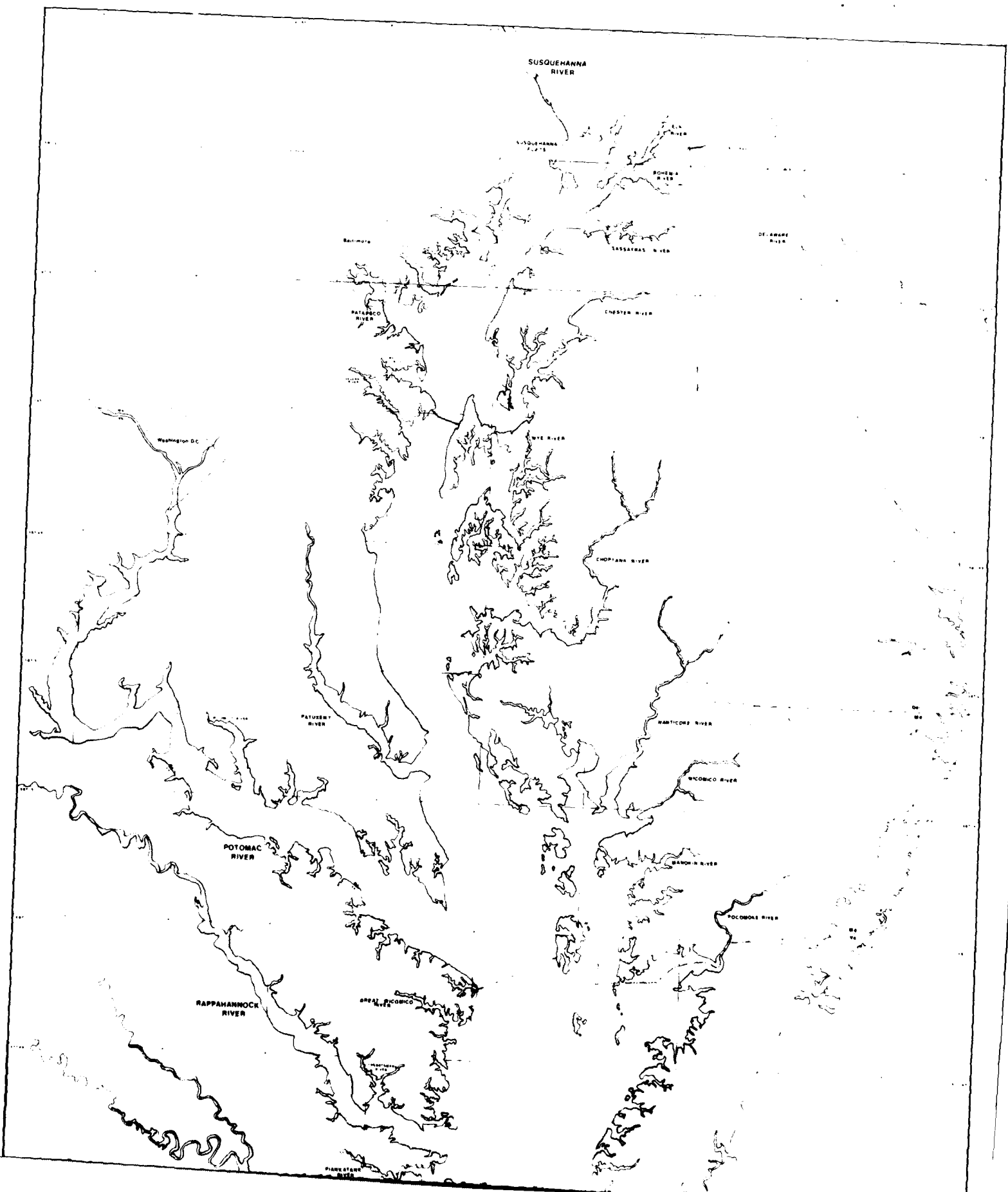


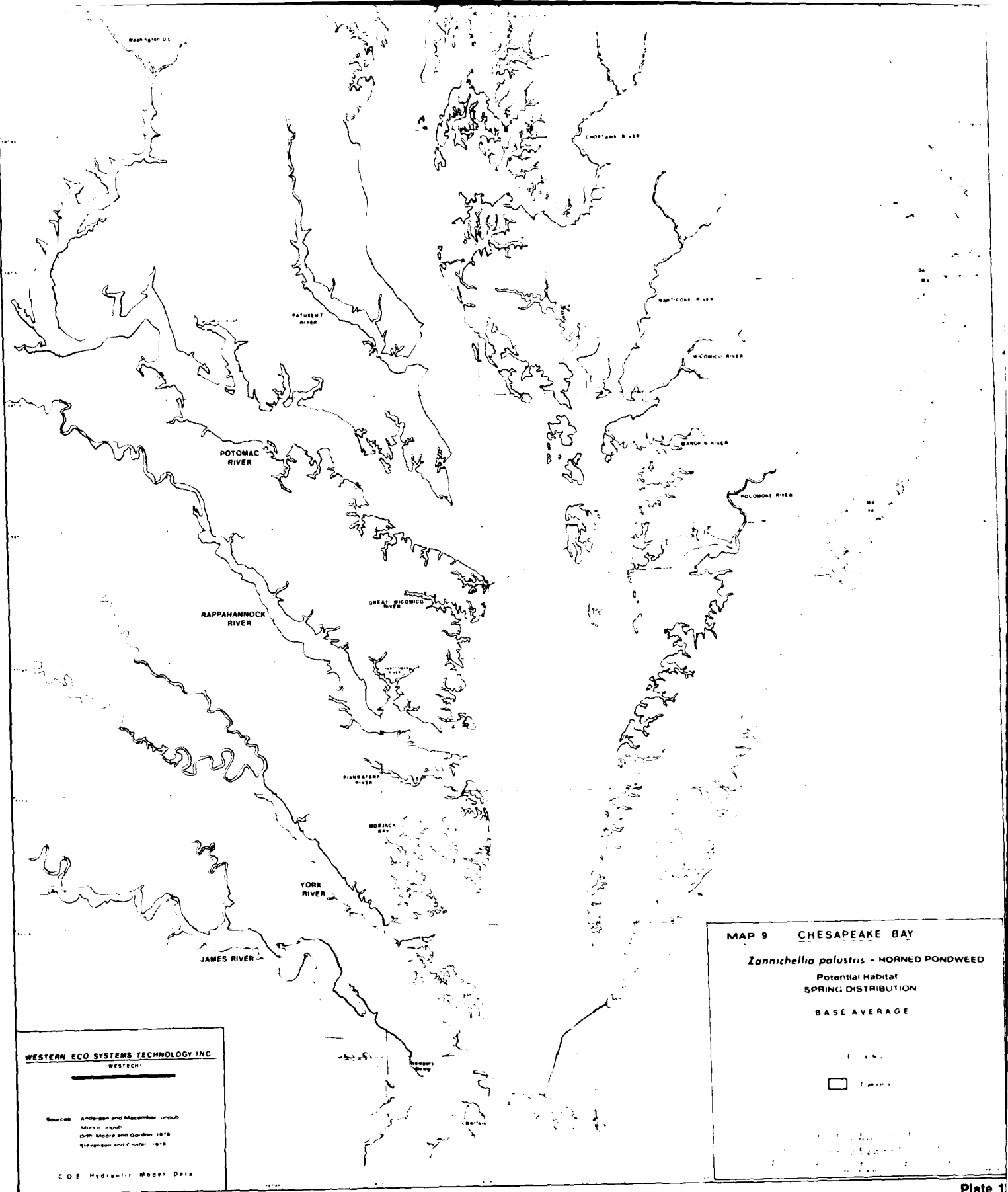


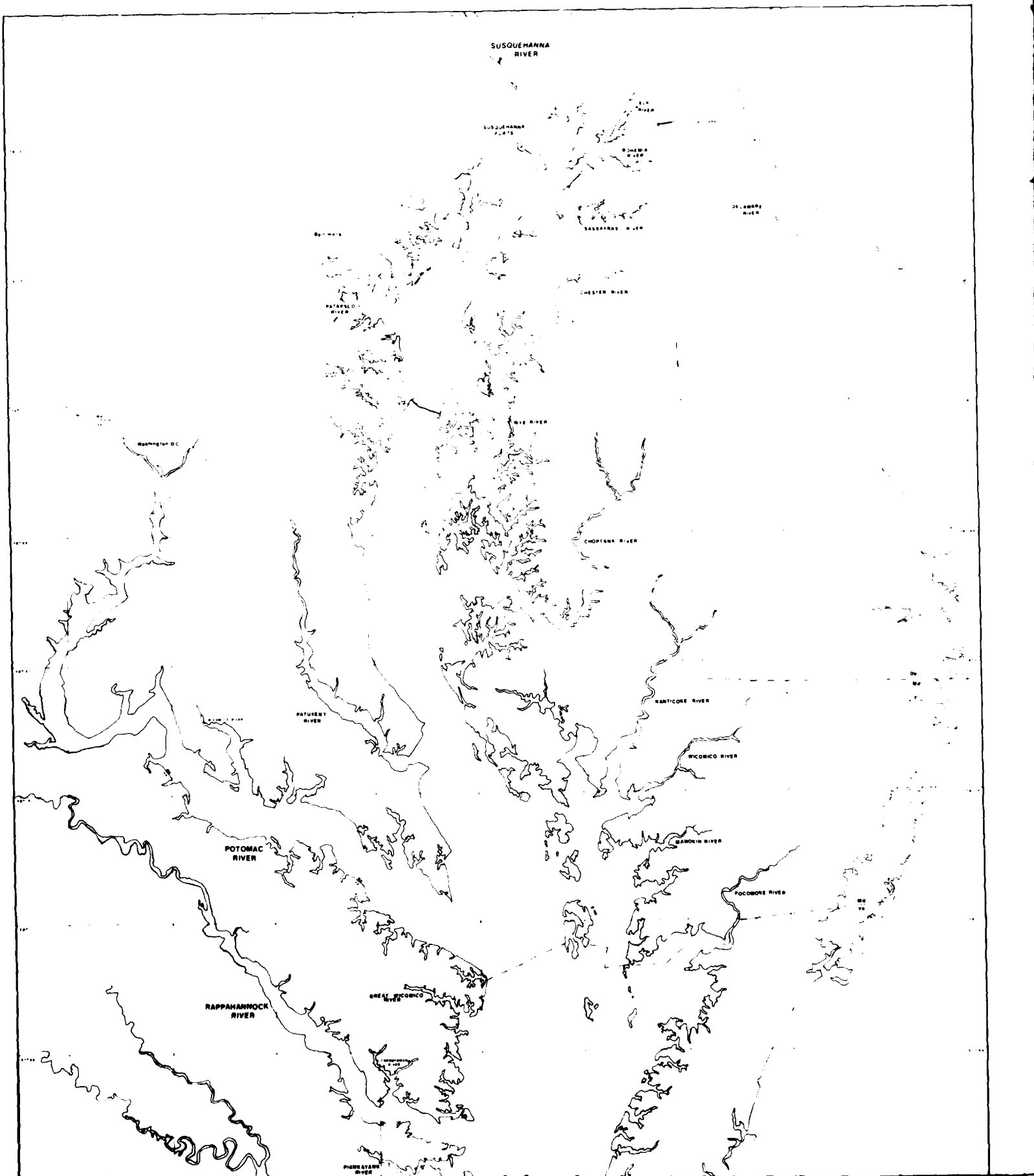




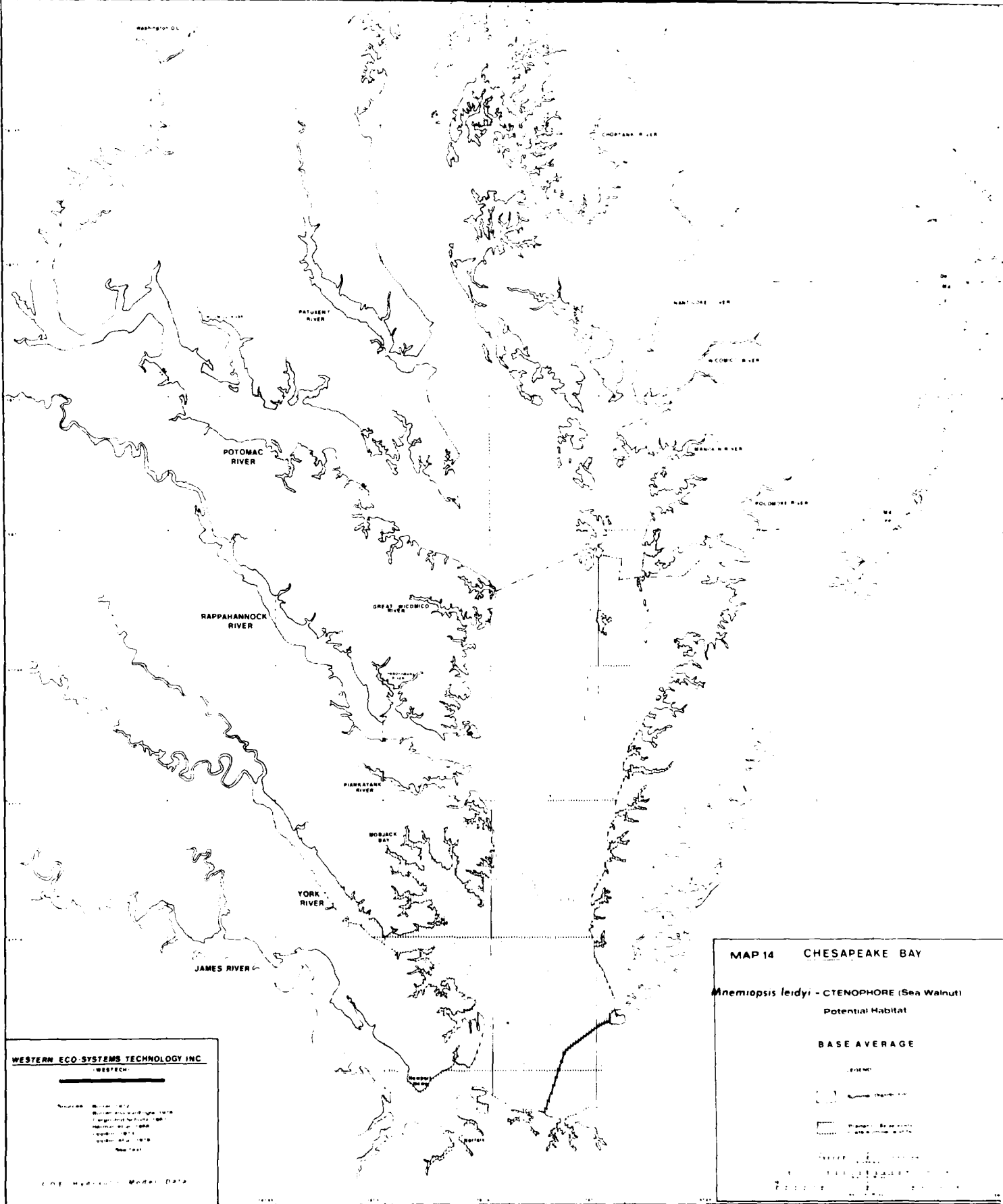












SUSQUEHANNA RIVER

SUSQUEHANNA RIVER

ROCKY MOUNTAIN

DELAWARE RIVER

SASSARATH RIVER

Baltimore

CHESTER RIVER

PATAPSCO RIVER

WYE RIVER

HOPTAN RIVER

NANTICORE RIVER

WICOMICO RIVER

MANON RIVER

POCOMORE RIVER

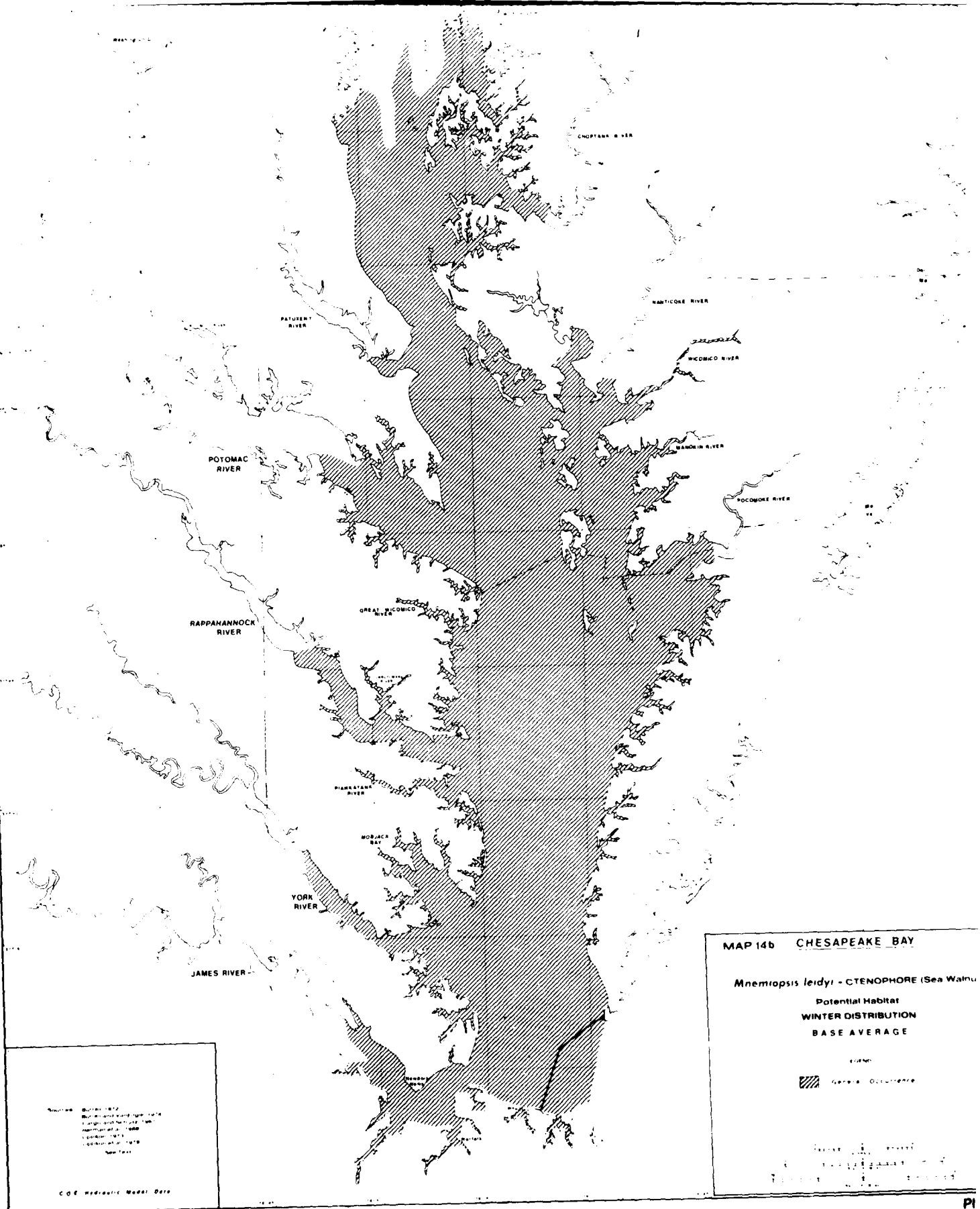
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RAPPAHANNOCK RIVER

GREY RIVER

PIANSTATON RIVER





SUSQUEHANNA RIVER

SUSQUEHANNA PLATS

ELA RIVER

ROHEIA RIVER

DELAWARE RIVER

SASSAPARAS RIVER

BALTIMORE

PATAPSCO RIVER

CHESTER RIVER

WYE RIVER

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PATUXENT RIVER

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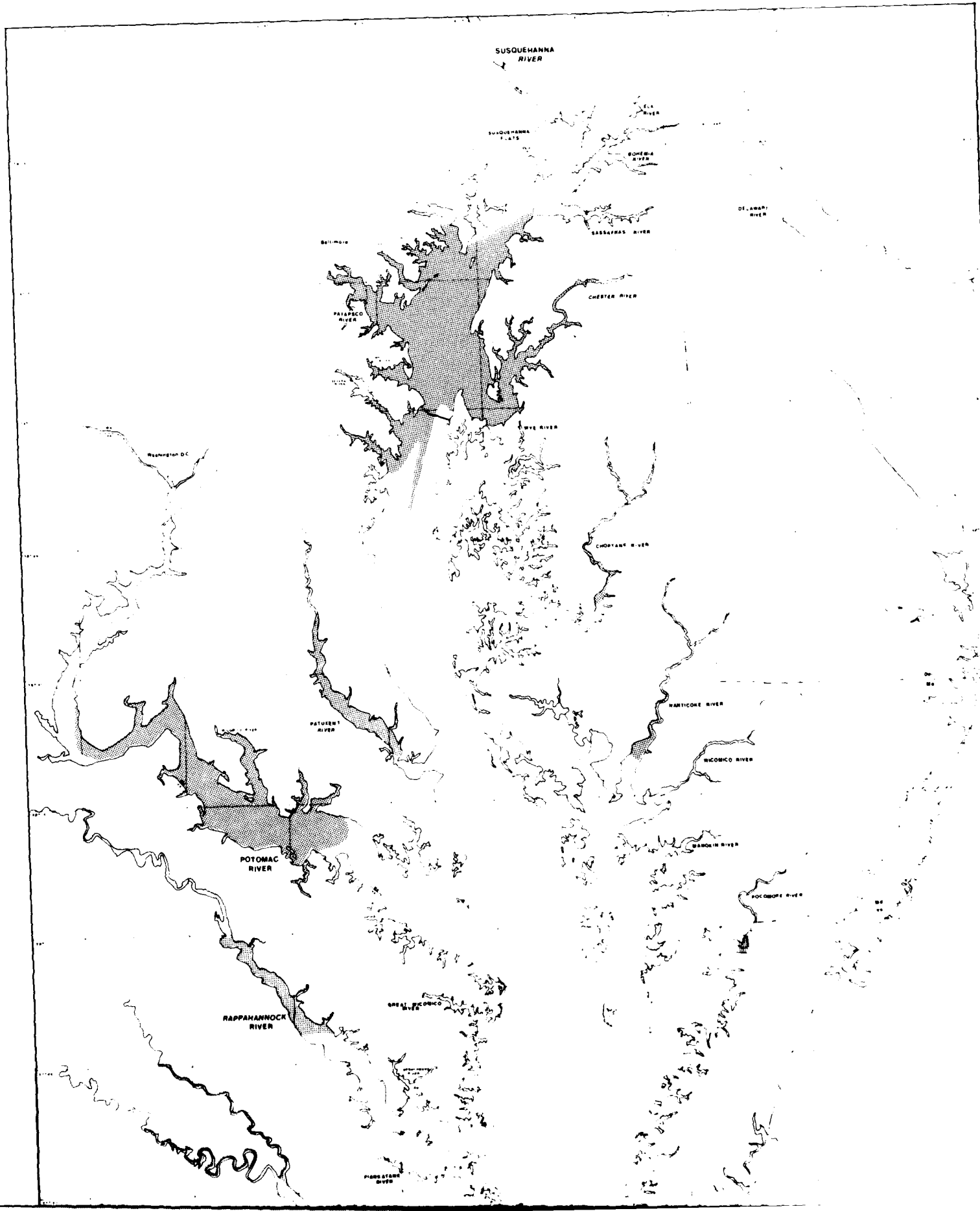
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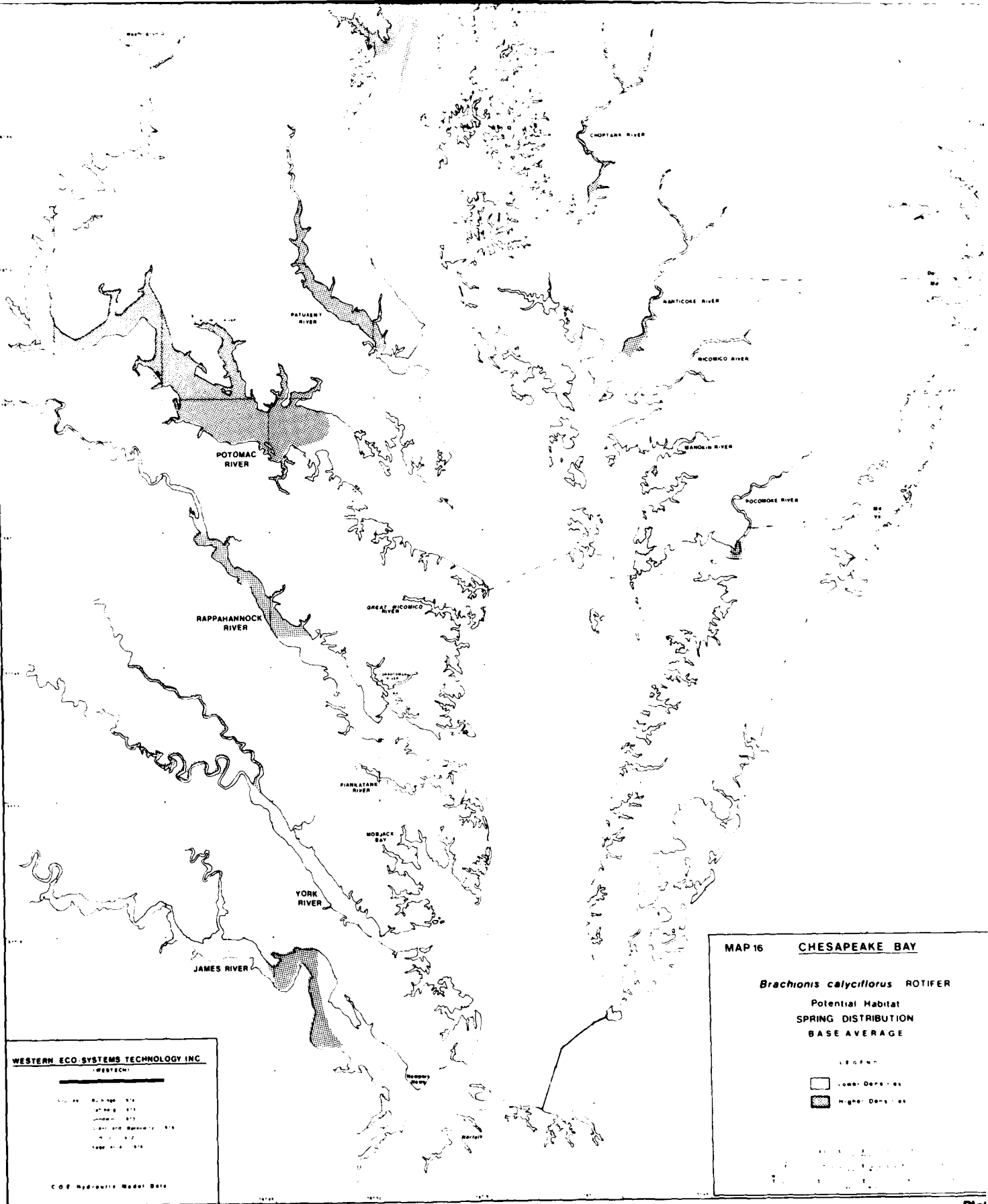
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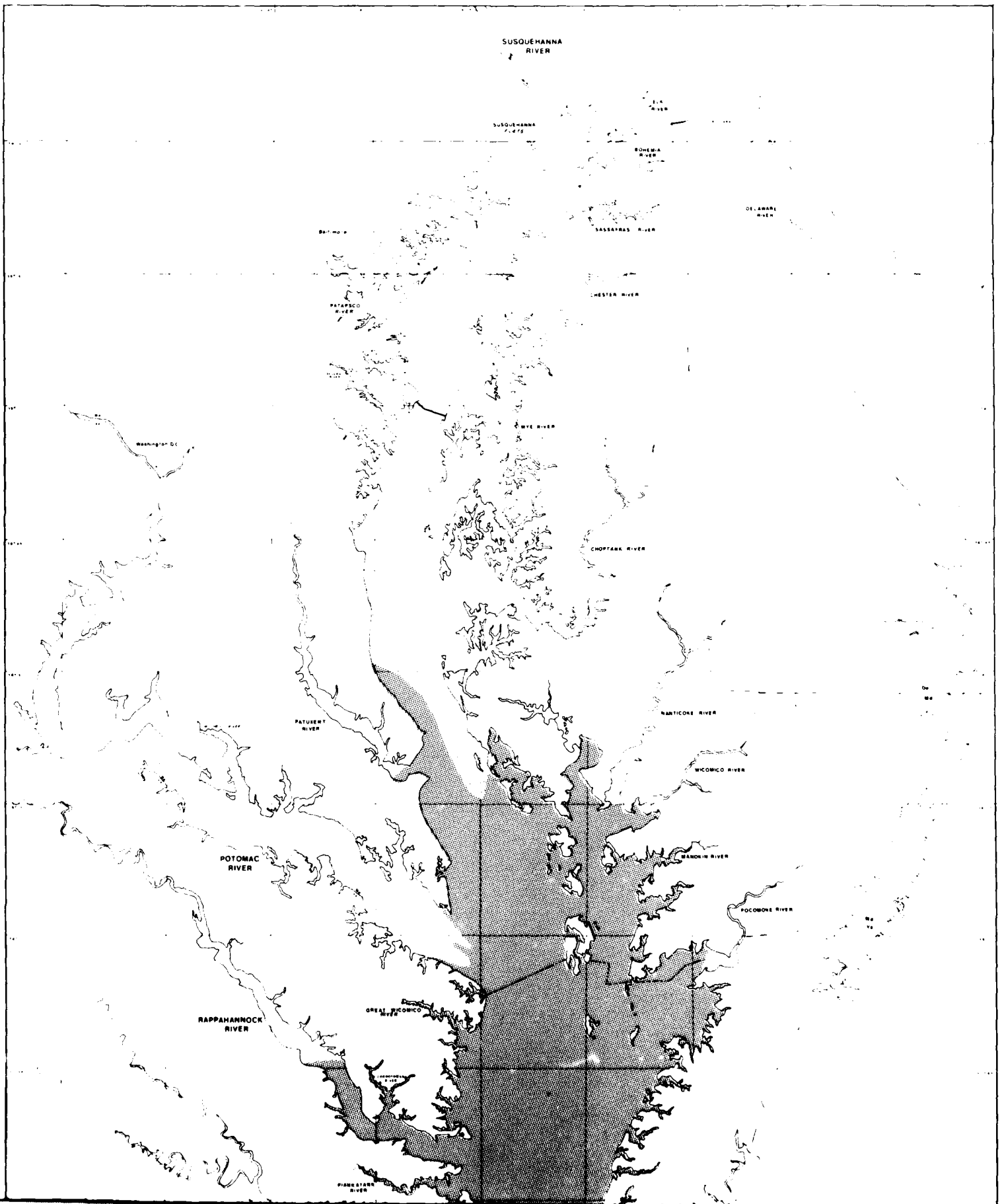
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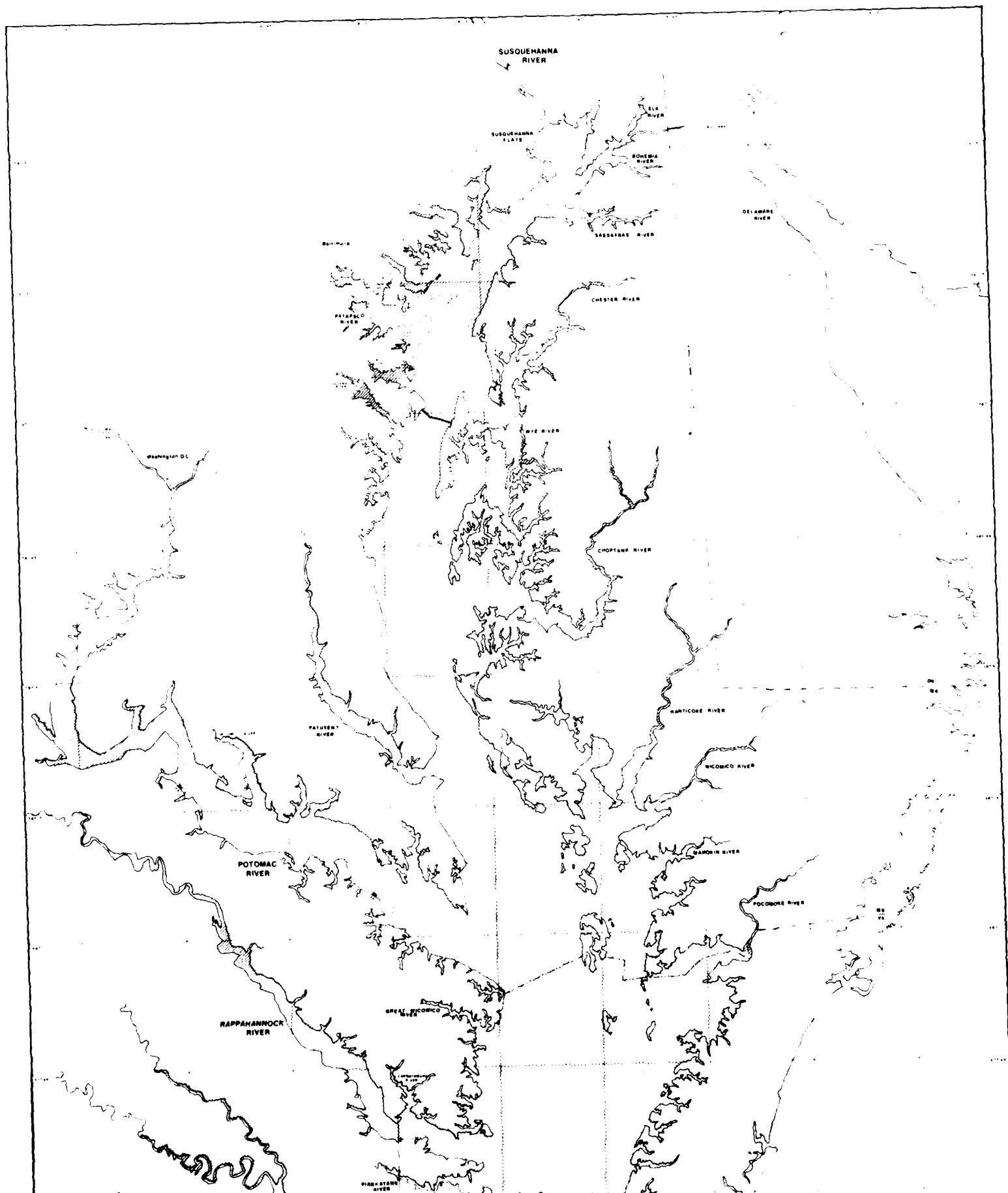
SHENANDOAH RIVER

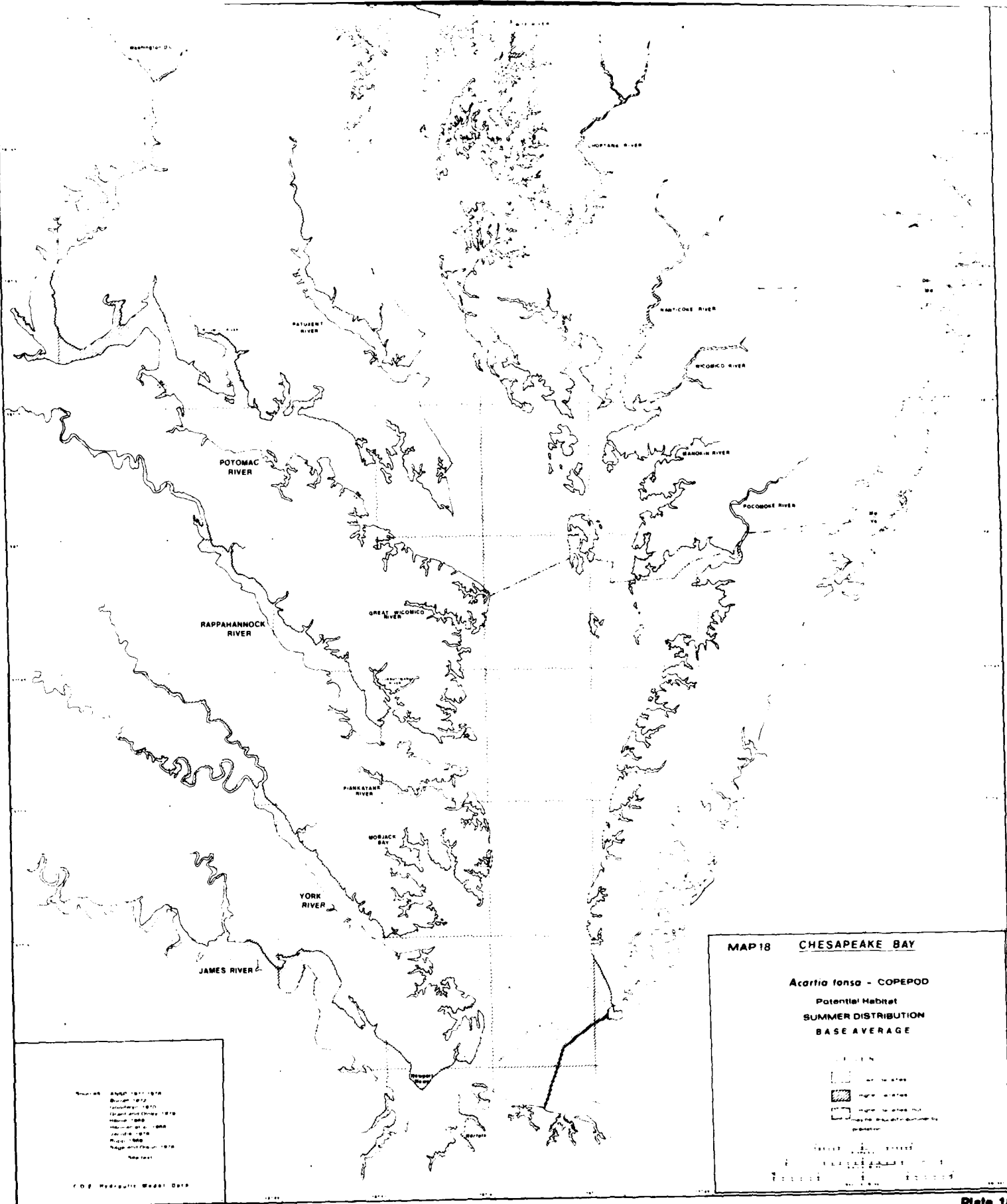
PIKE RIVER

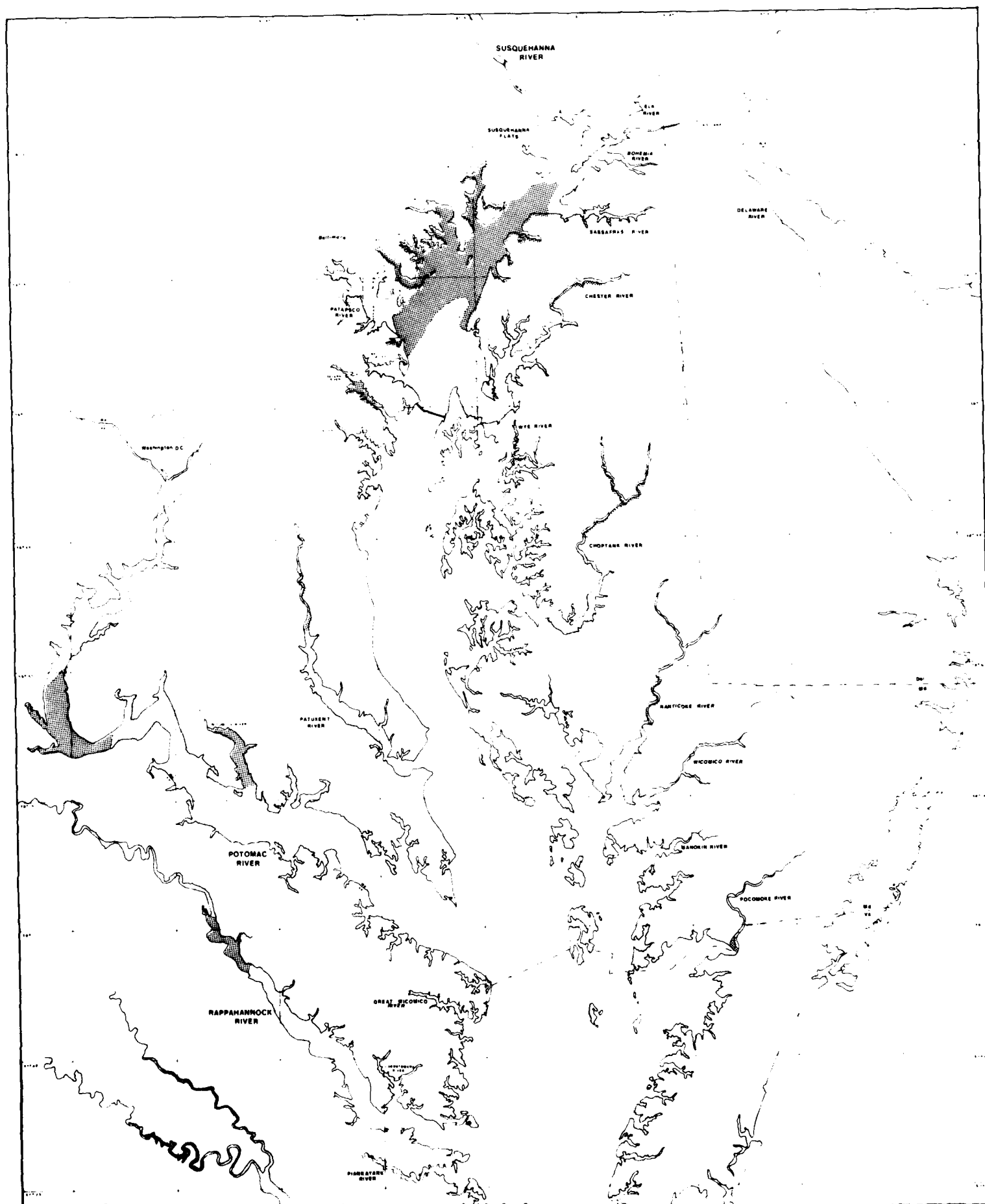


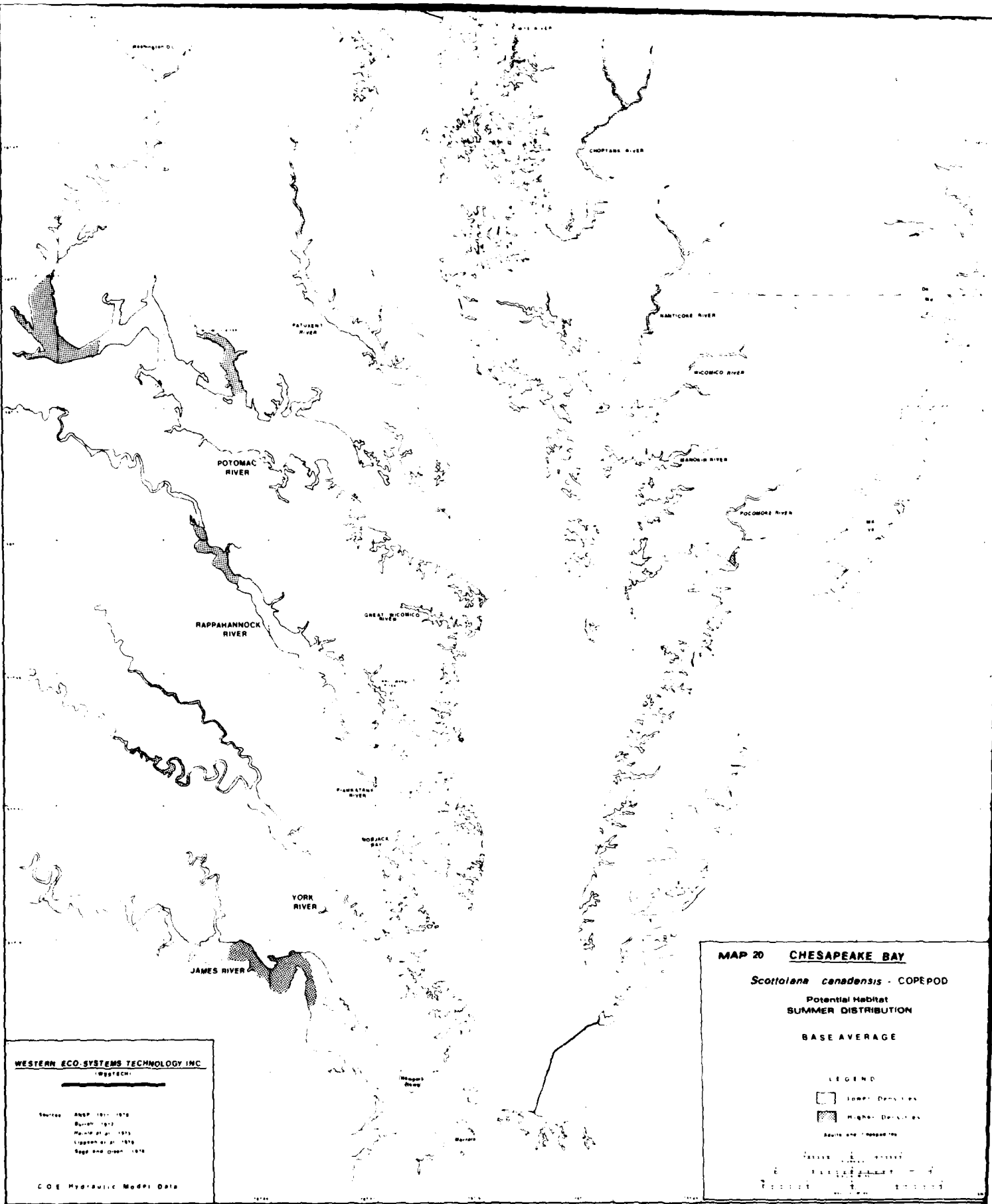


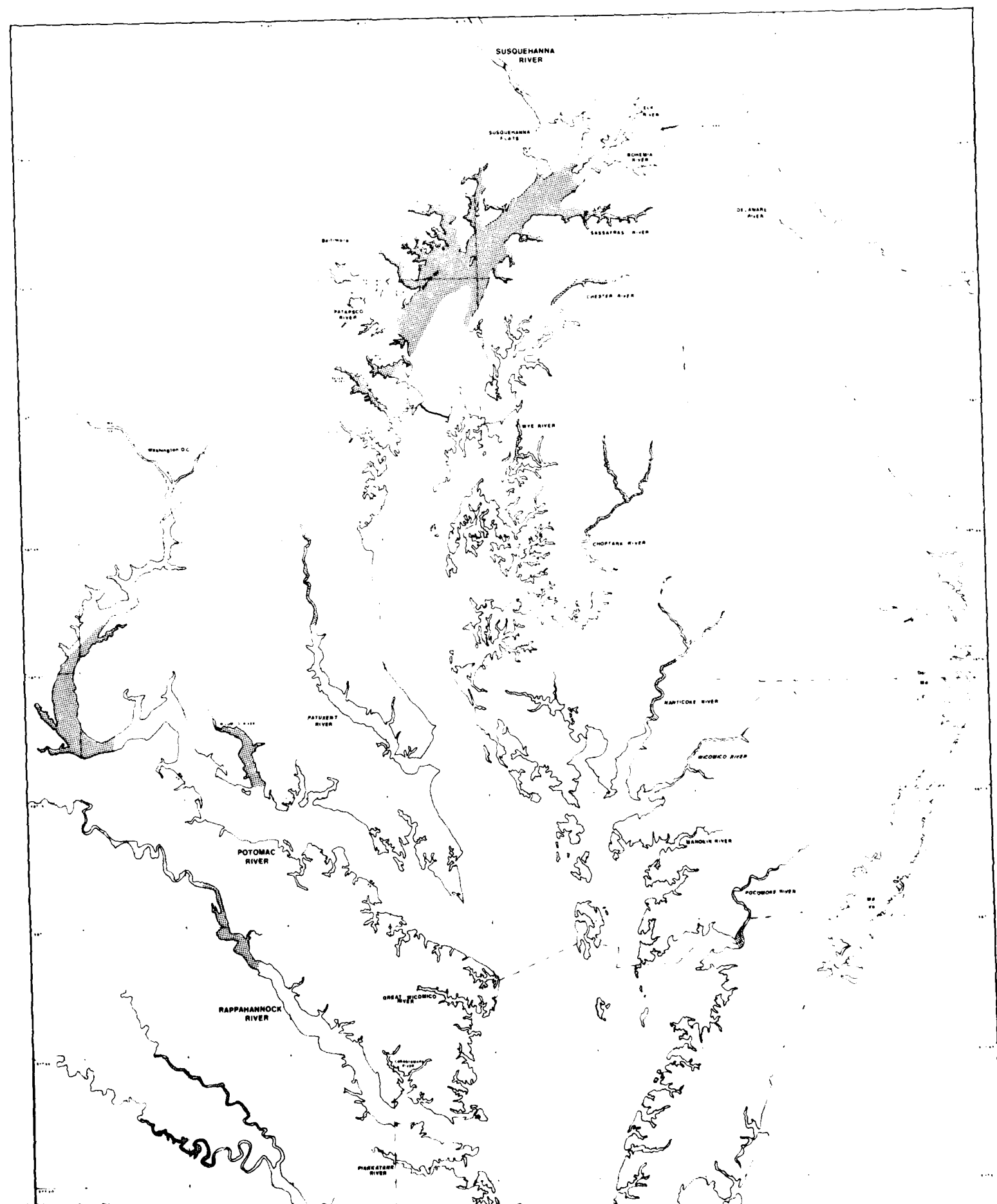


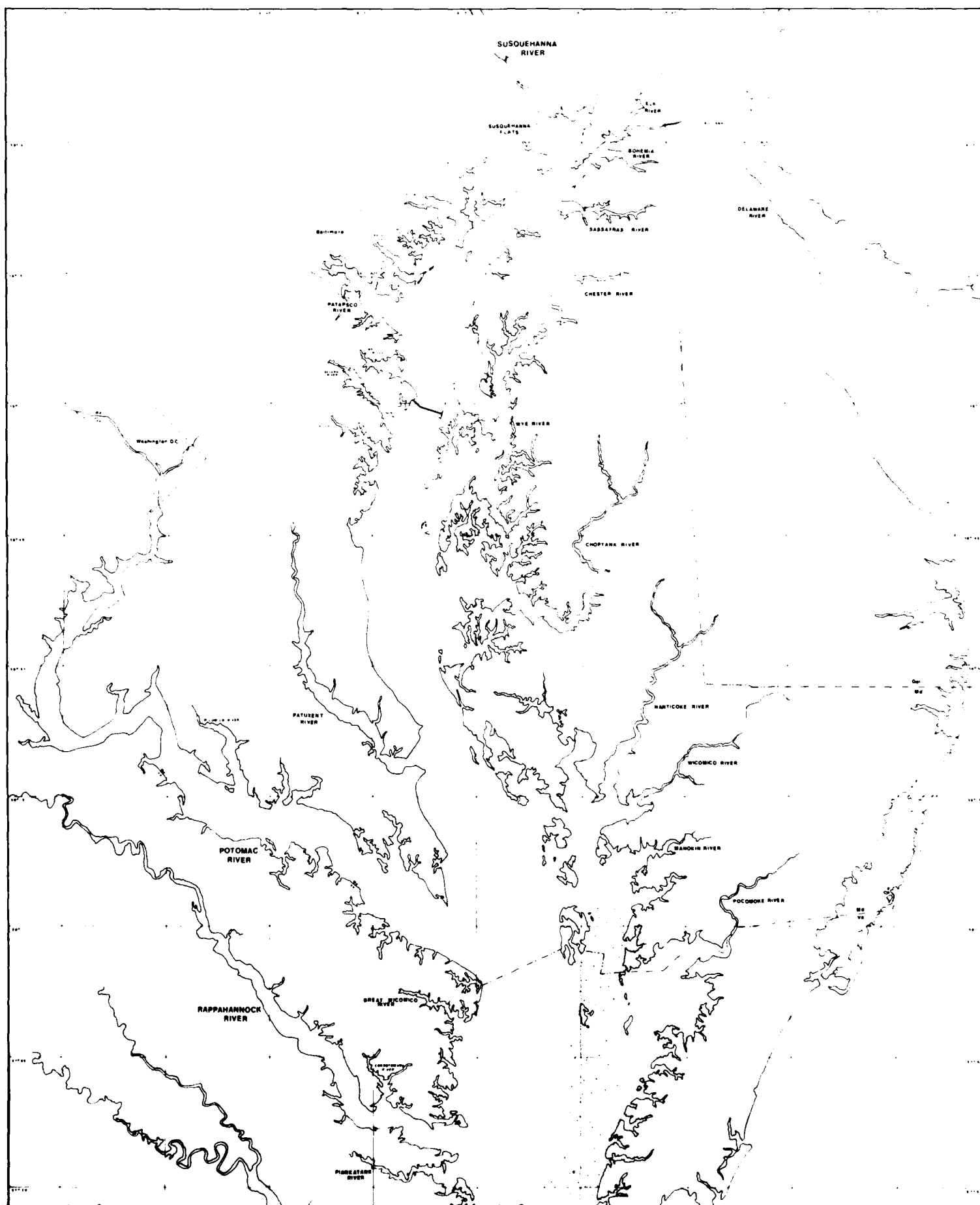


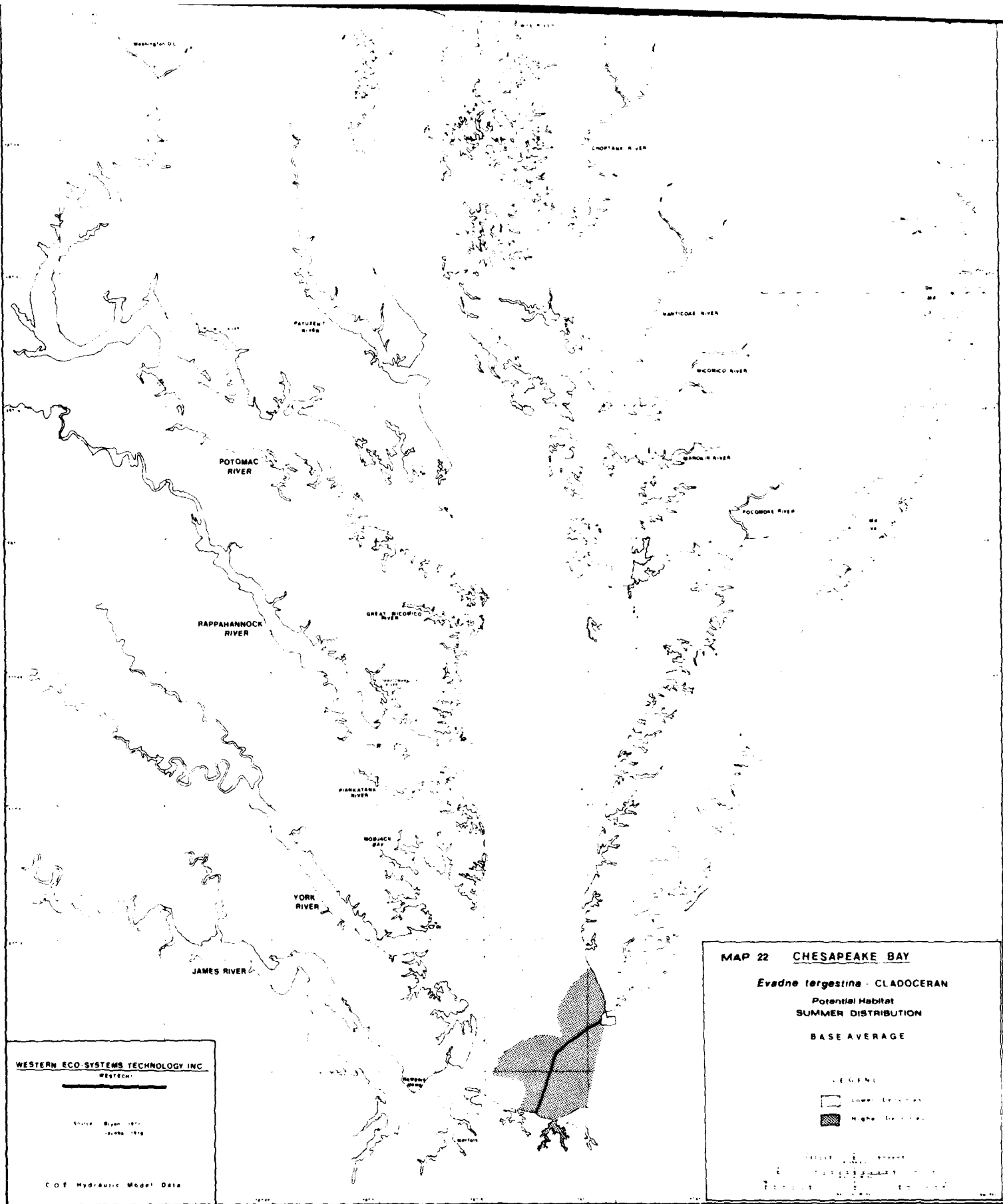


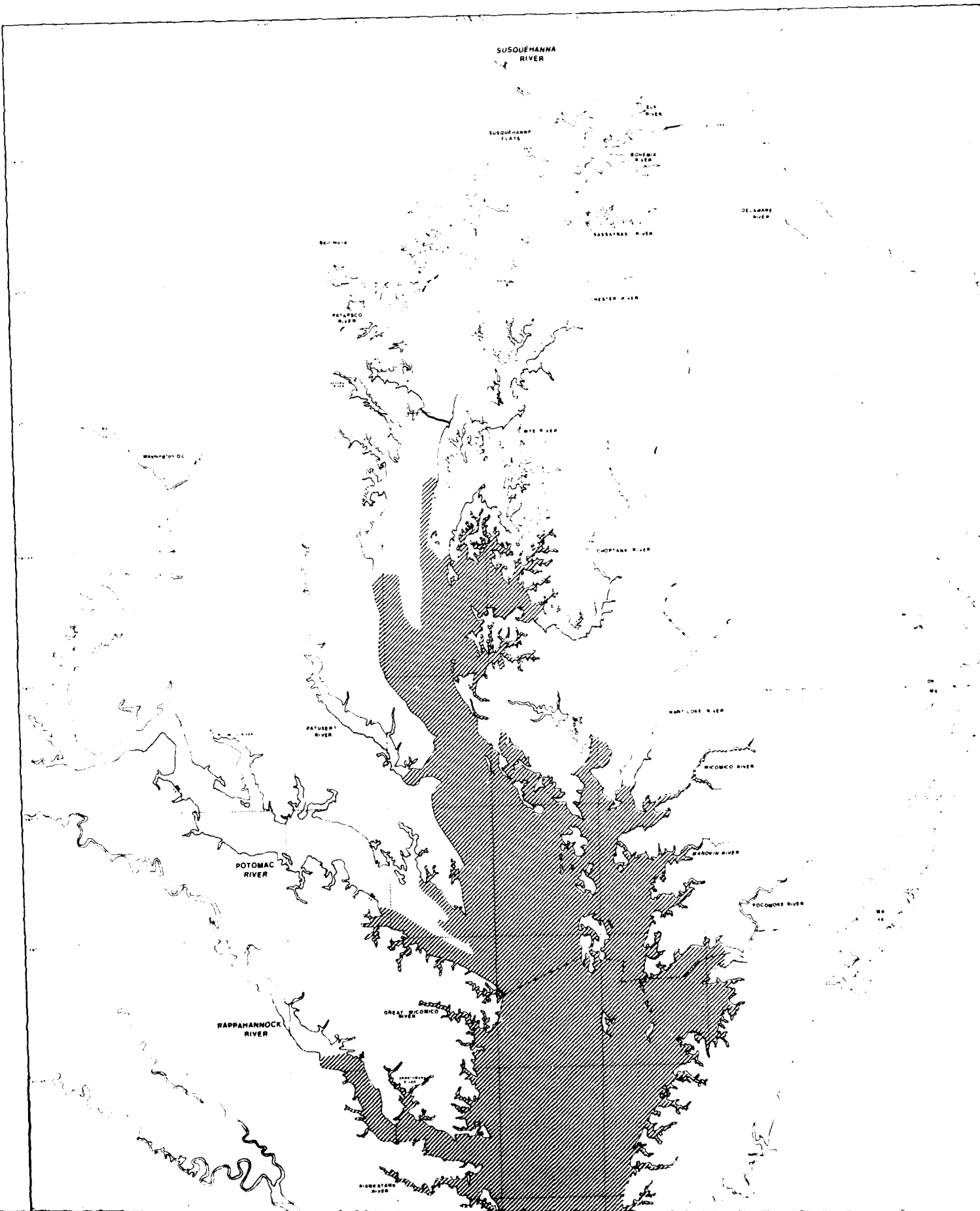


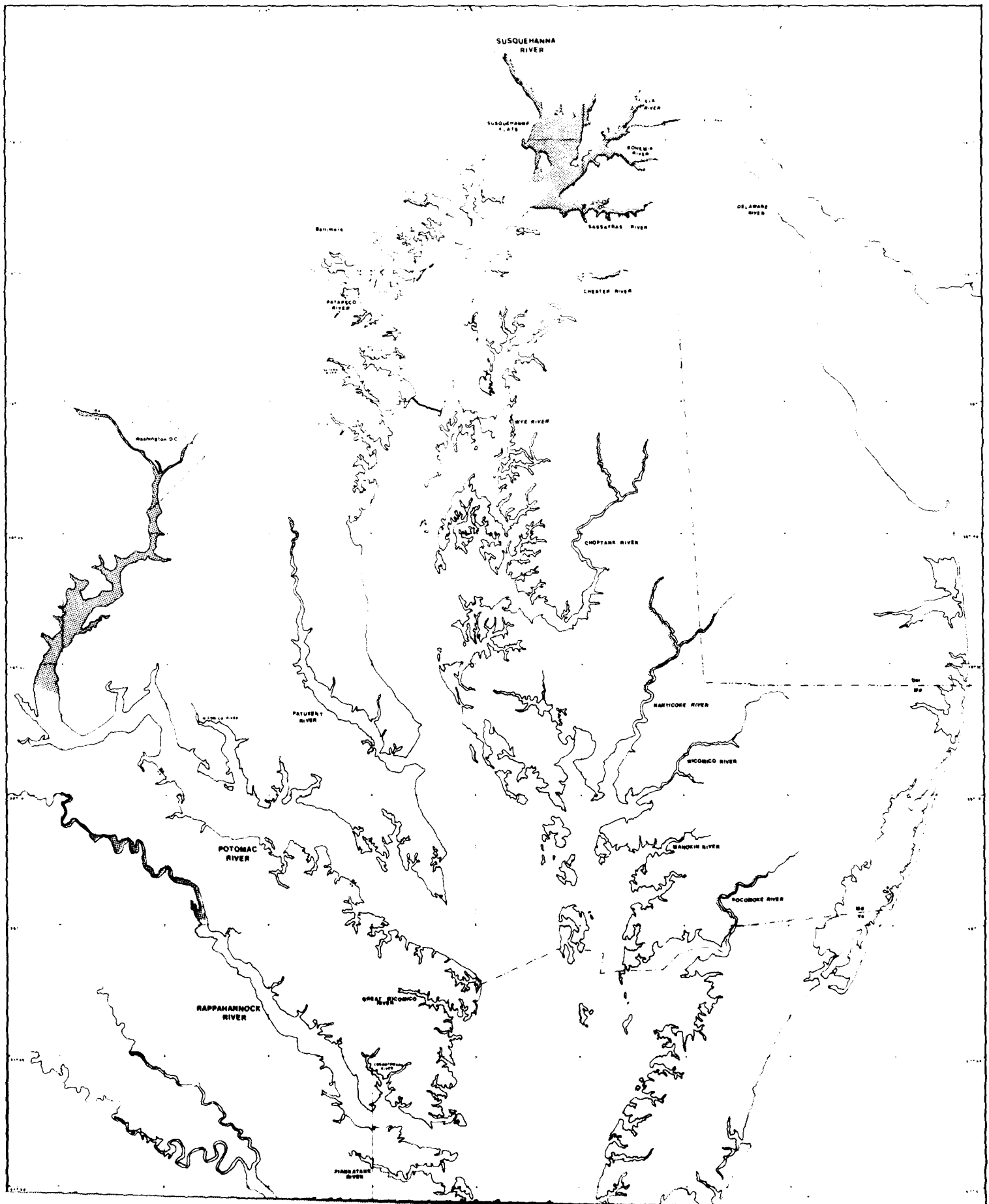


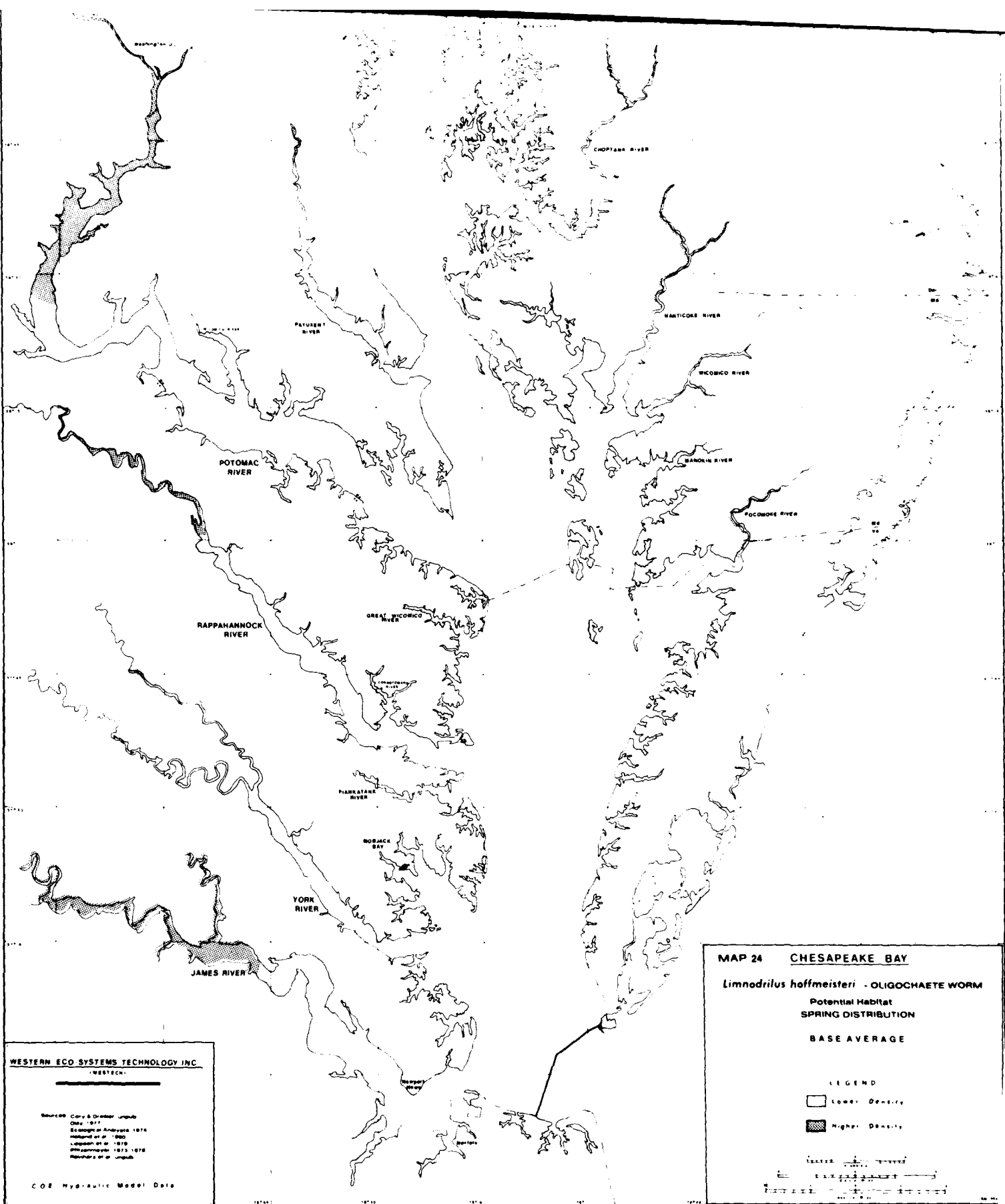


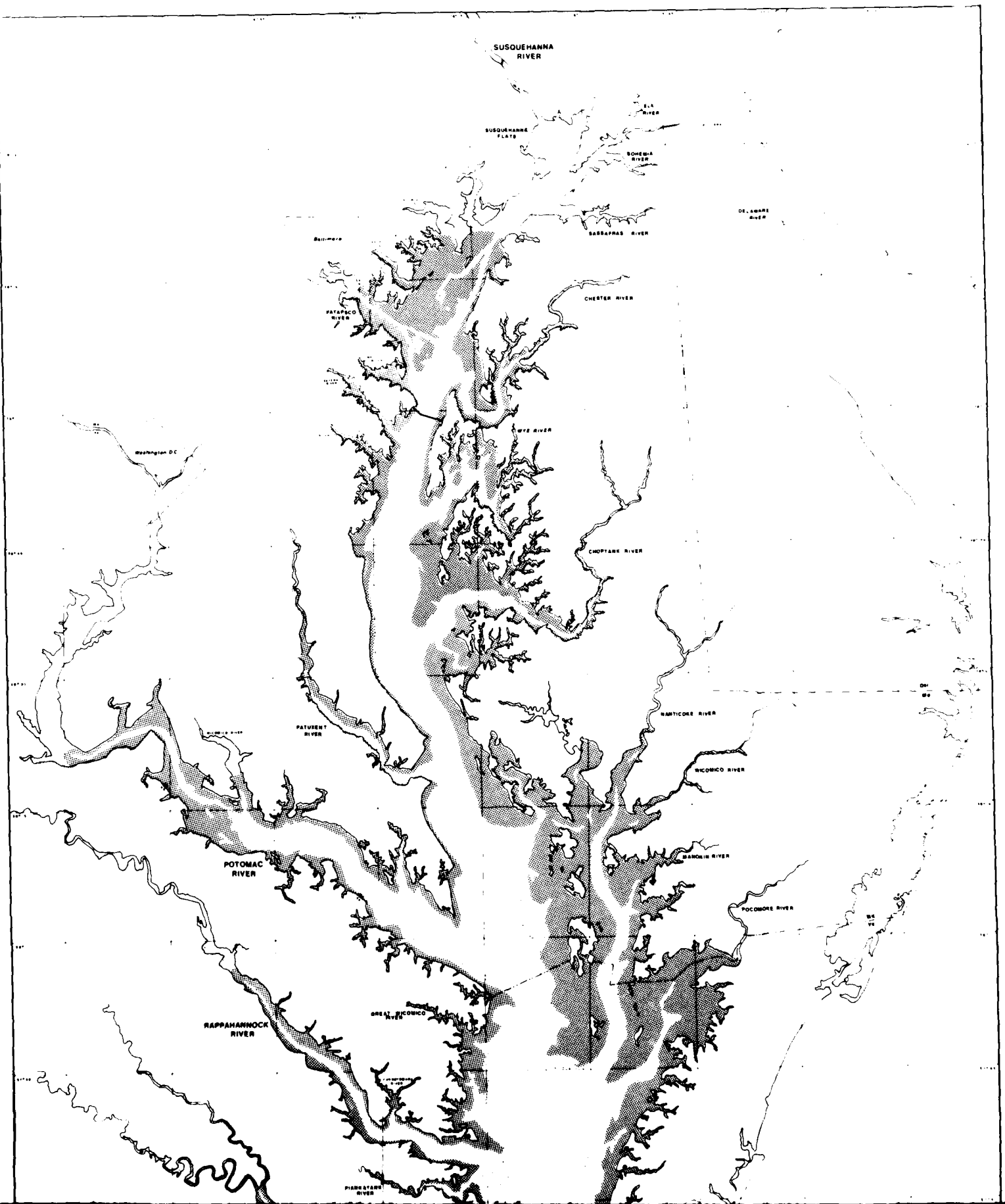












SUSQUEHANNA
RIVER

SUSQUEHANNA
PLATE

ELK
RIVER

BOHEMIA
RIVER

DELAWARE
RIVER

SASSARAS RIVER

CHESTER RIVER

PATAPSCO
RIVER

WYE RIVER

CHOPTANK RIVER

WASHINGTON DC

PATUXENT
RIVER

ANTICOSTA RIVER

WICOMICO RIVER

POTOMAC
RIVER

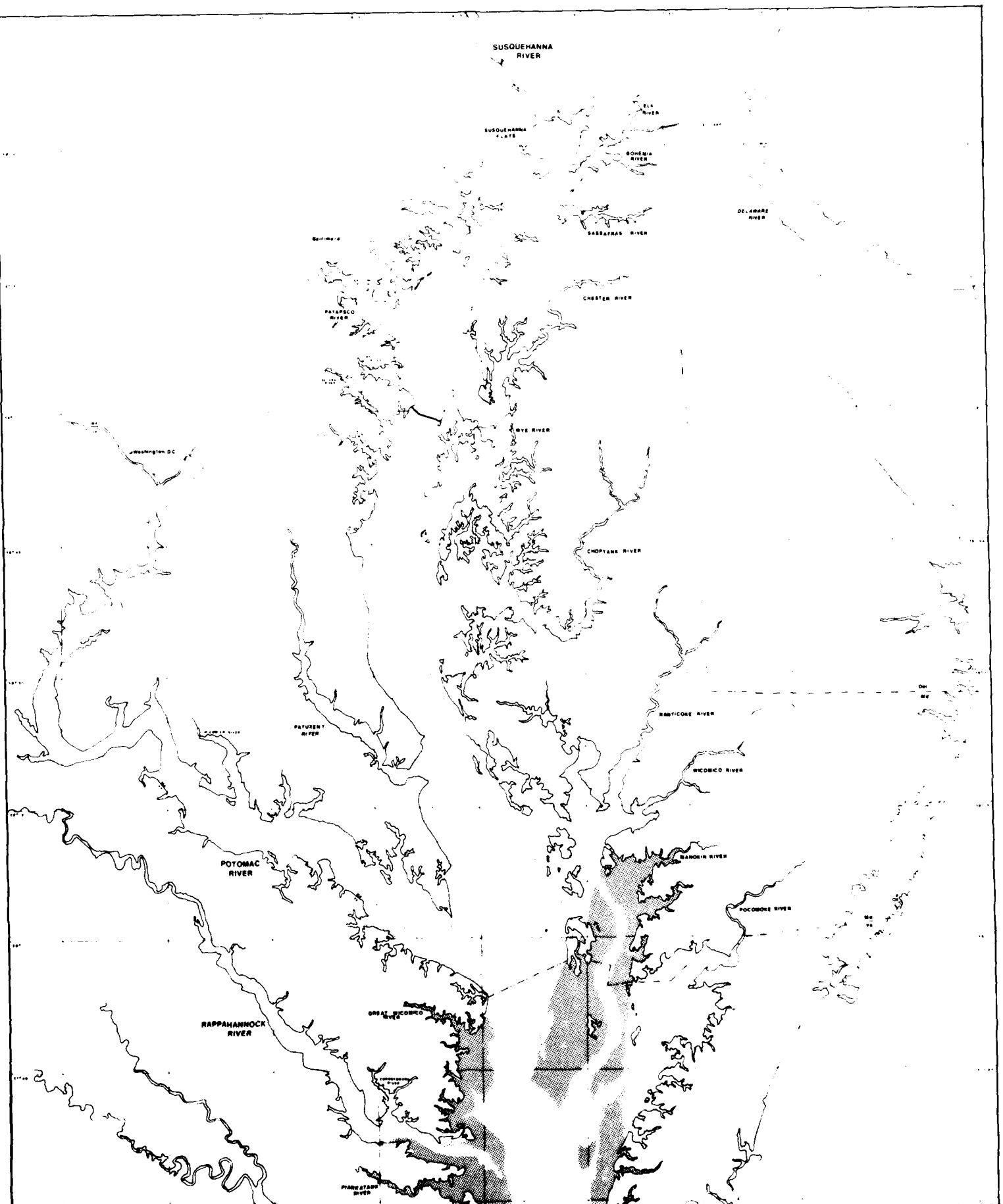
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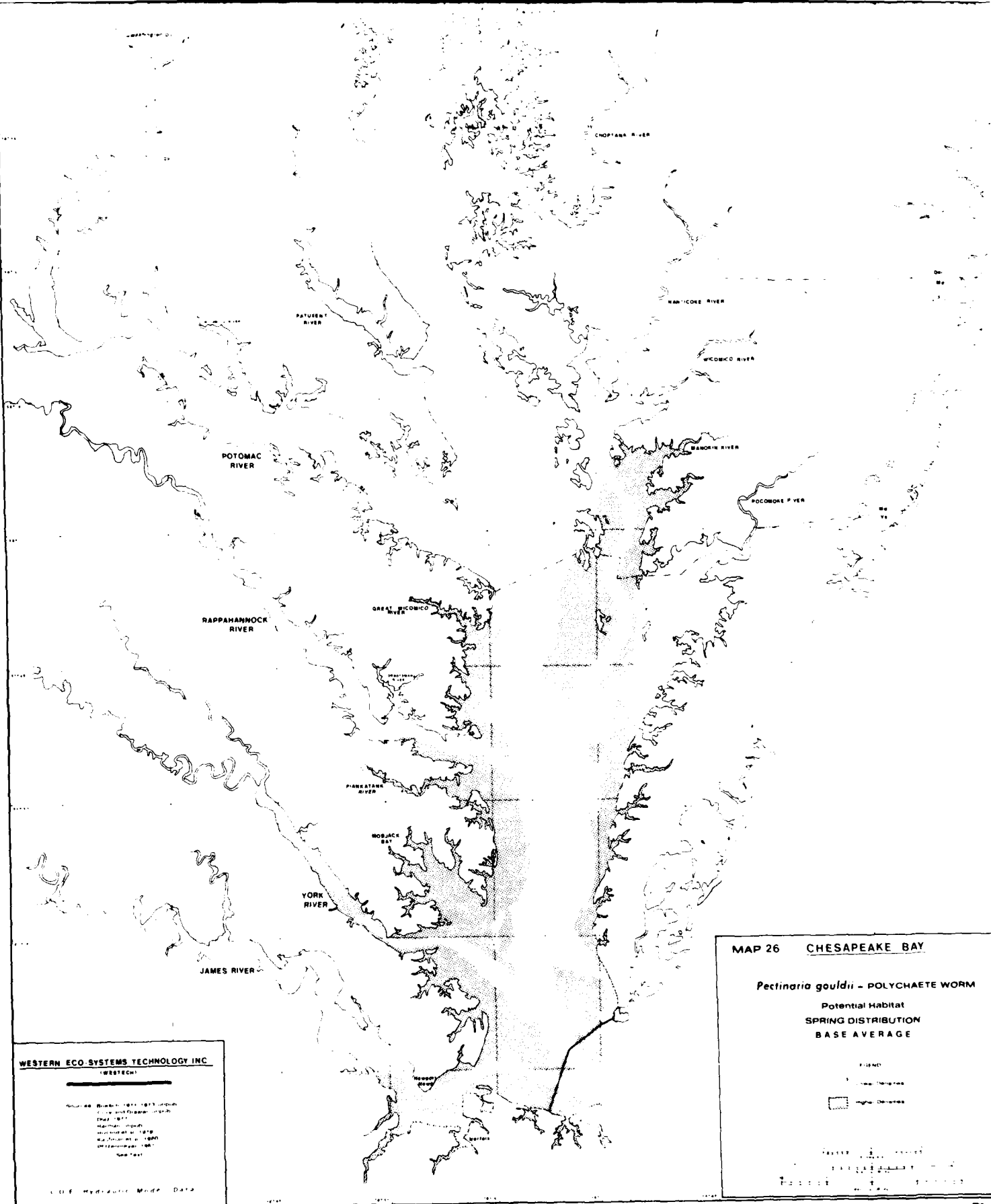
POCONO RIVER

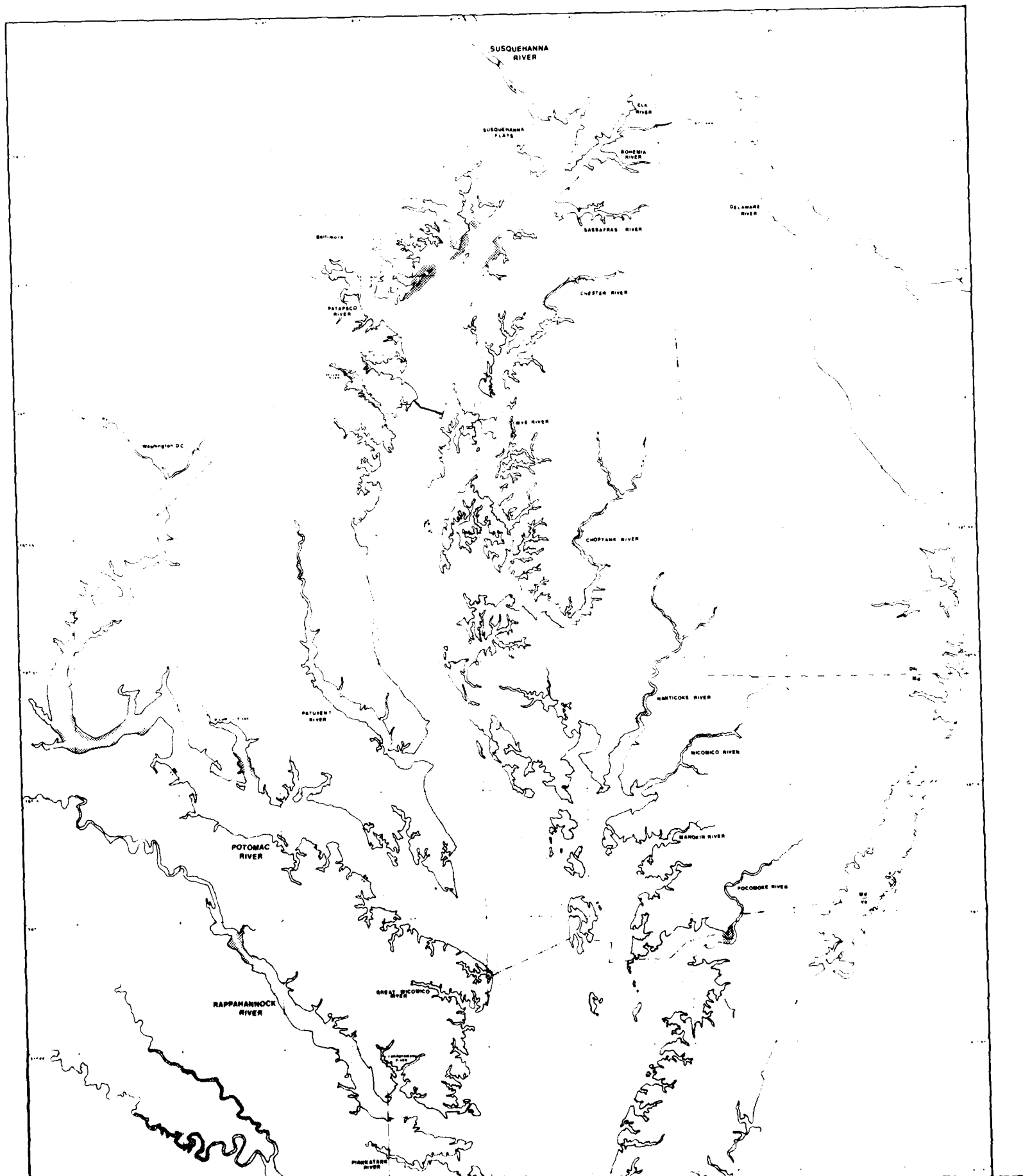
RAPPAHANNOCK
RIVER

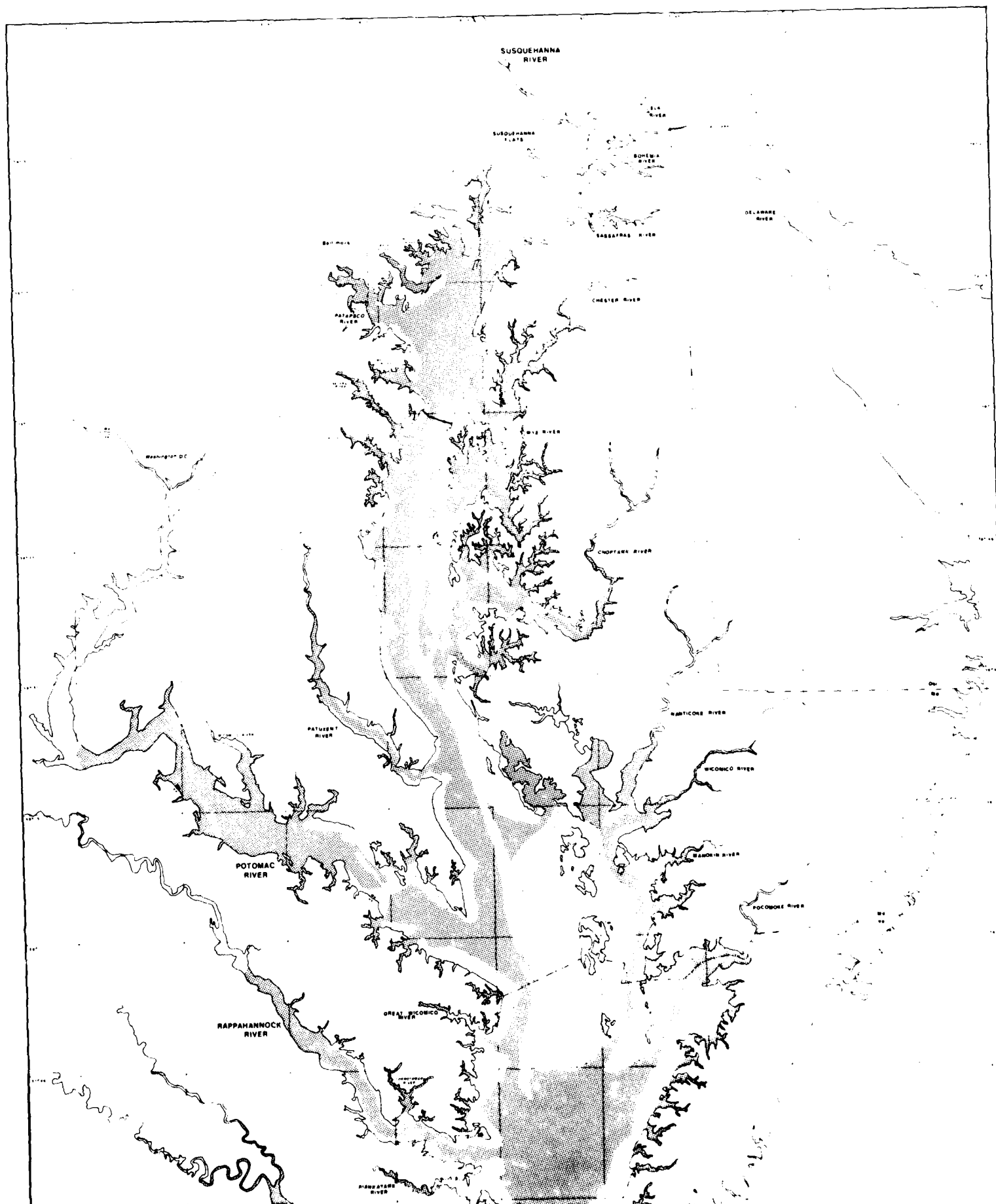
ORAL WICOMICO
RIVER

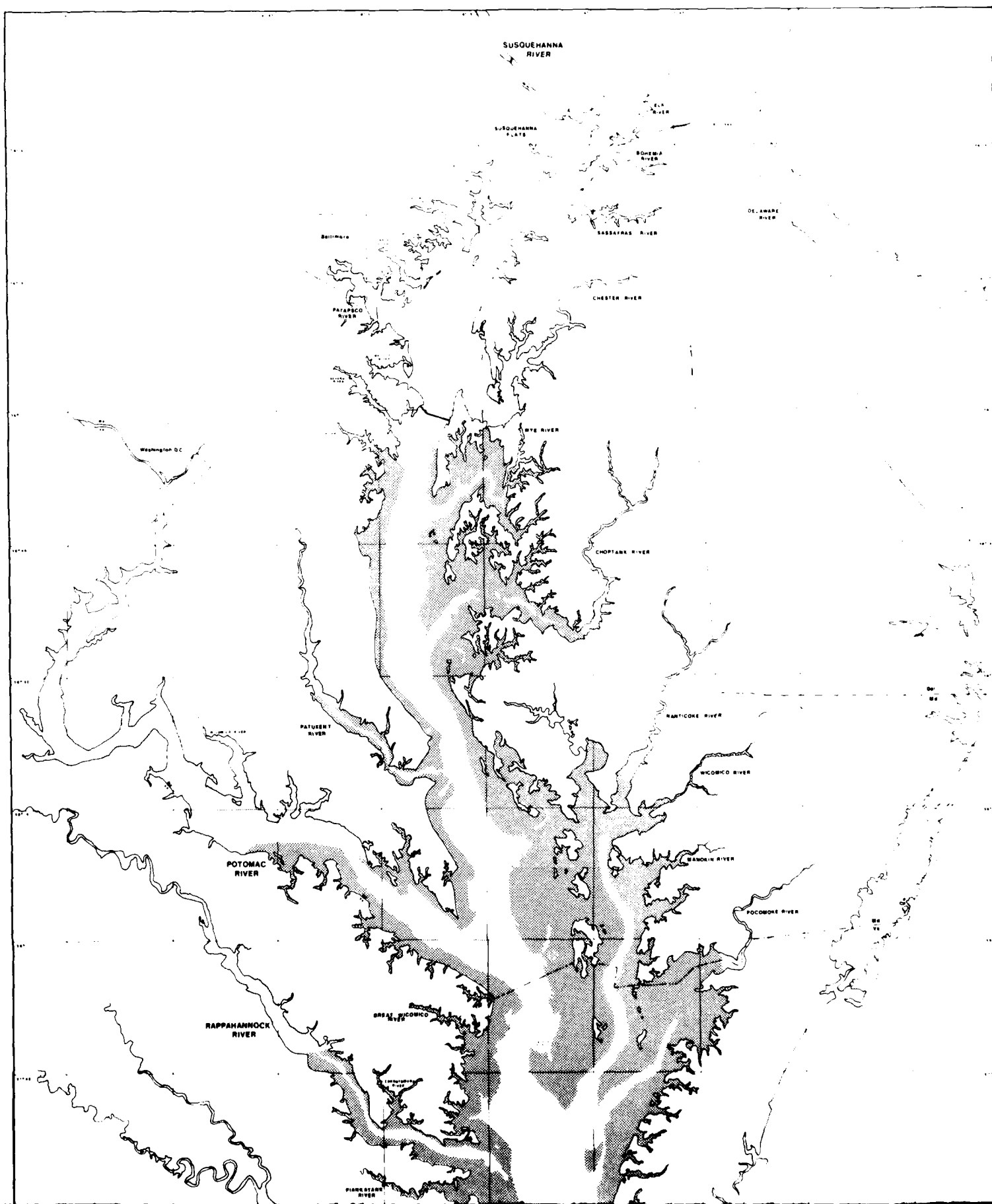
PIKE STAR
RIVER

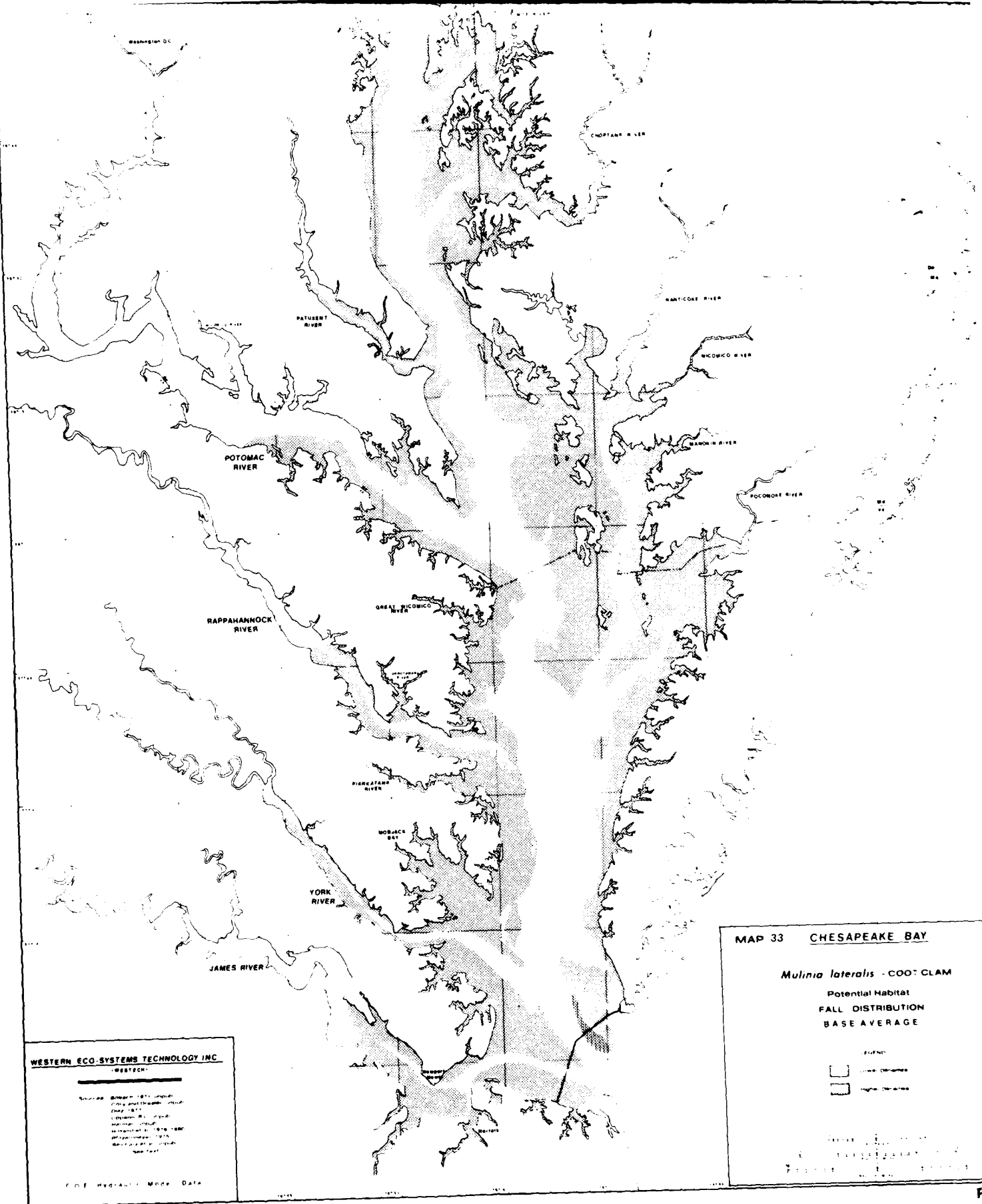


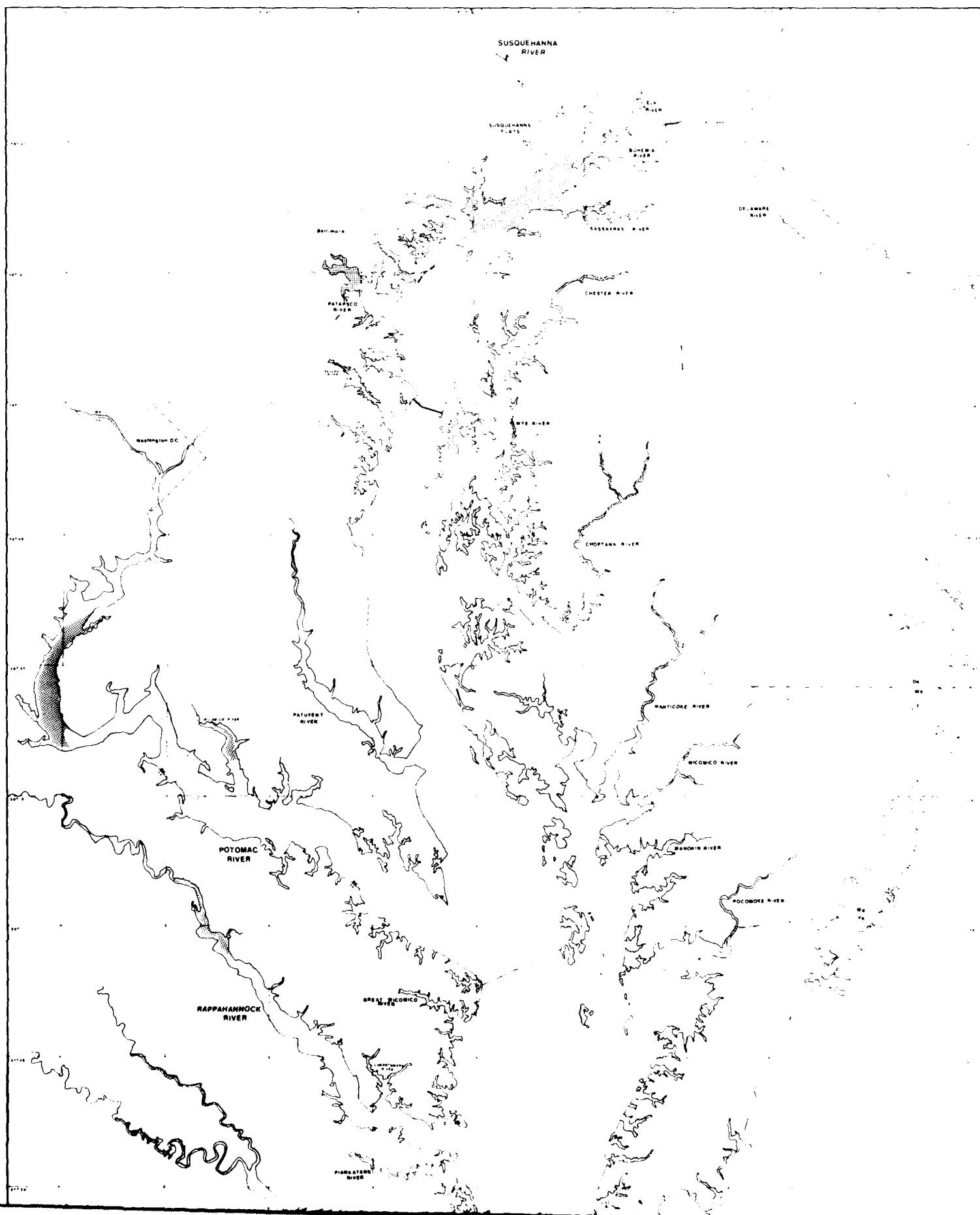


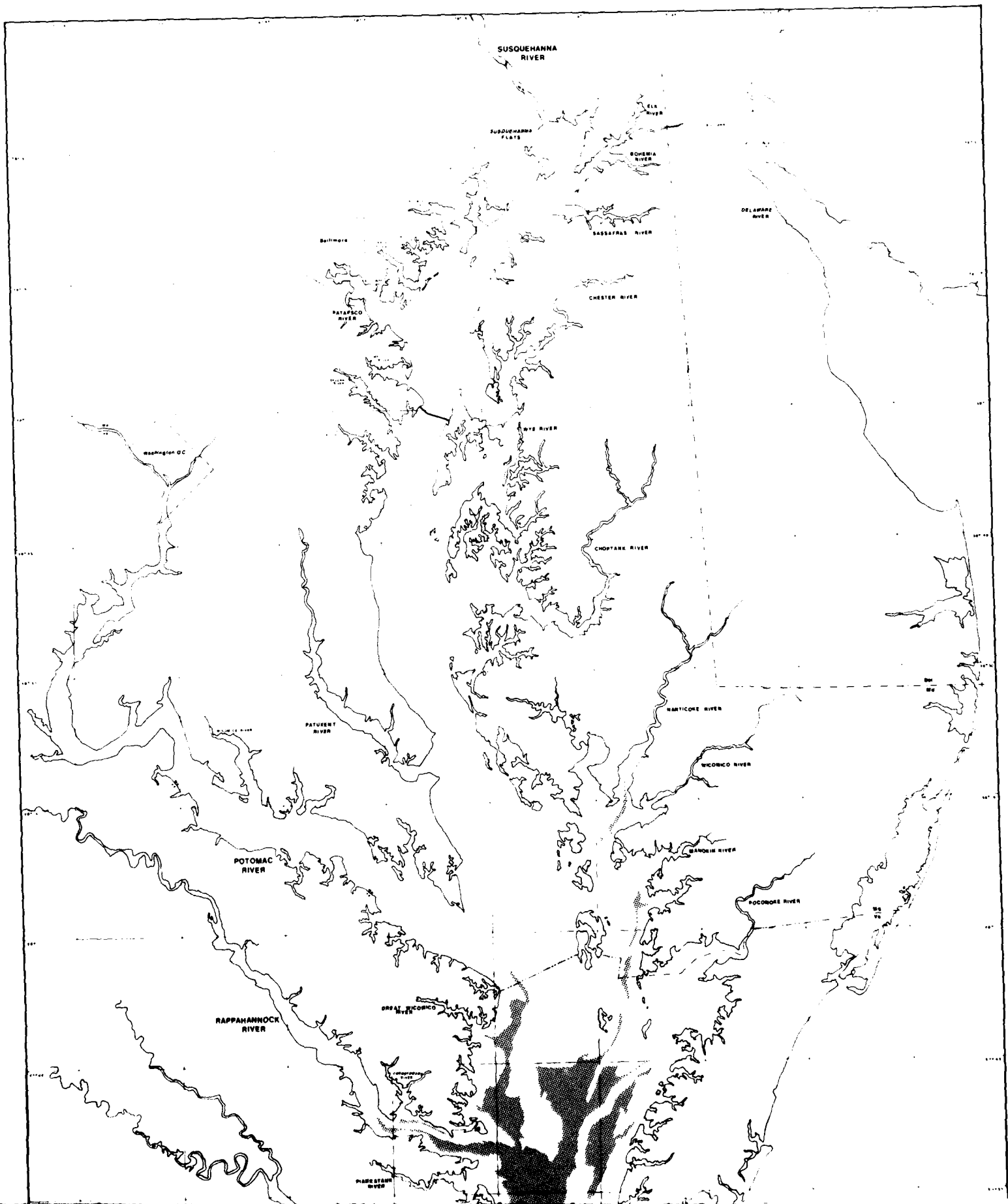


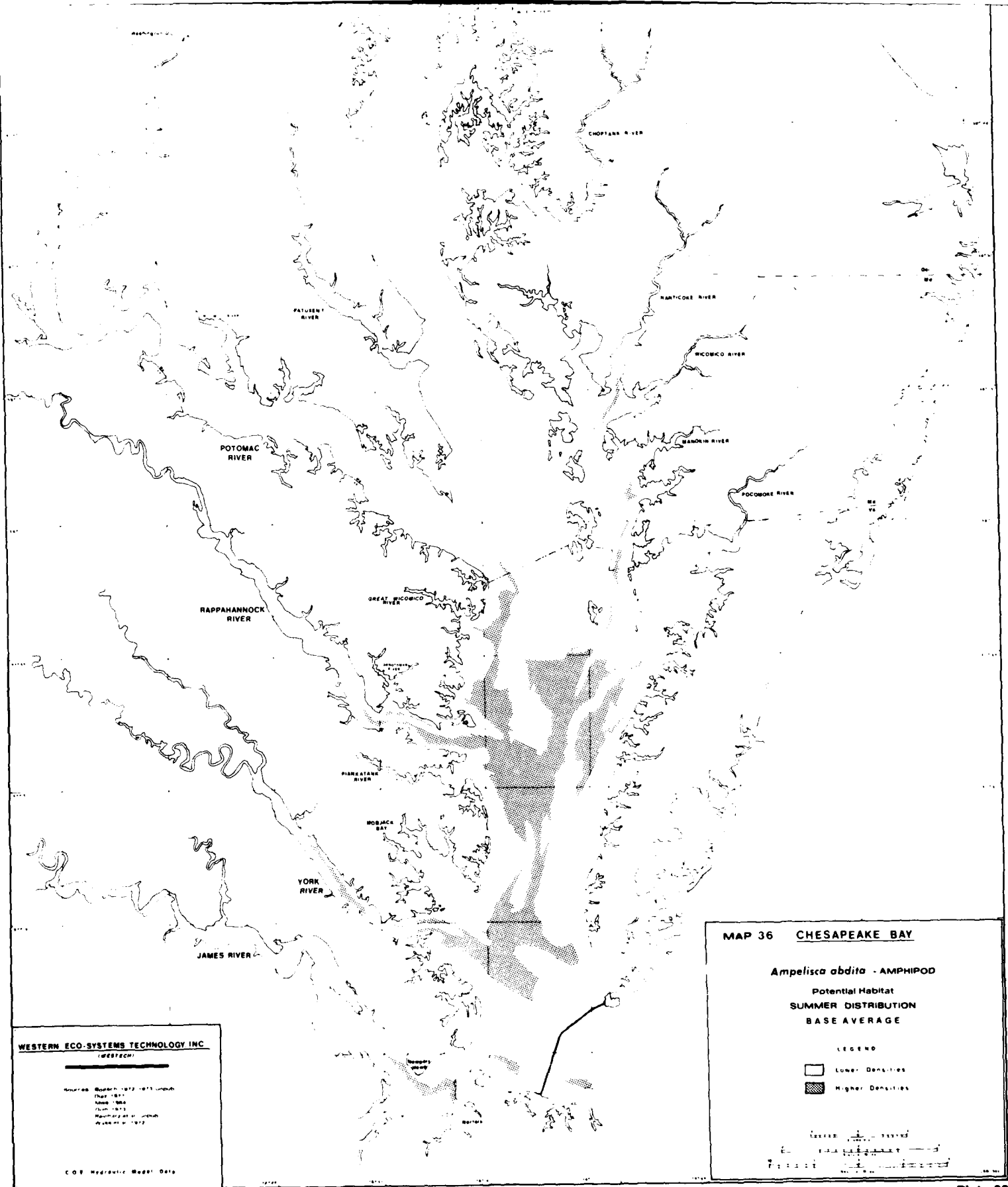


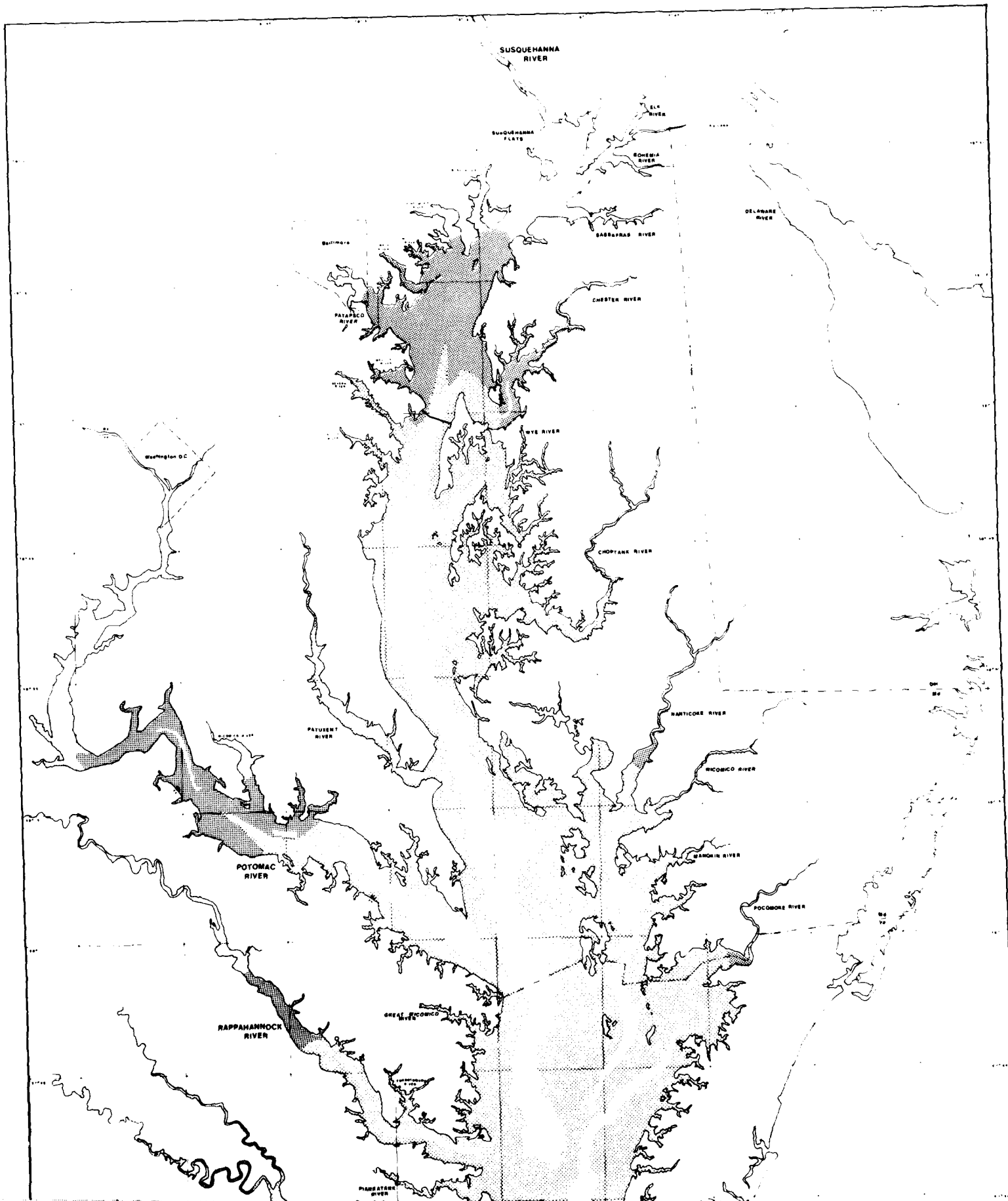


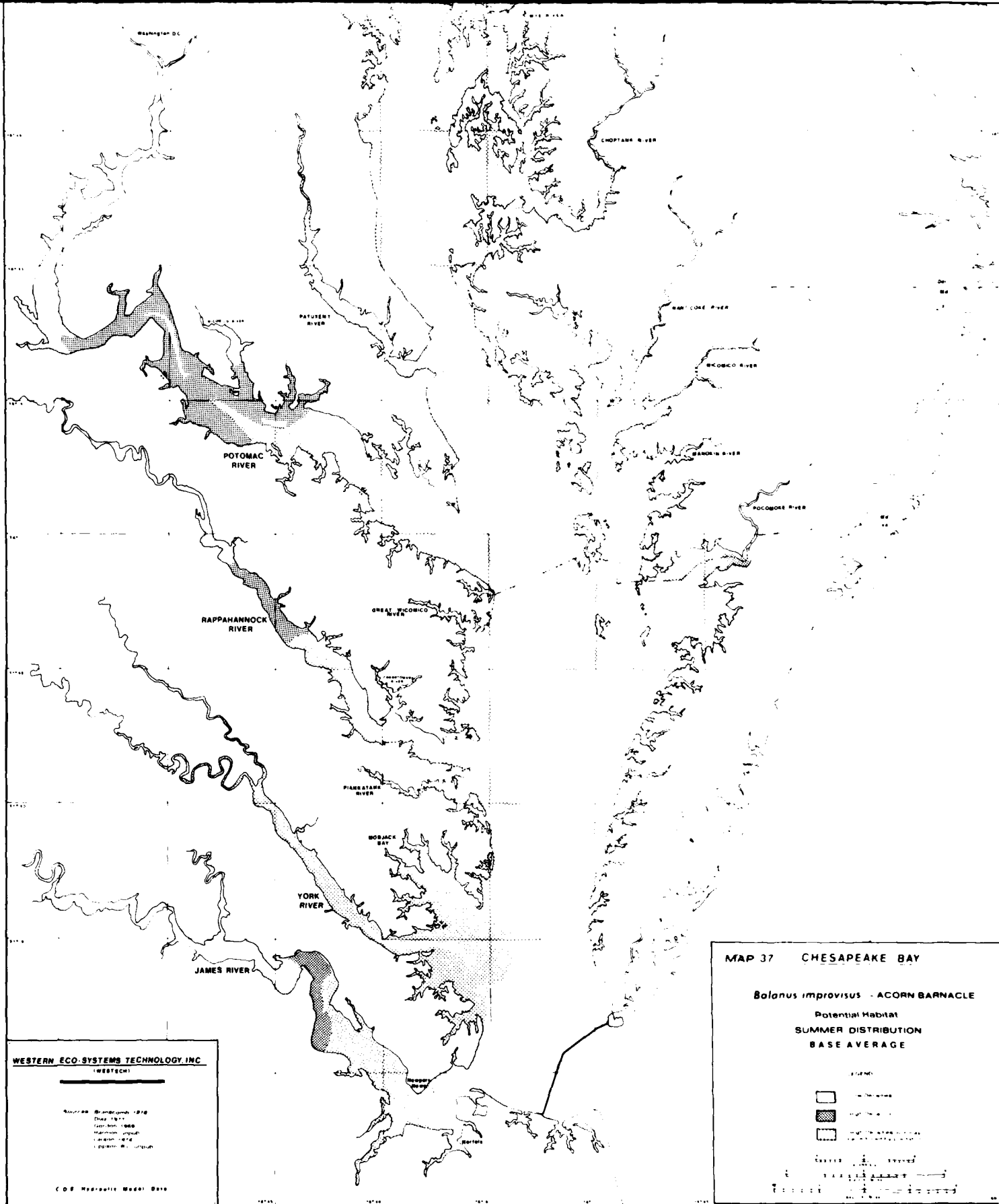


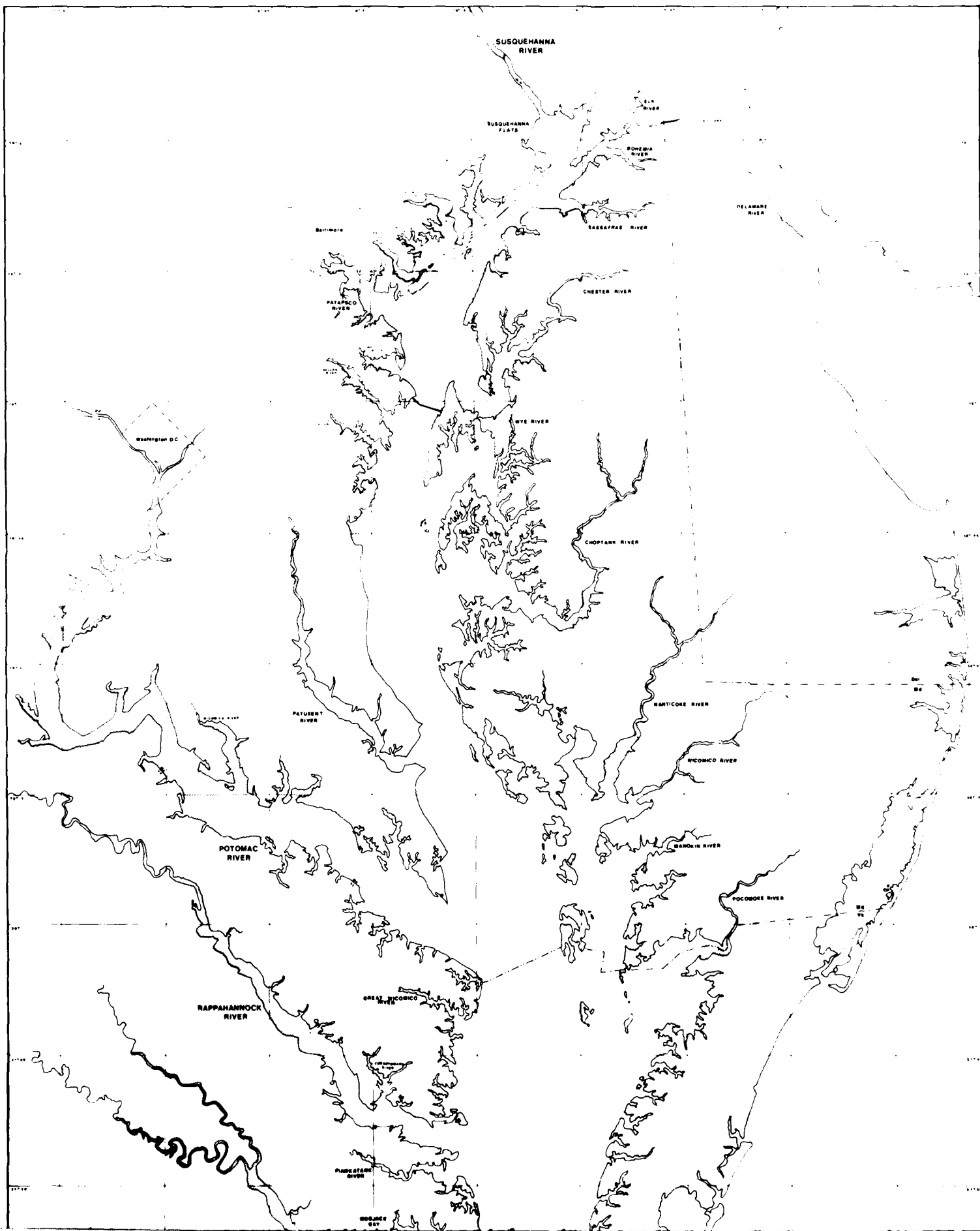


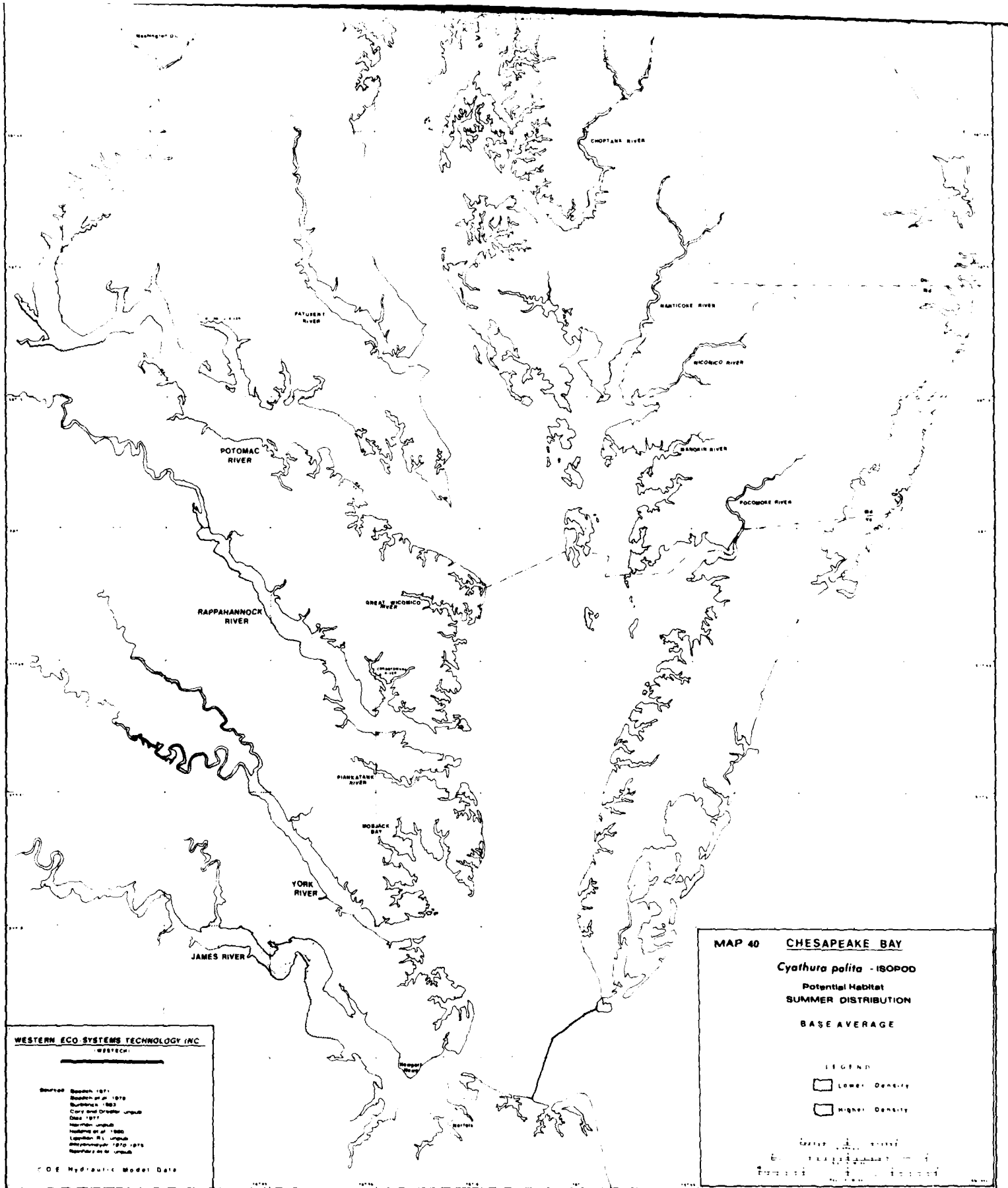


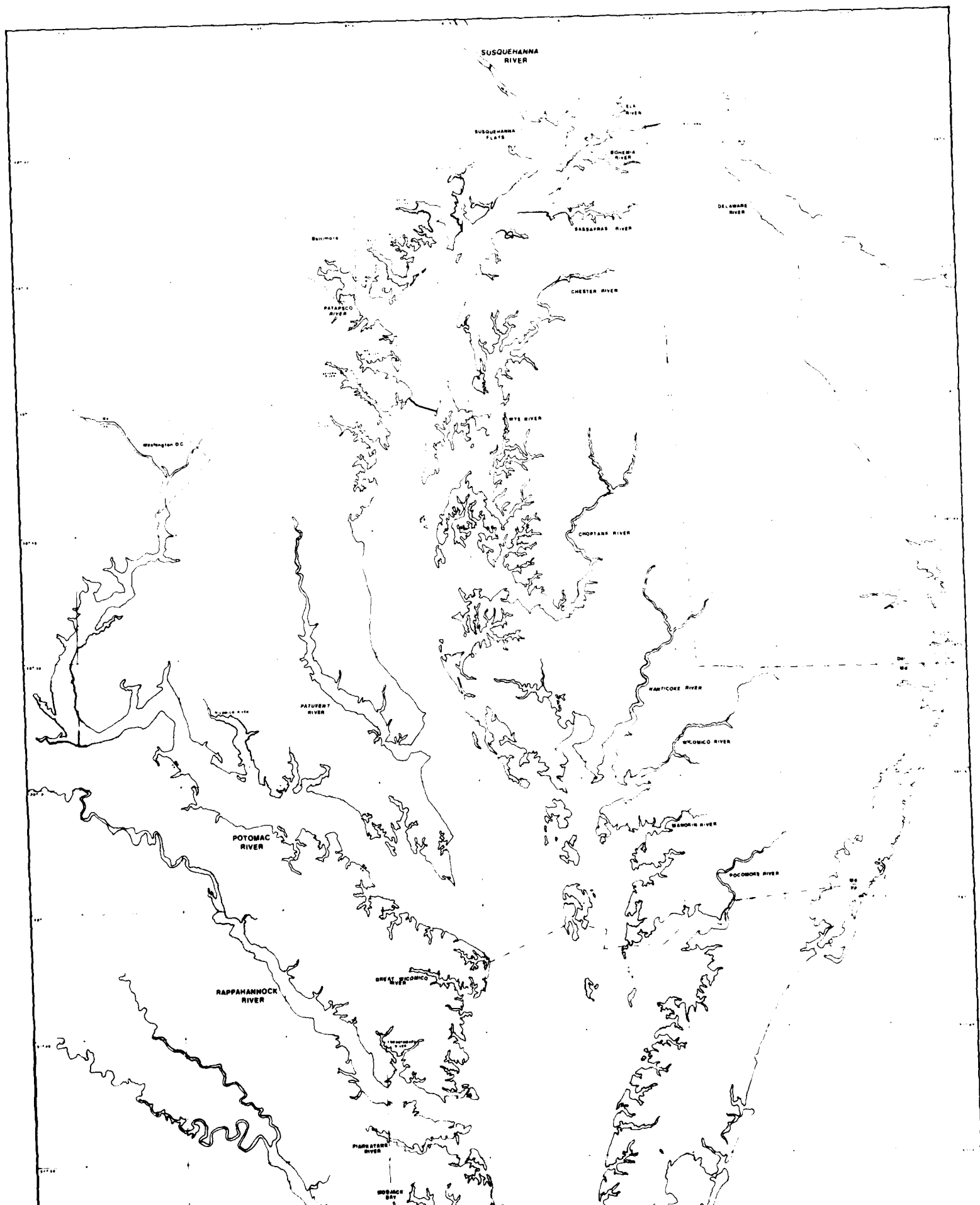


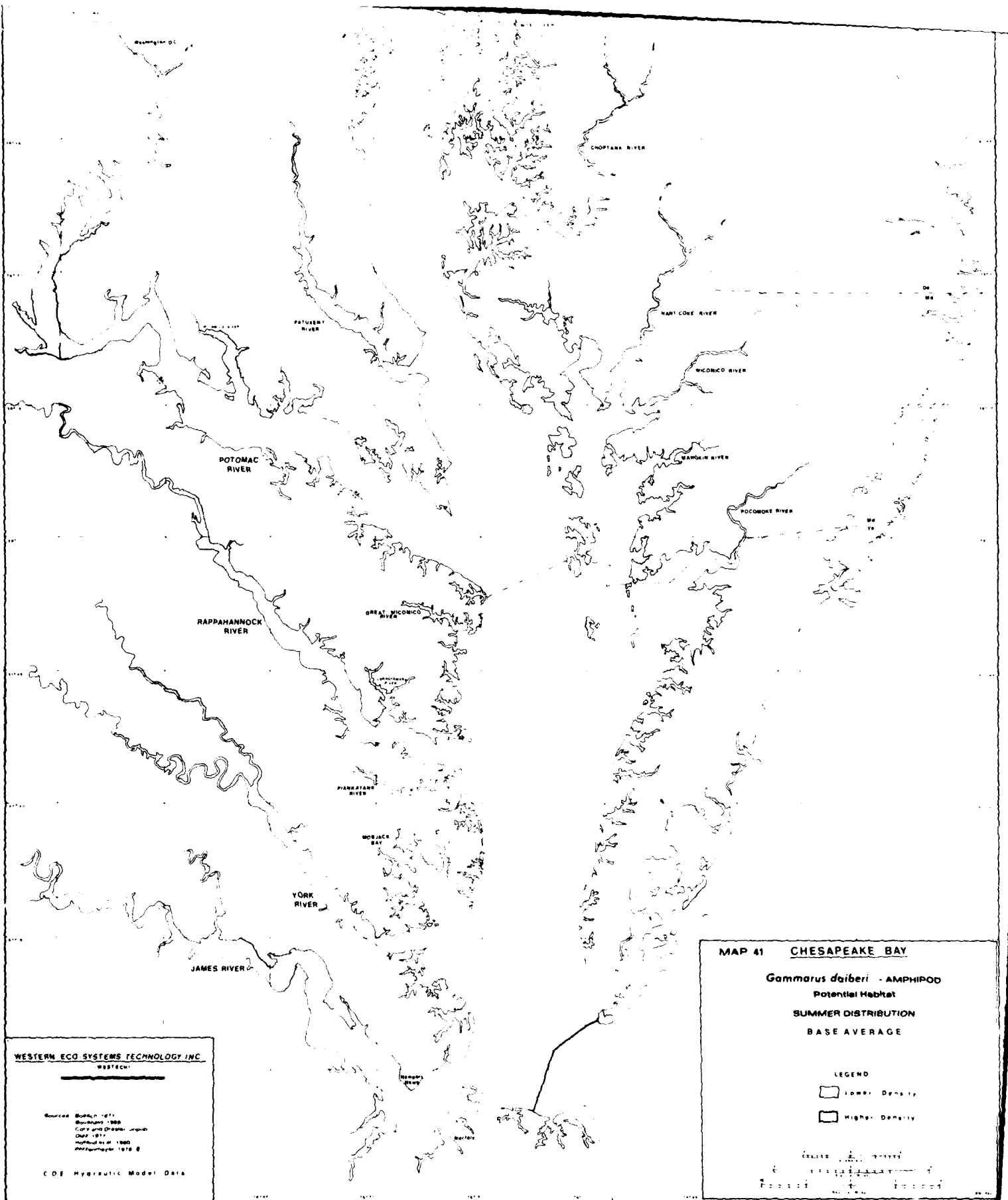




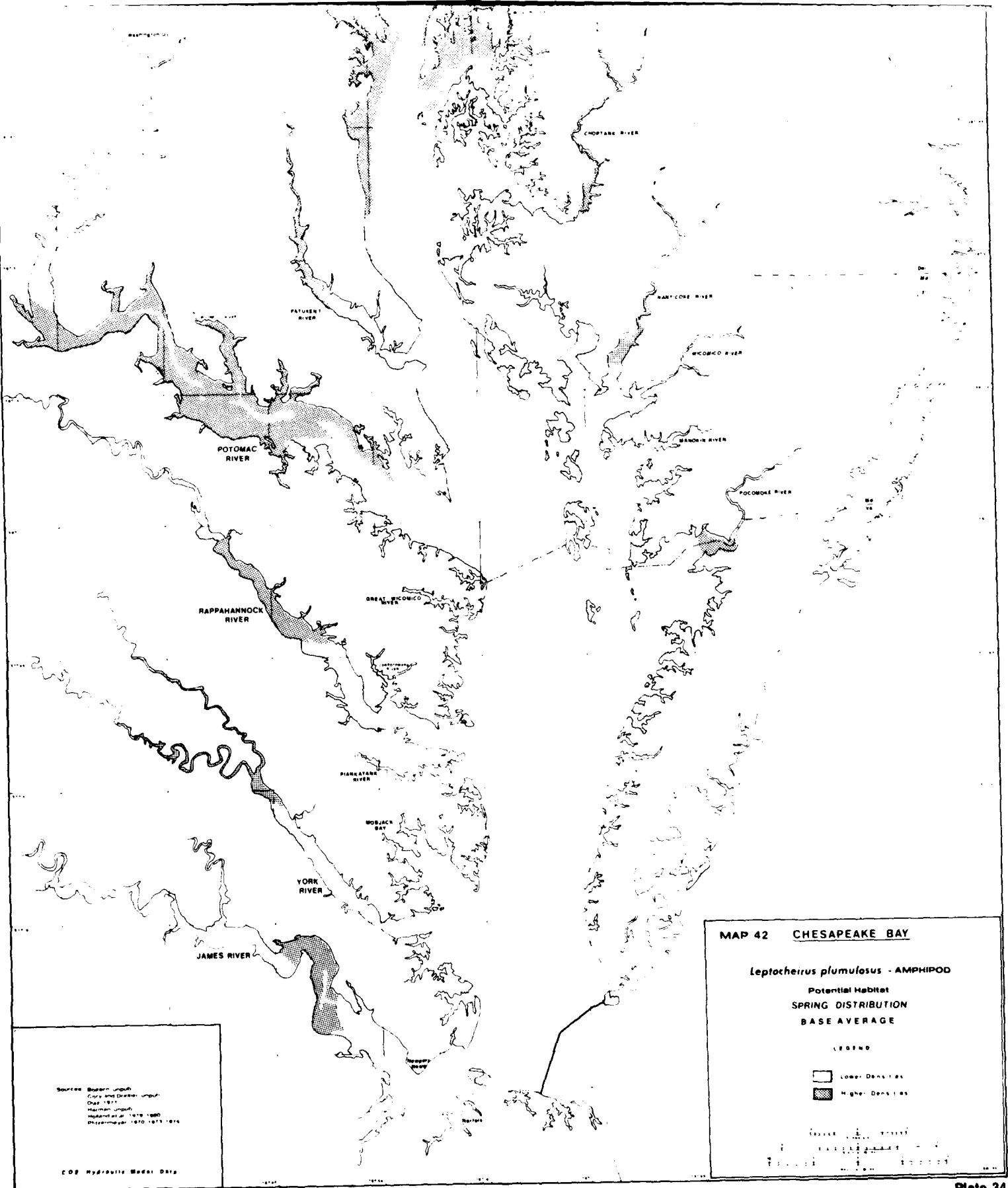


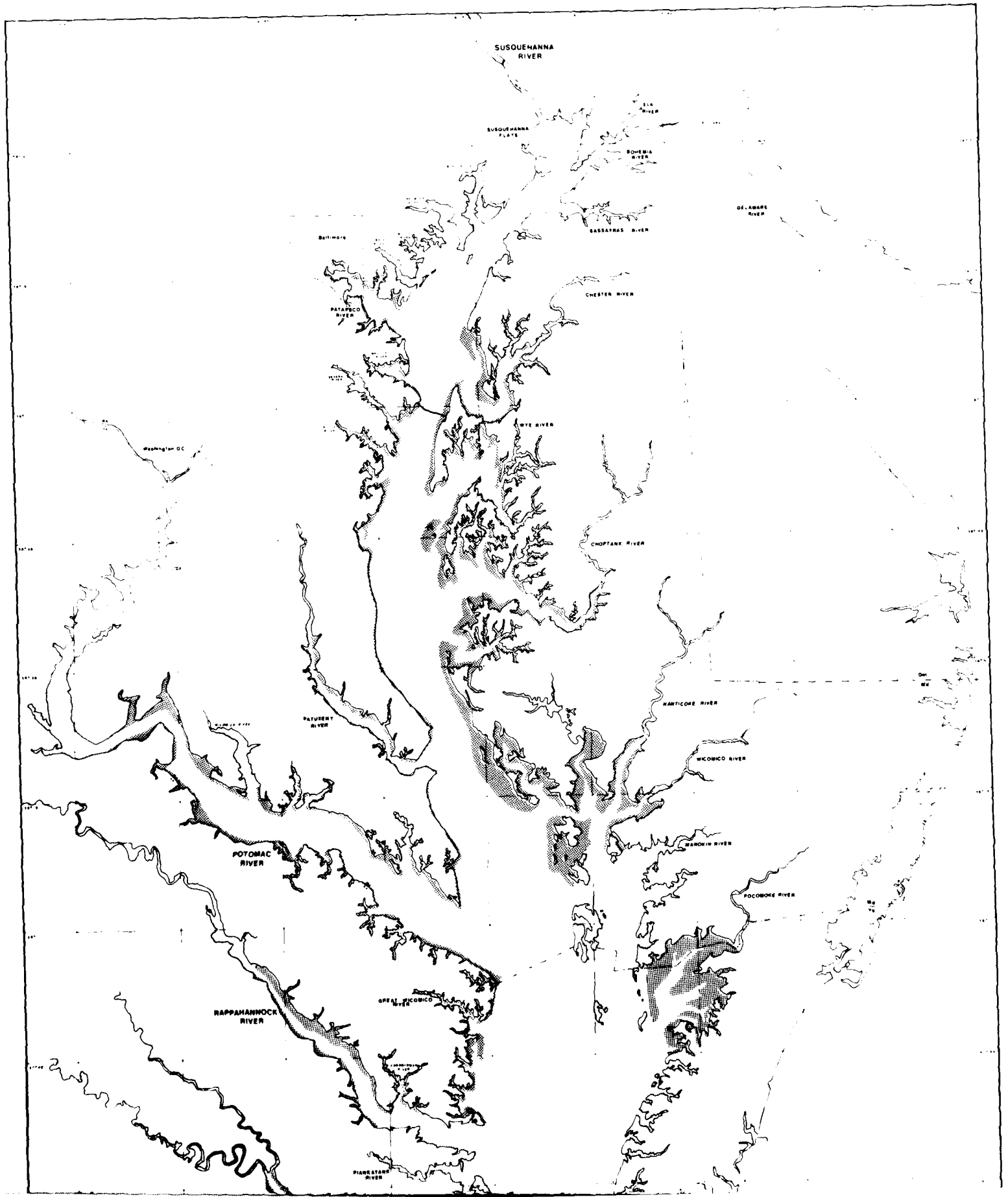


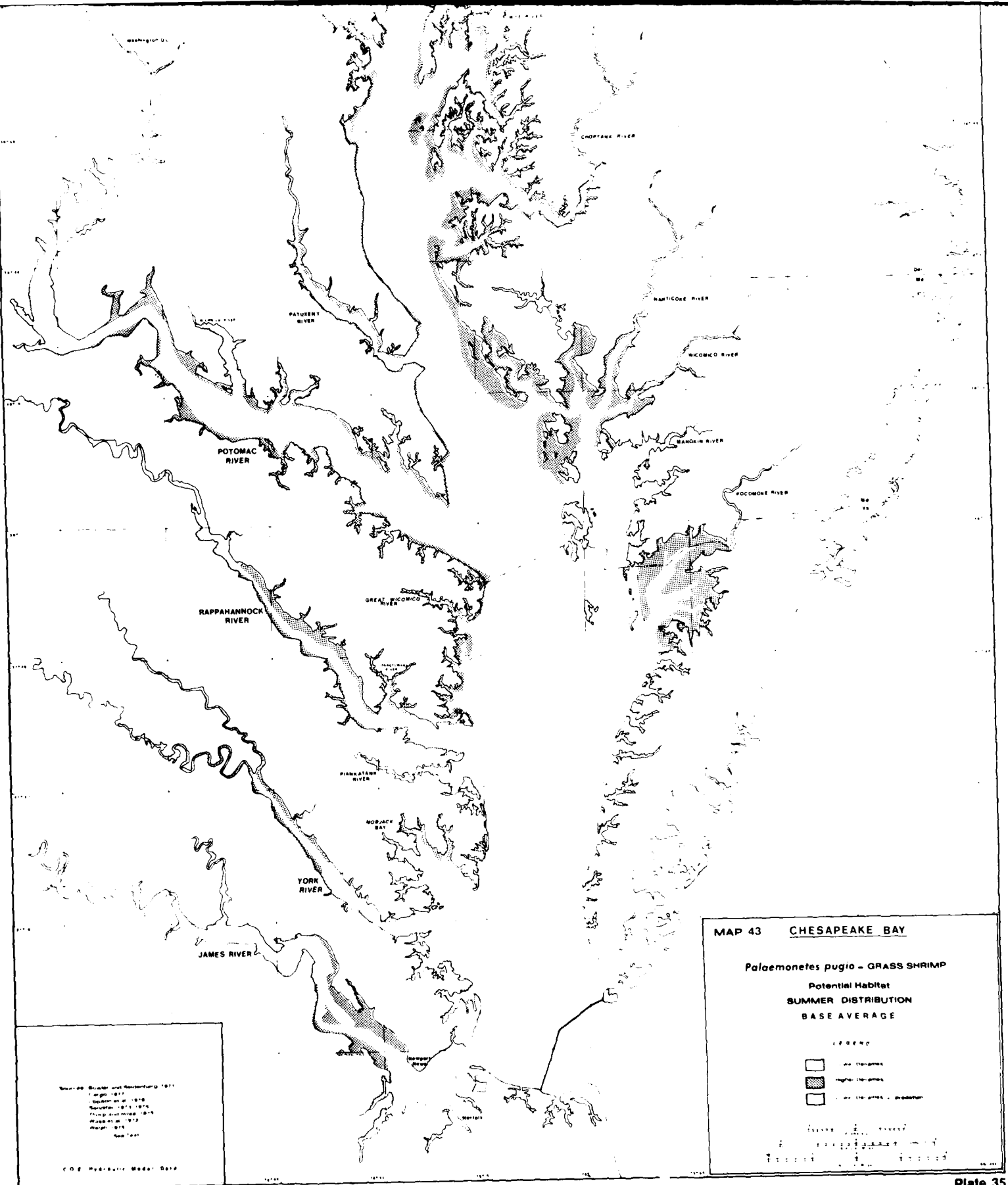


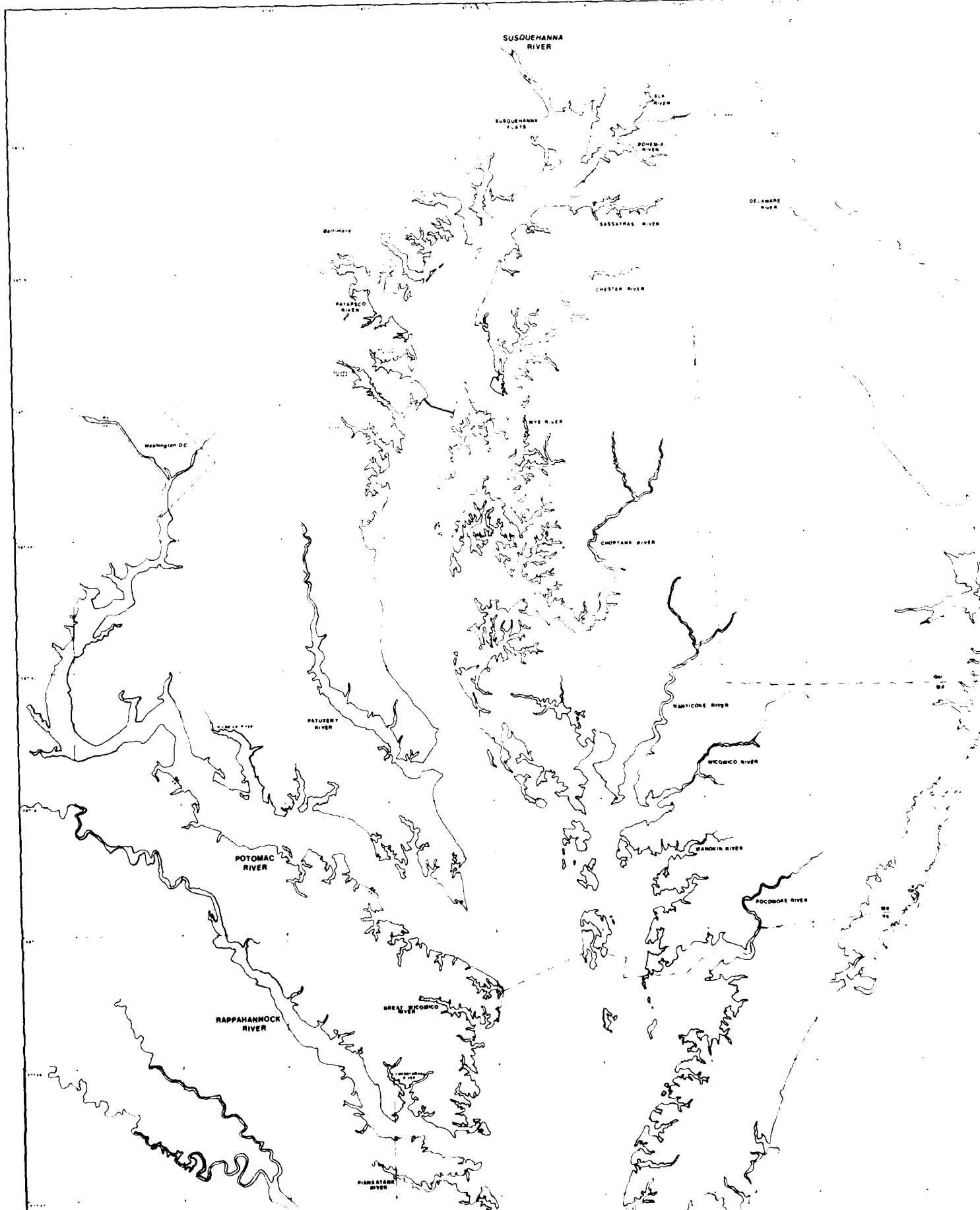


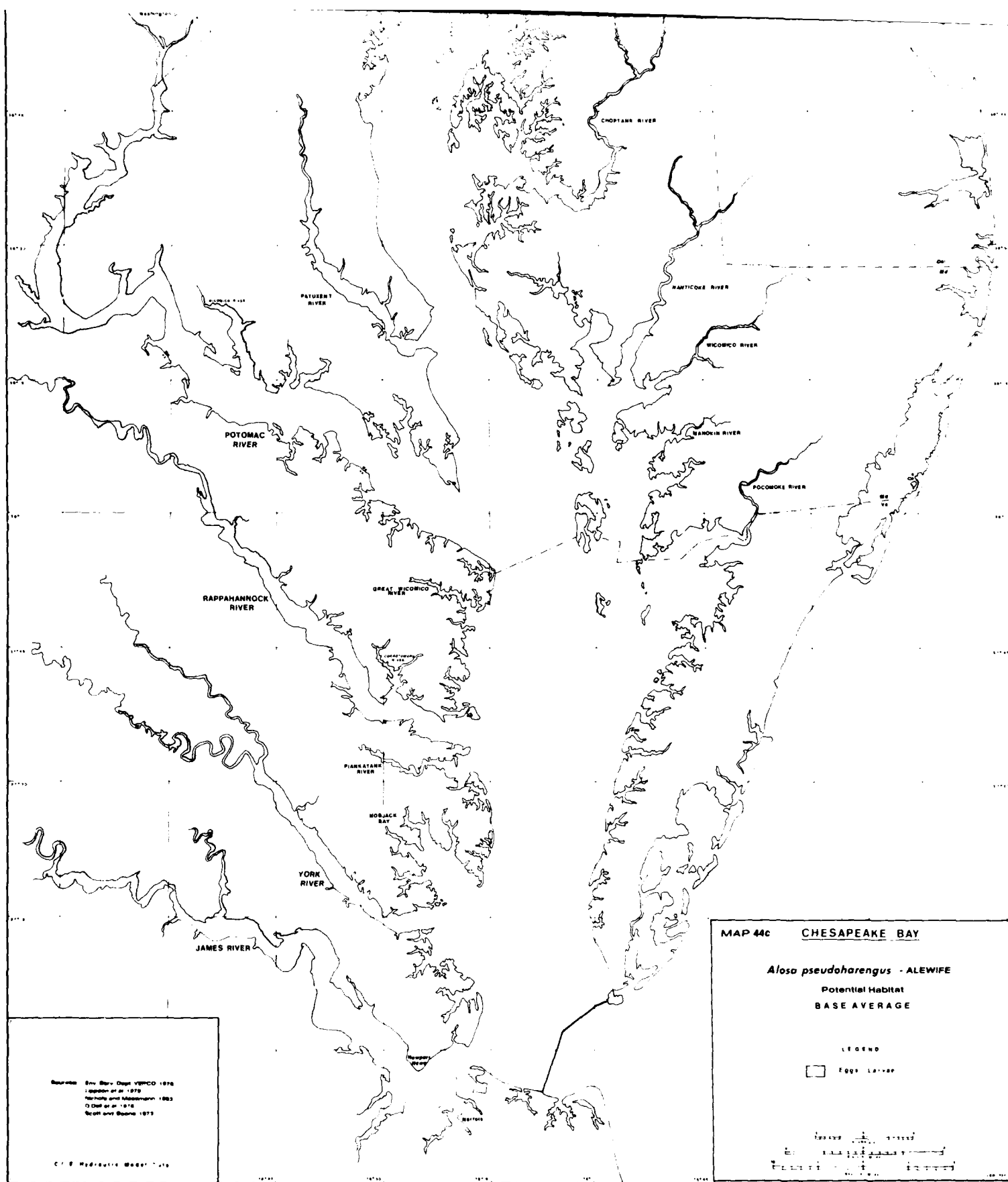


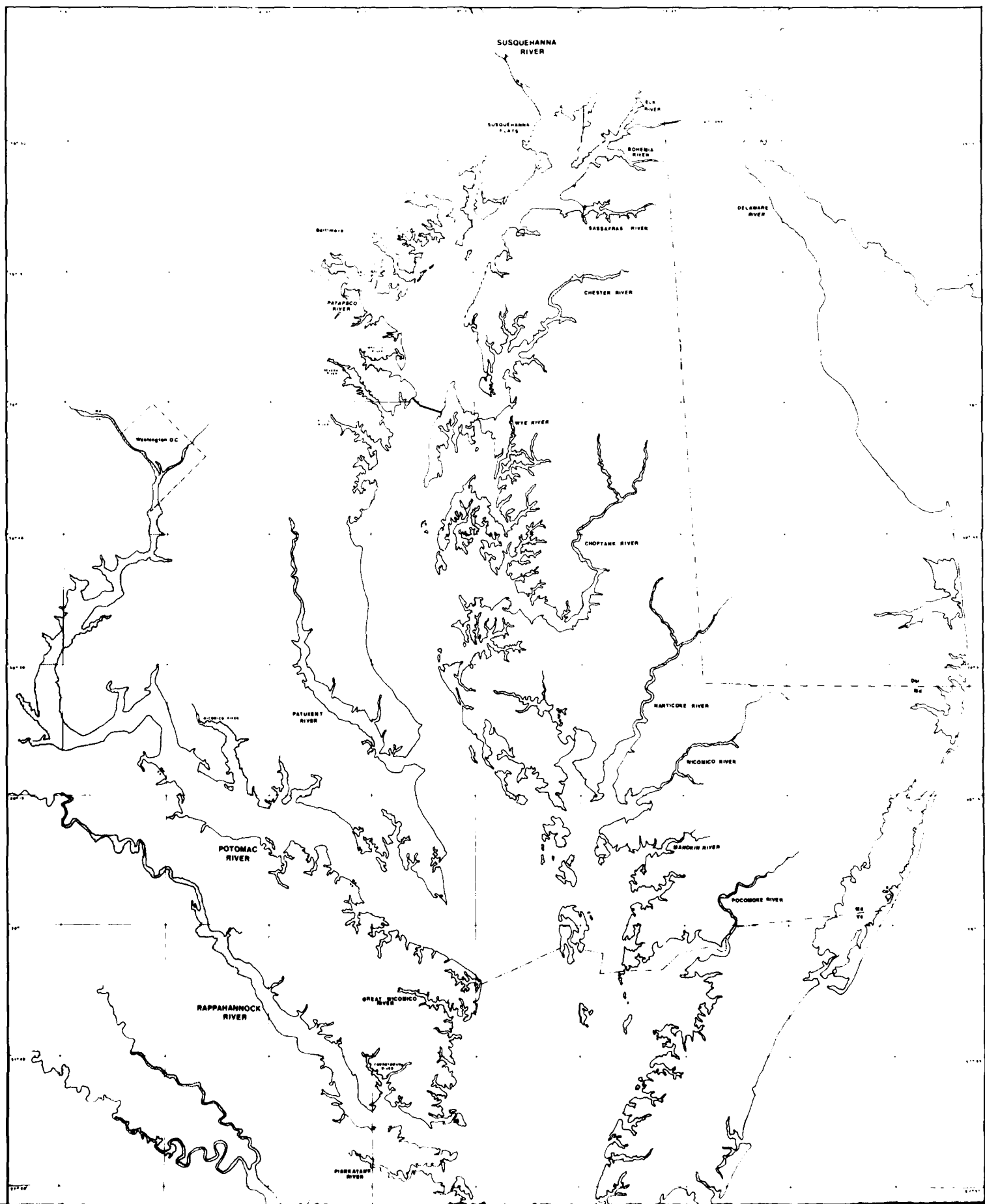


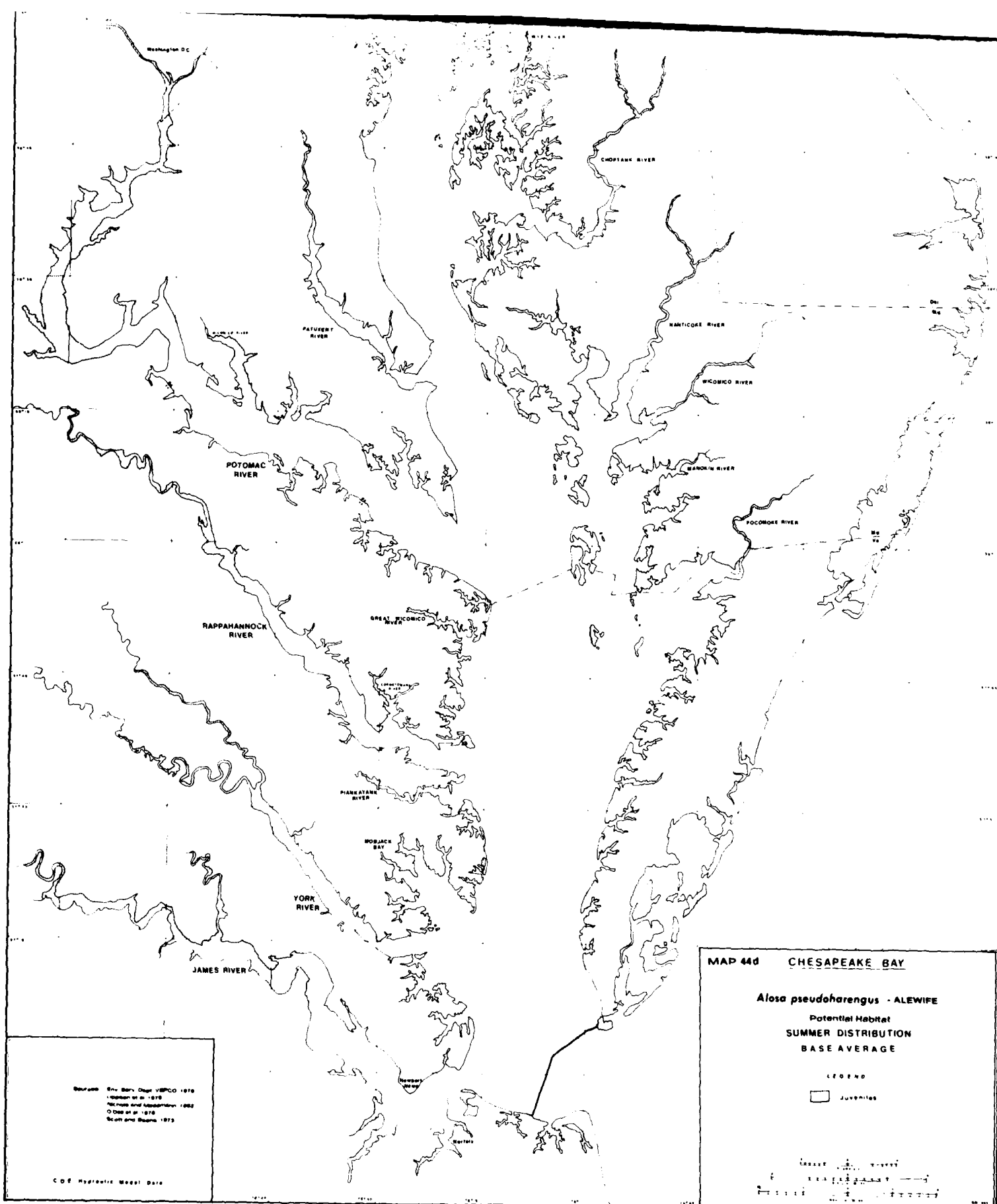


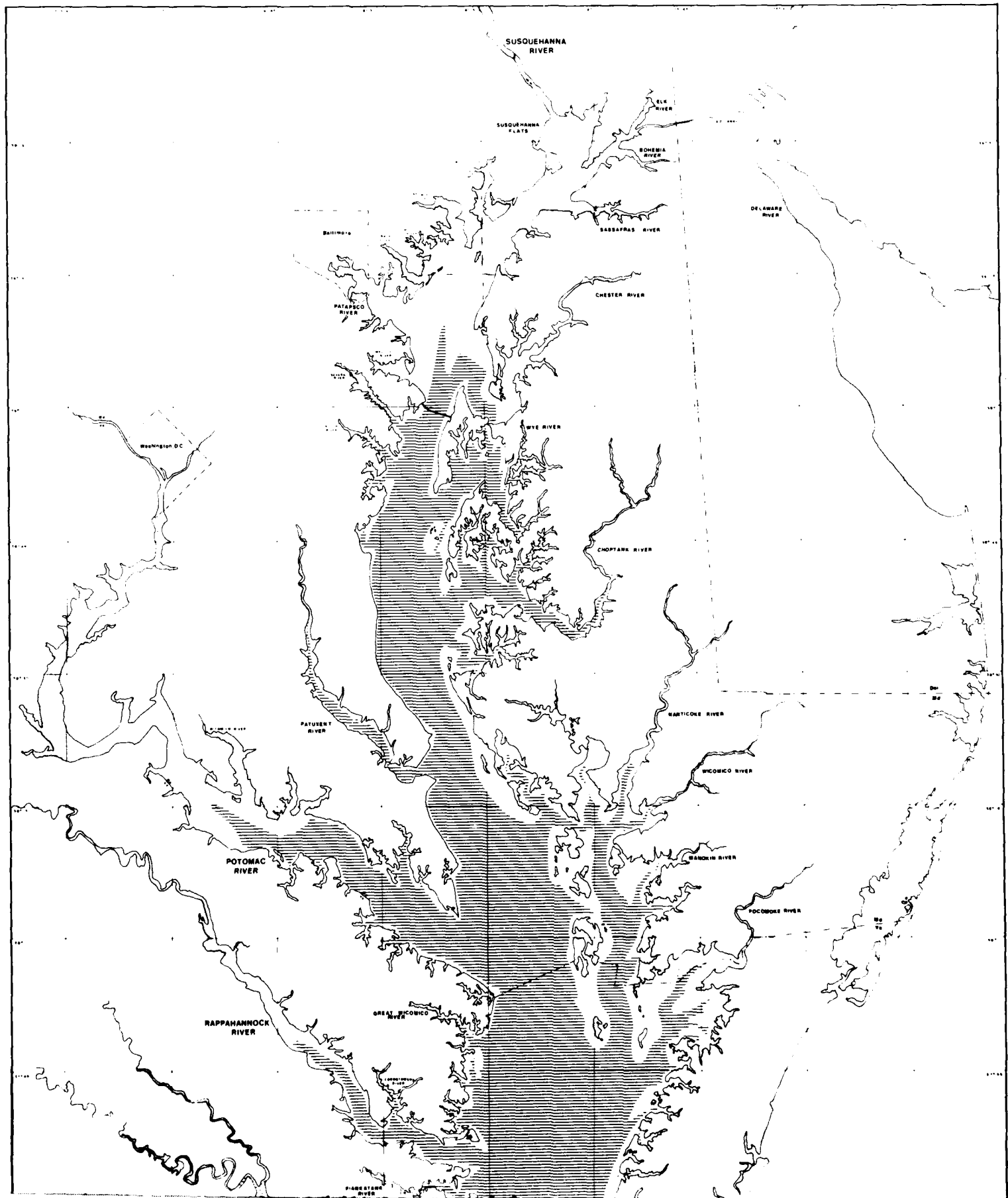


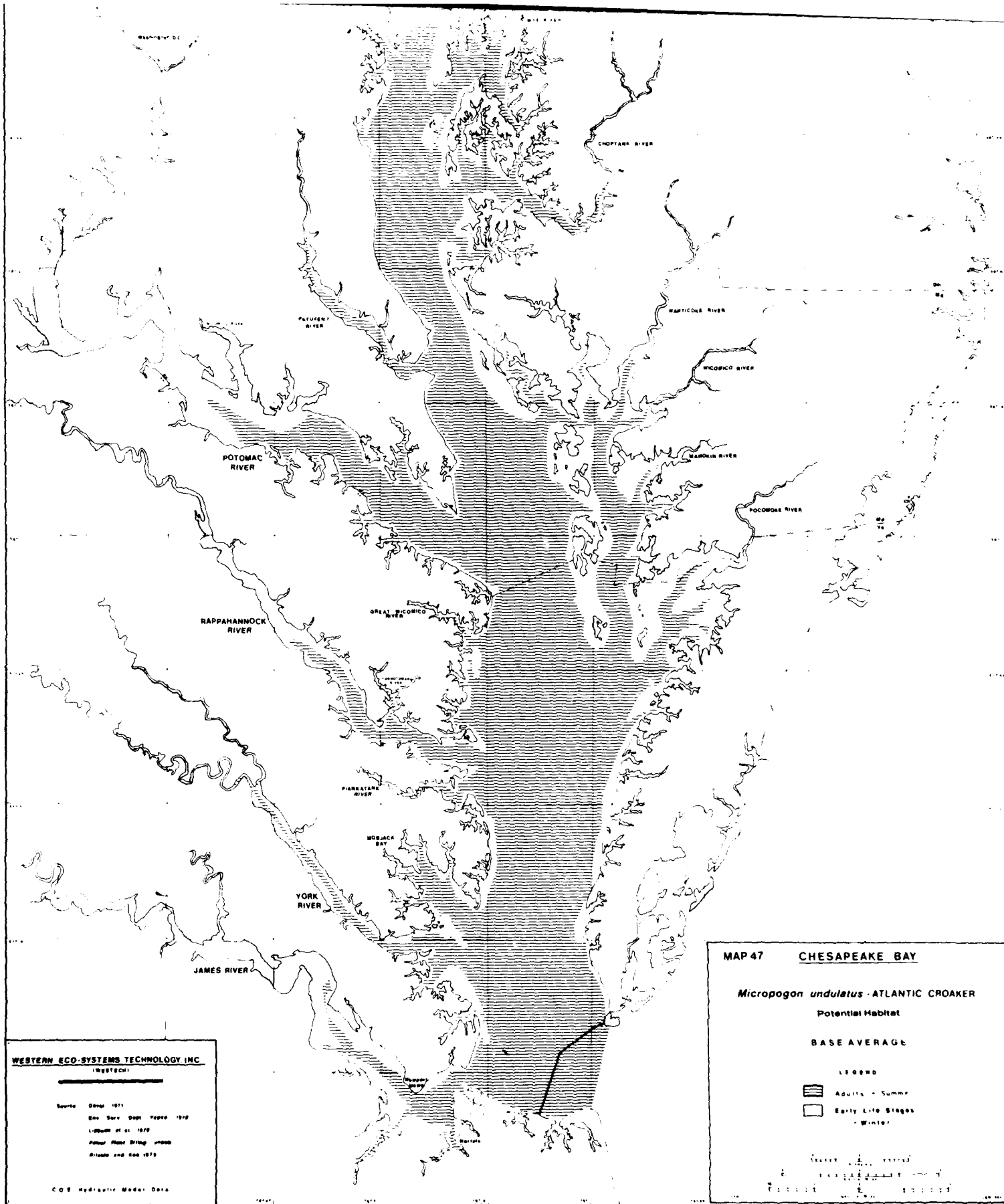












SUSQUEHANNA
RIVER

SUSQUEHANNA
FLATS

ELK
RIVER

BOHEMIA
RIVER

DELAWARE
RIVER

SASSAFRAS RIVER

Baltimore

CHESTER RIVER

PATAPSCO RIVER

WYE RIVER

Washington D.C.

CHOPTANK RIVER

PATUXENT RIVER

NANTICORE RIVER

WICOMICO RIVER

POTOMAC RIVER

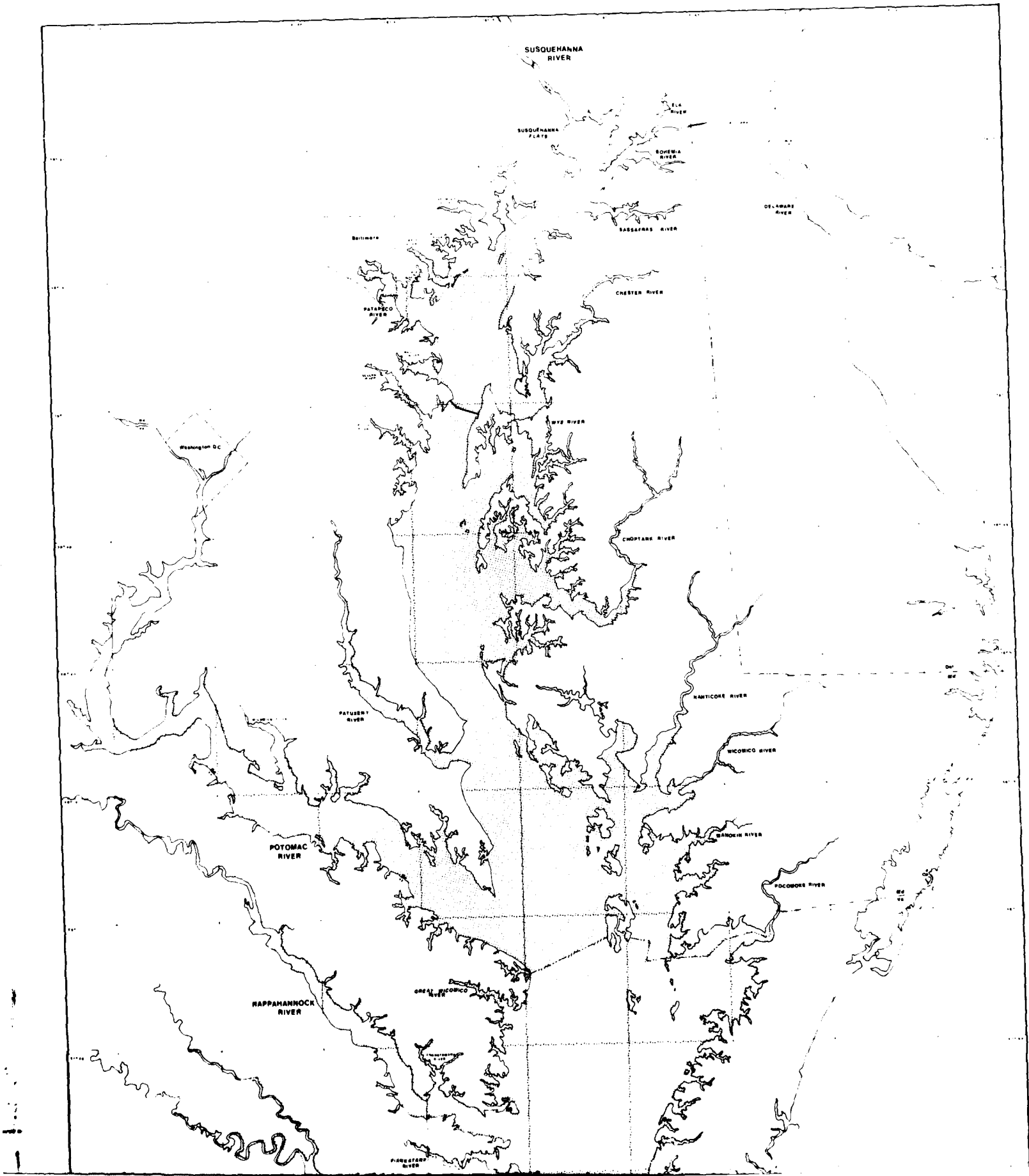
ANNOKE RIVER

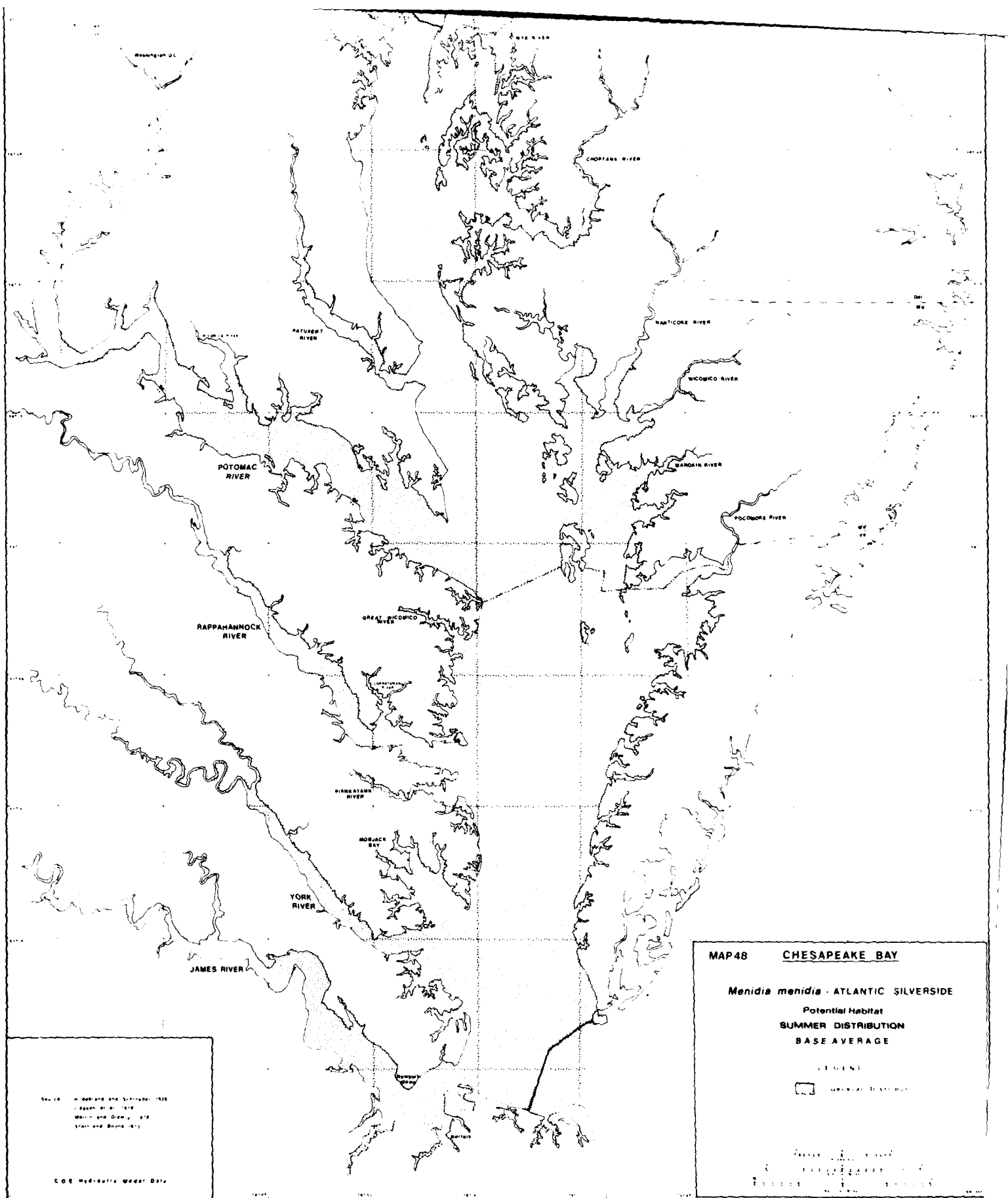
POCOMORE RIVER

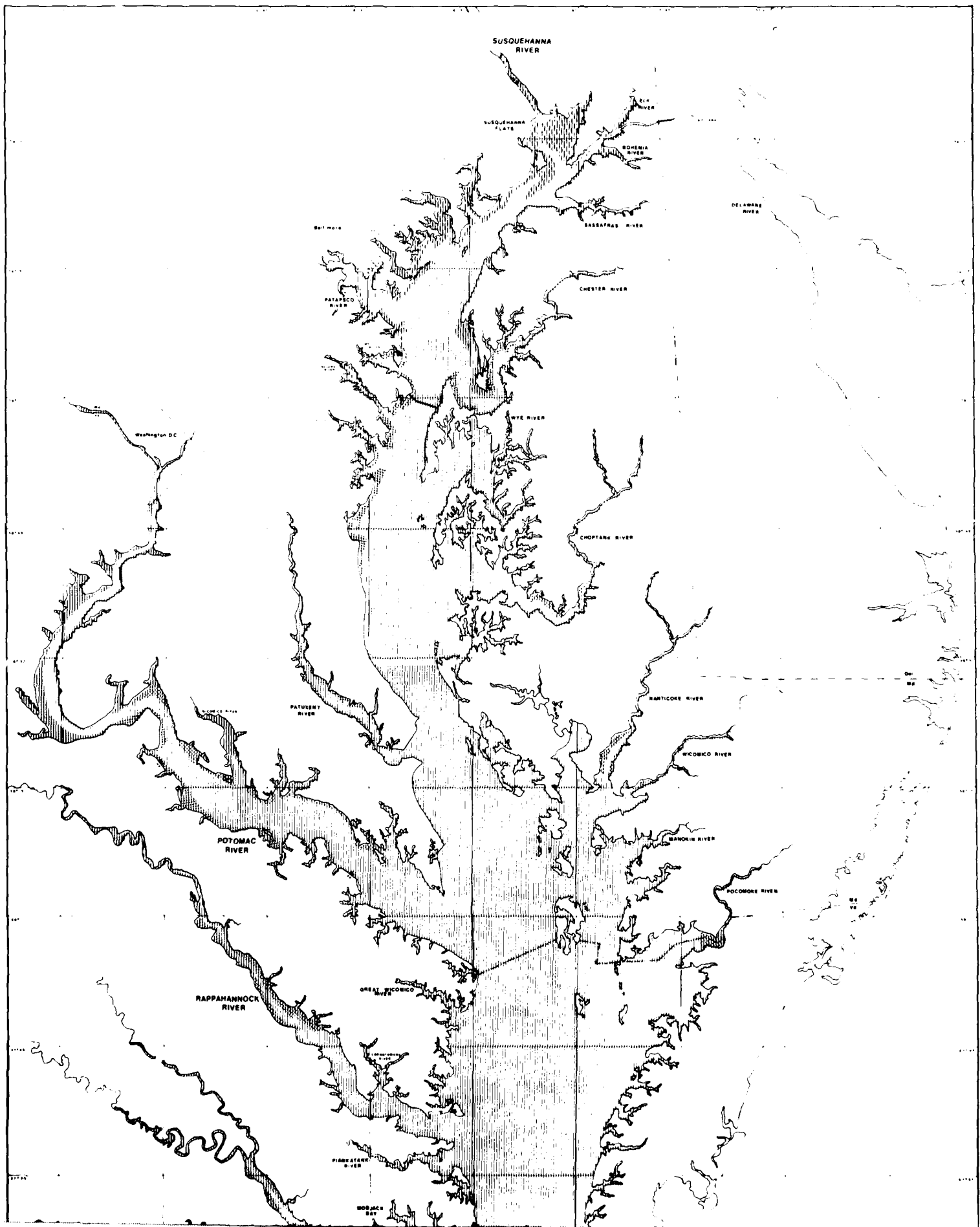
RAPPAHANNOCK RIVER

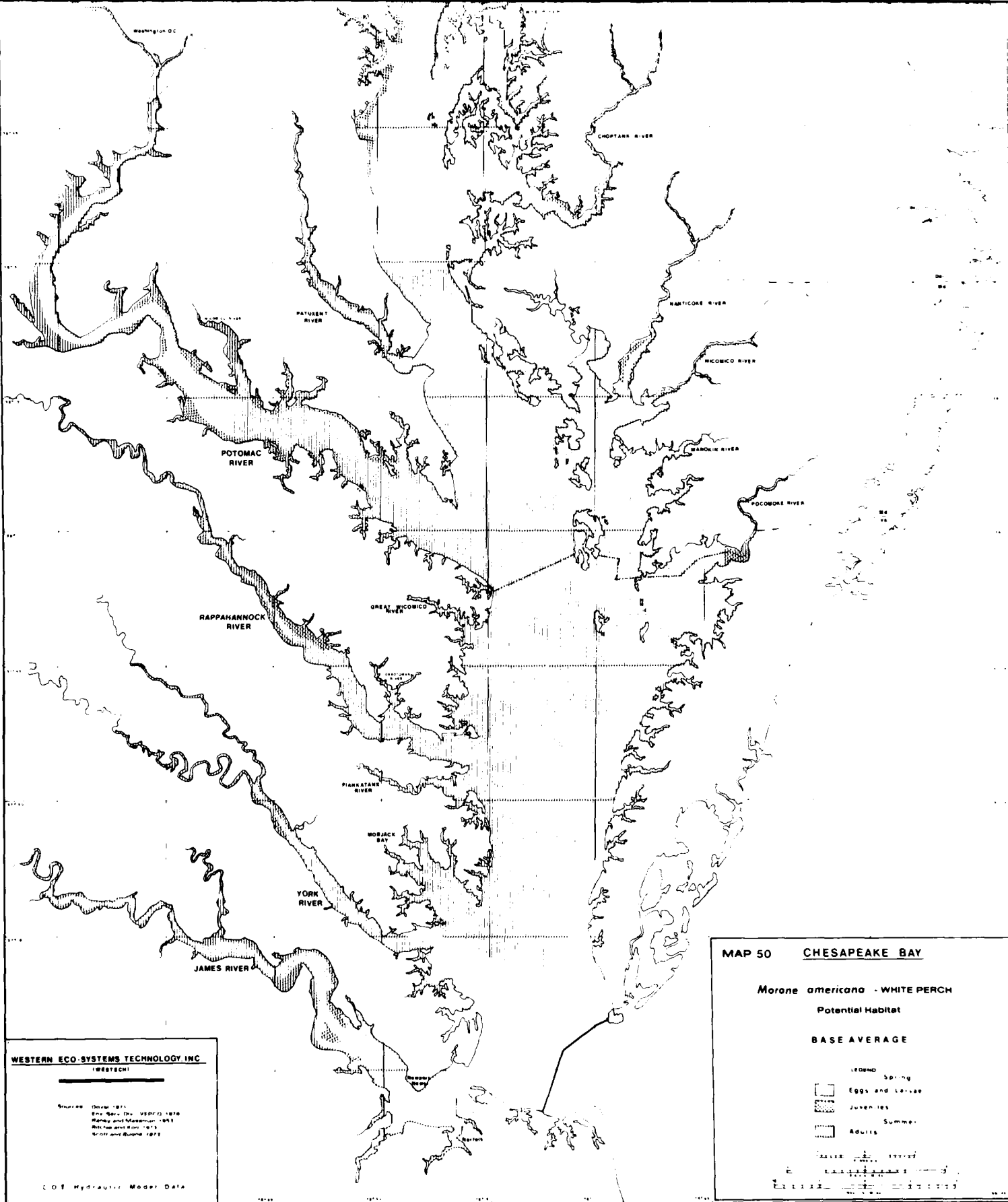
ORIAL WICOMICO RIVER

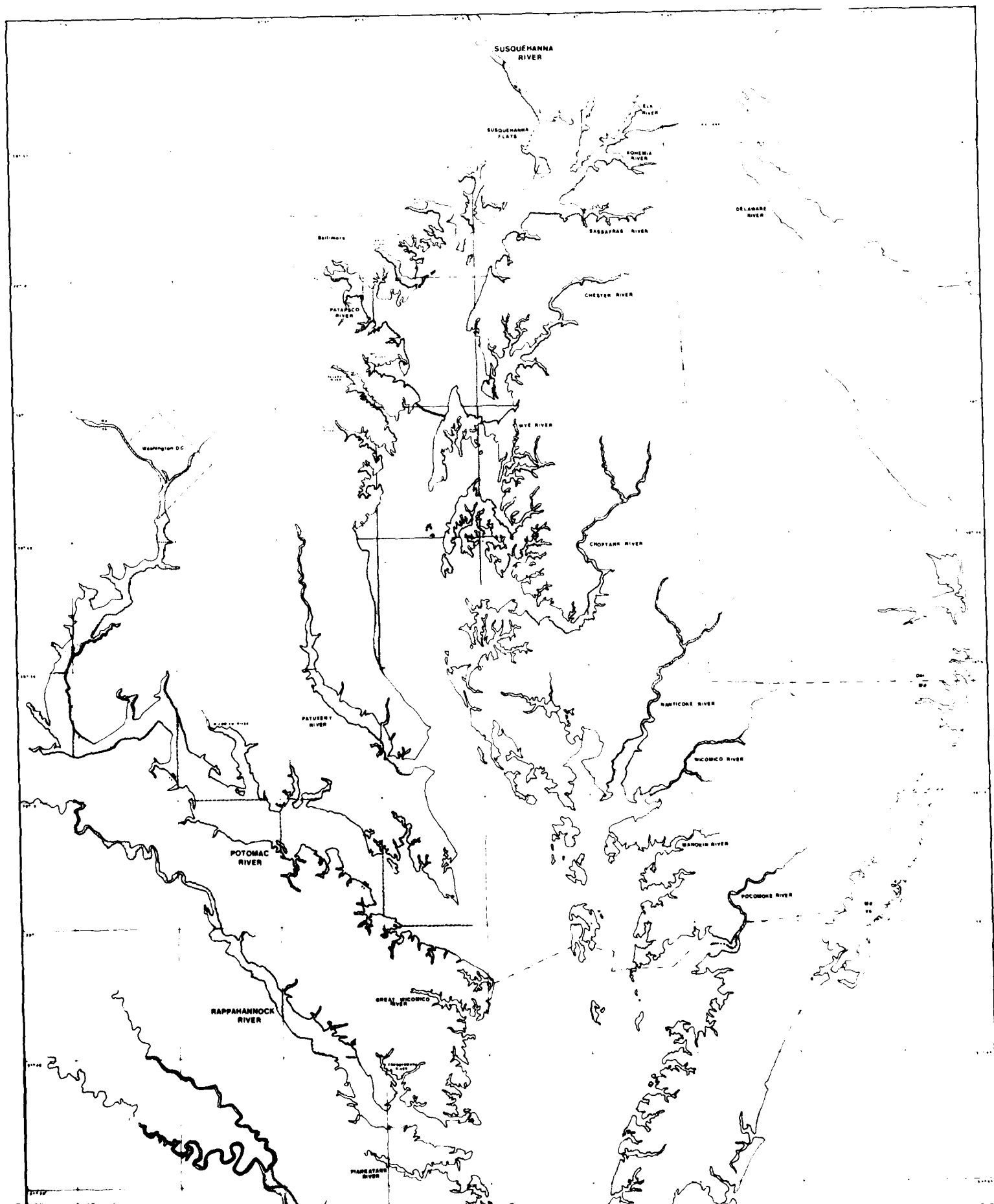
PIKESTAR RIVER

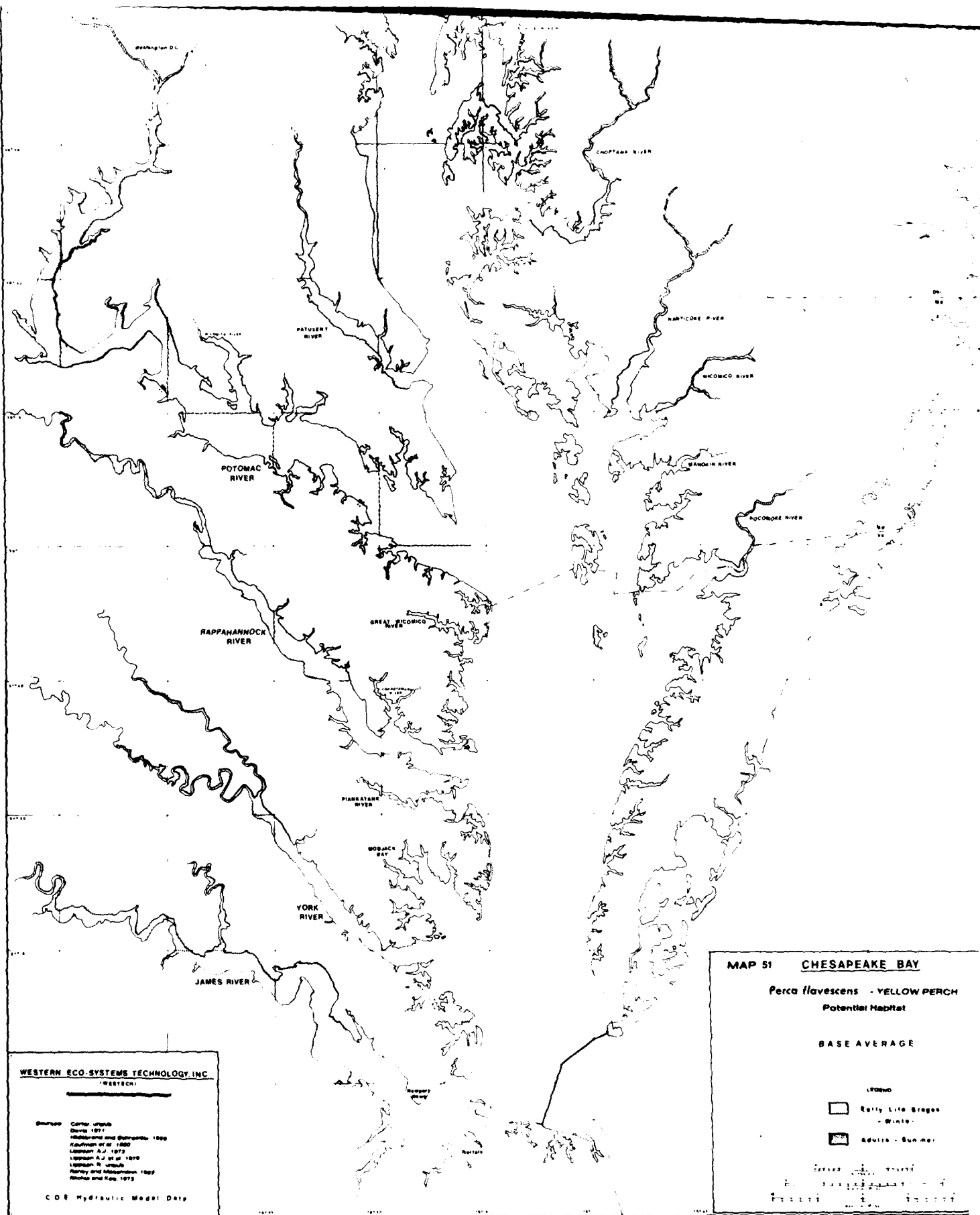


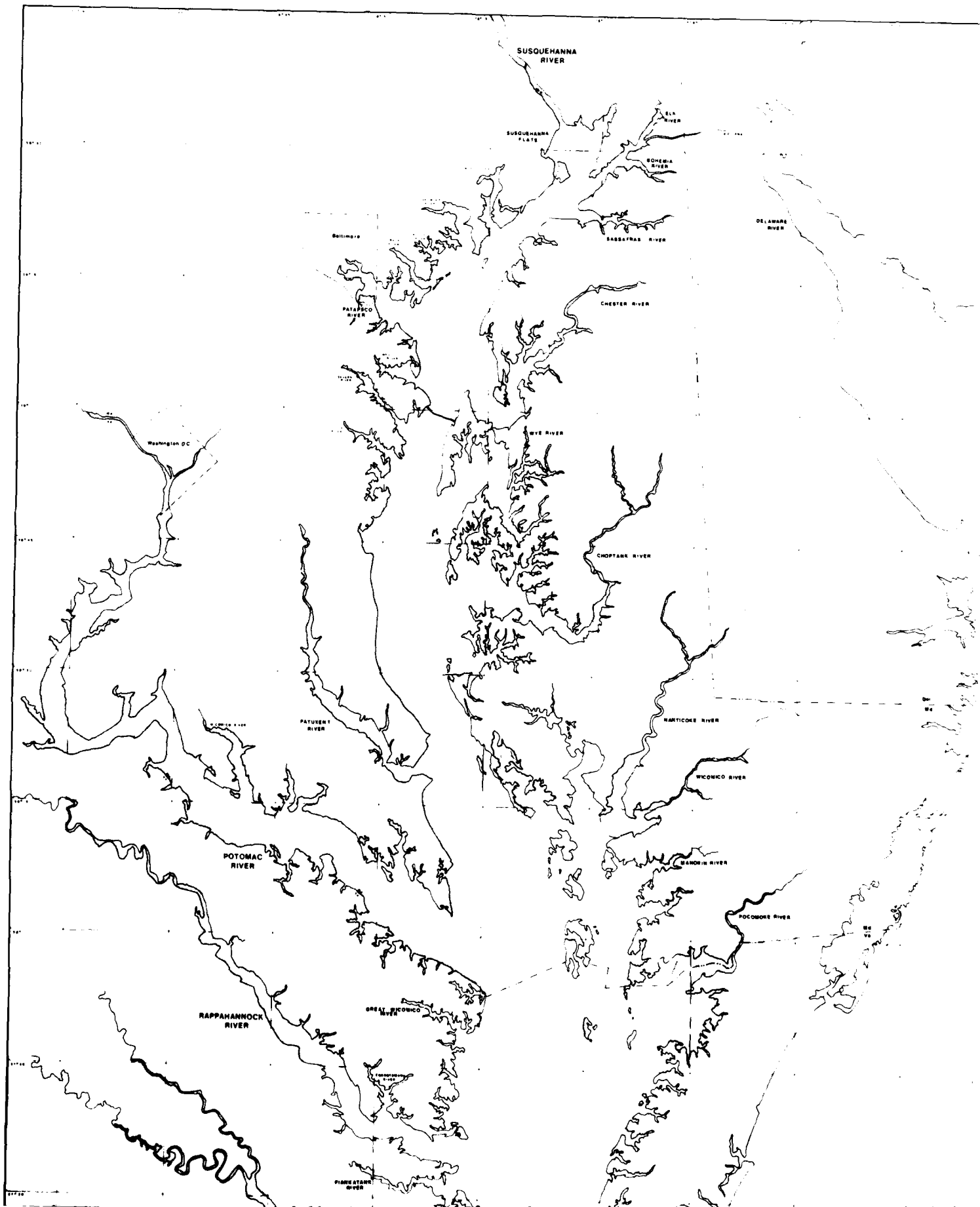


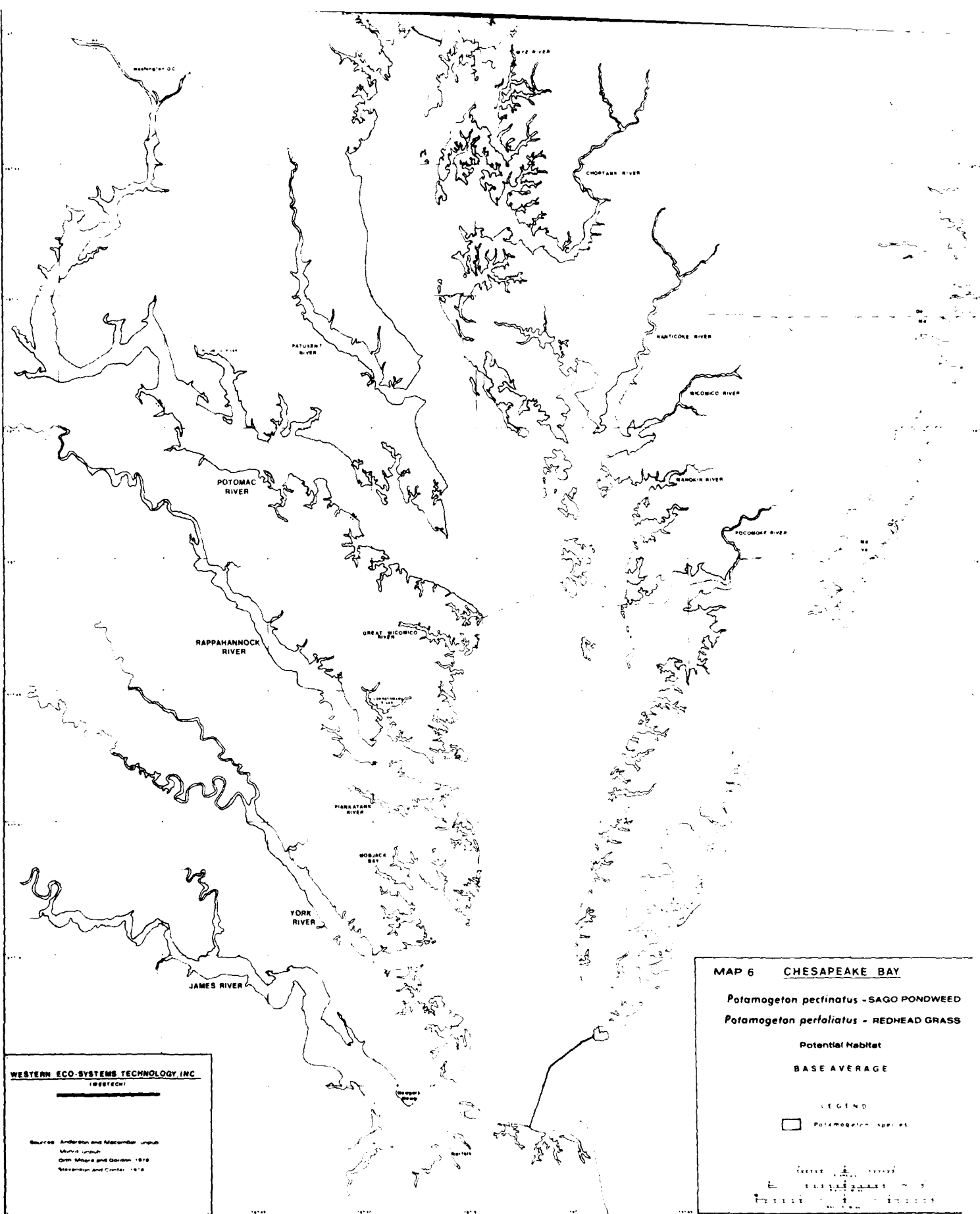


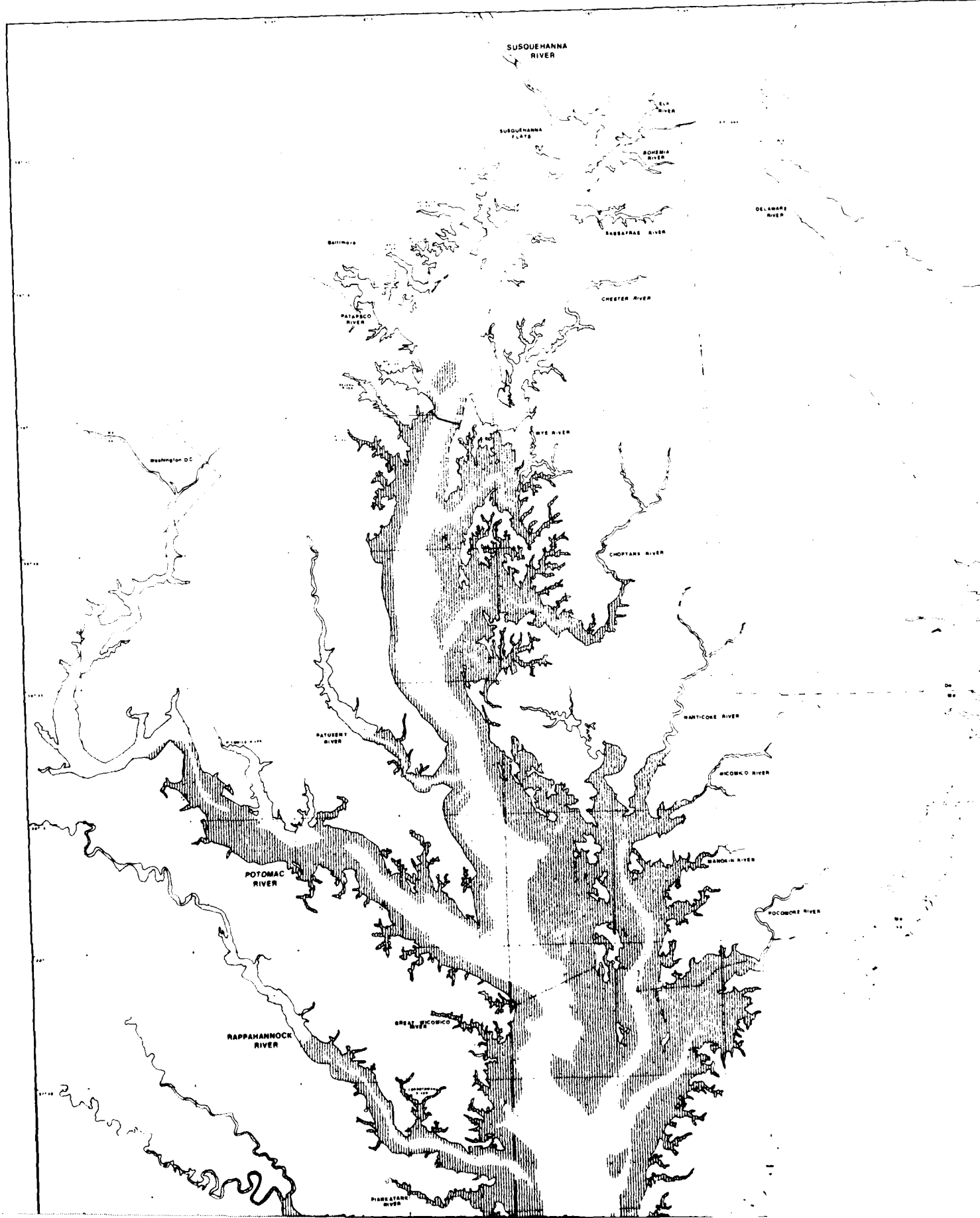












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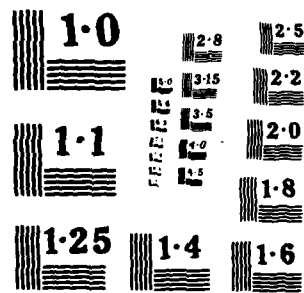
CHESAPEAKE BAY LOW FRESHWATER INFLOW STUDY APPENDIX F
MAP FOLIO(I)I CORPS OF ENGINEERS BALTIMORE MD BALTIMORE
DISTRICT SEP 84 CHB-84-L-APP-F

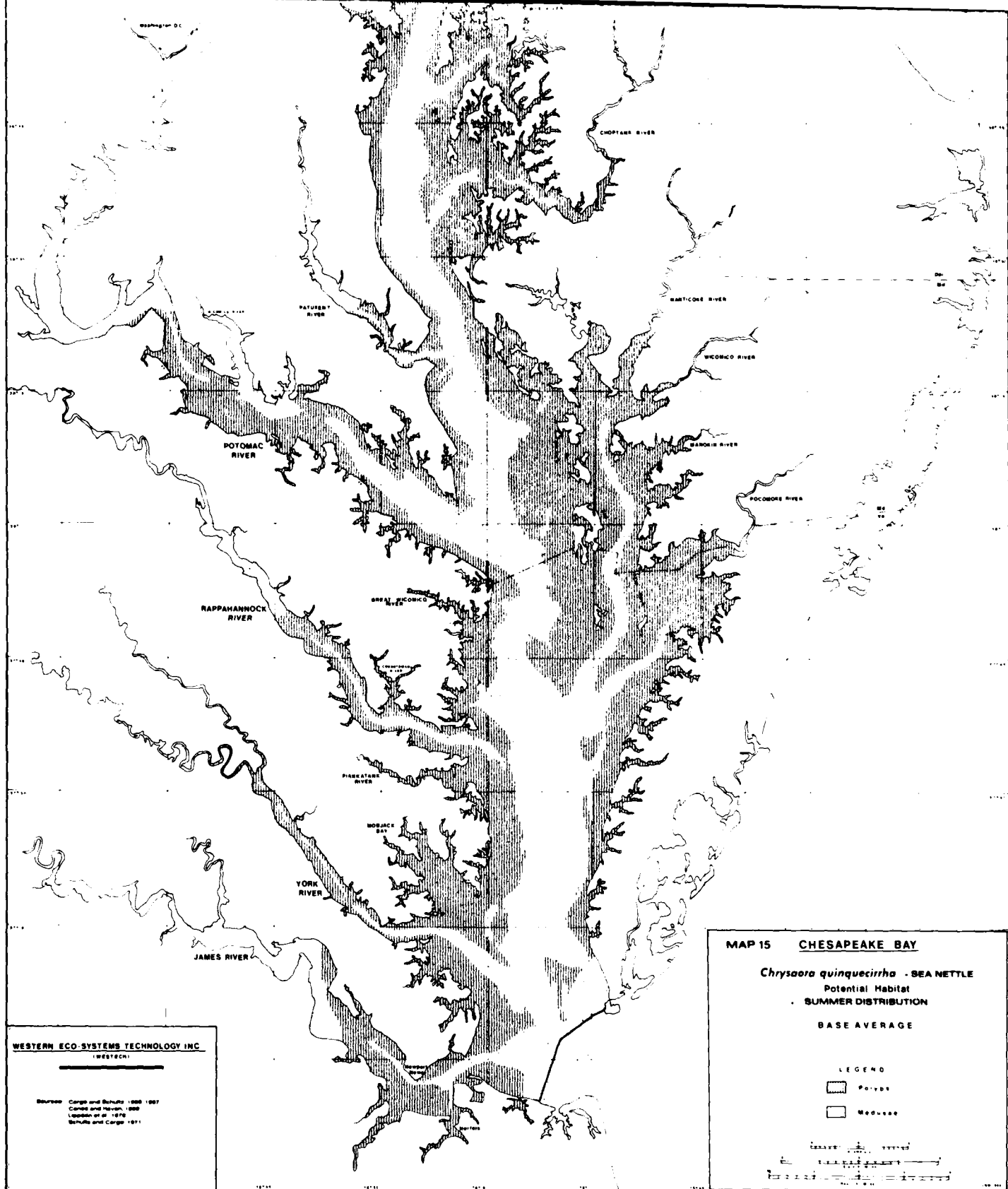
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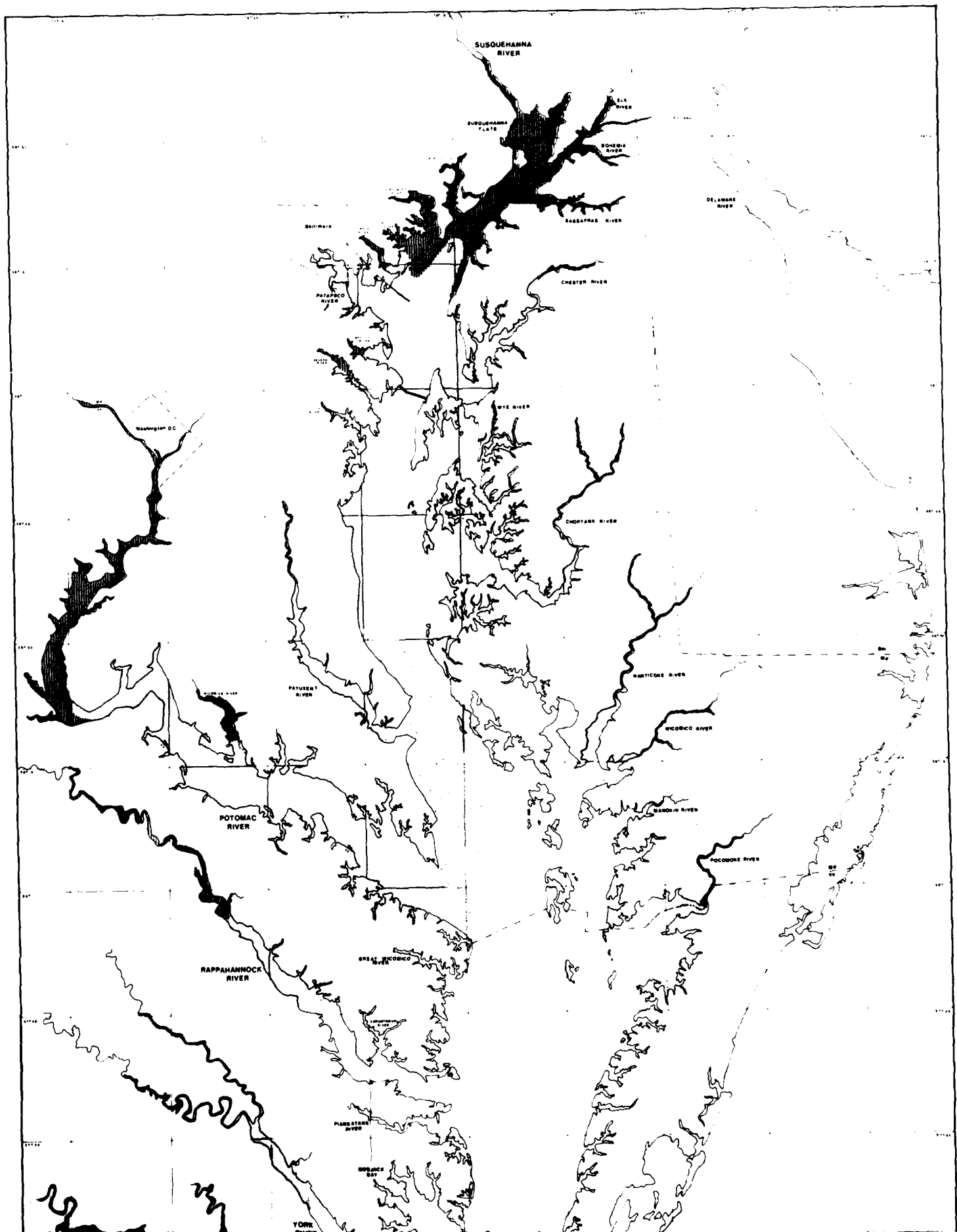
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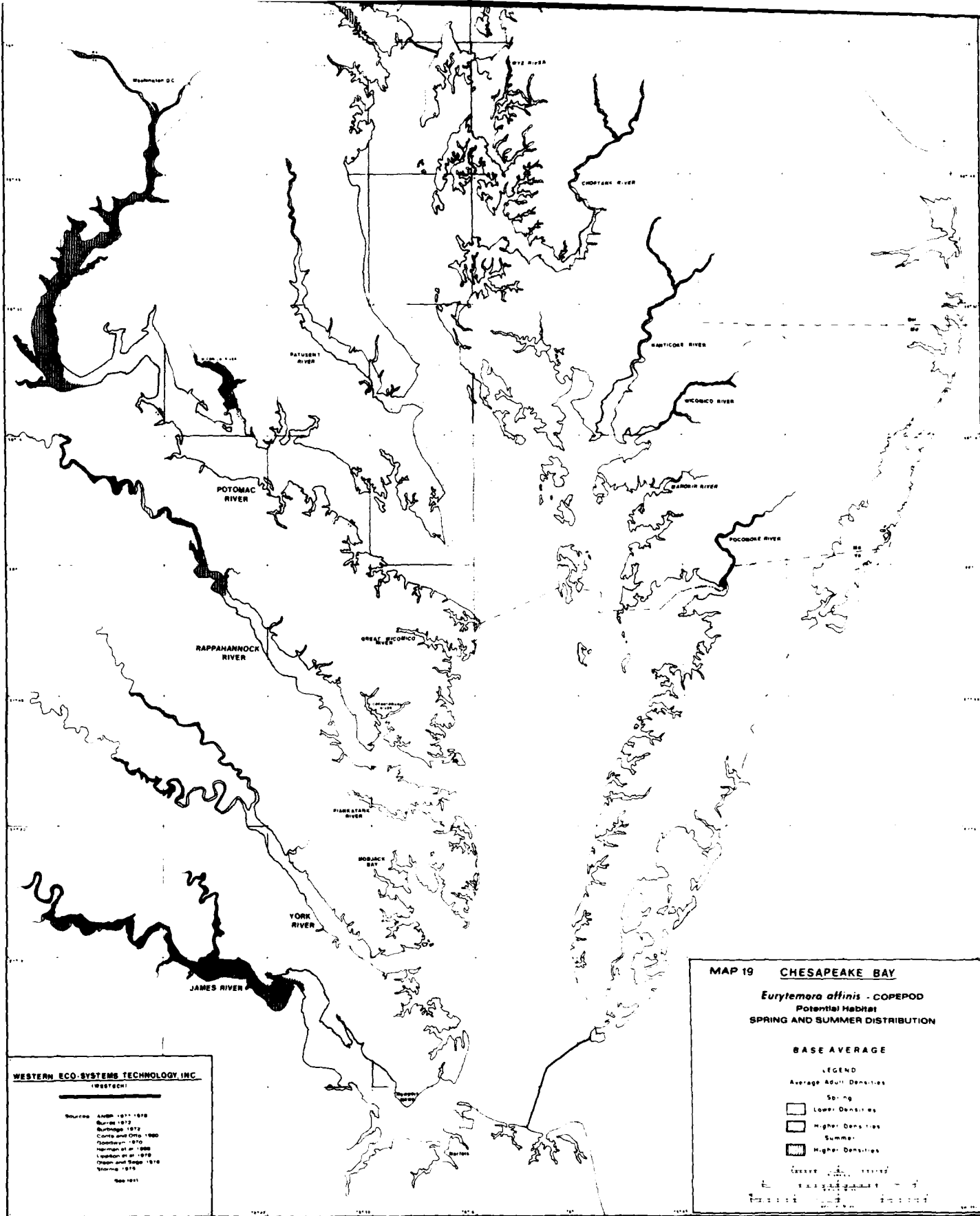
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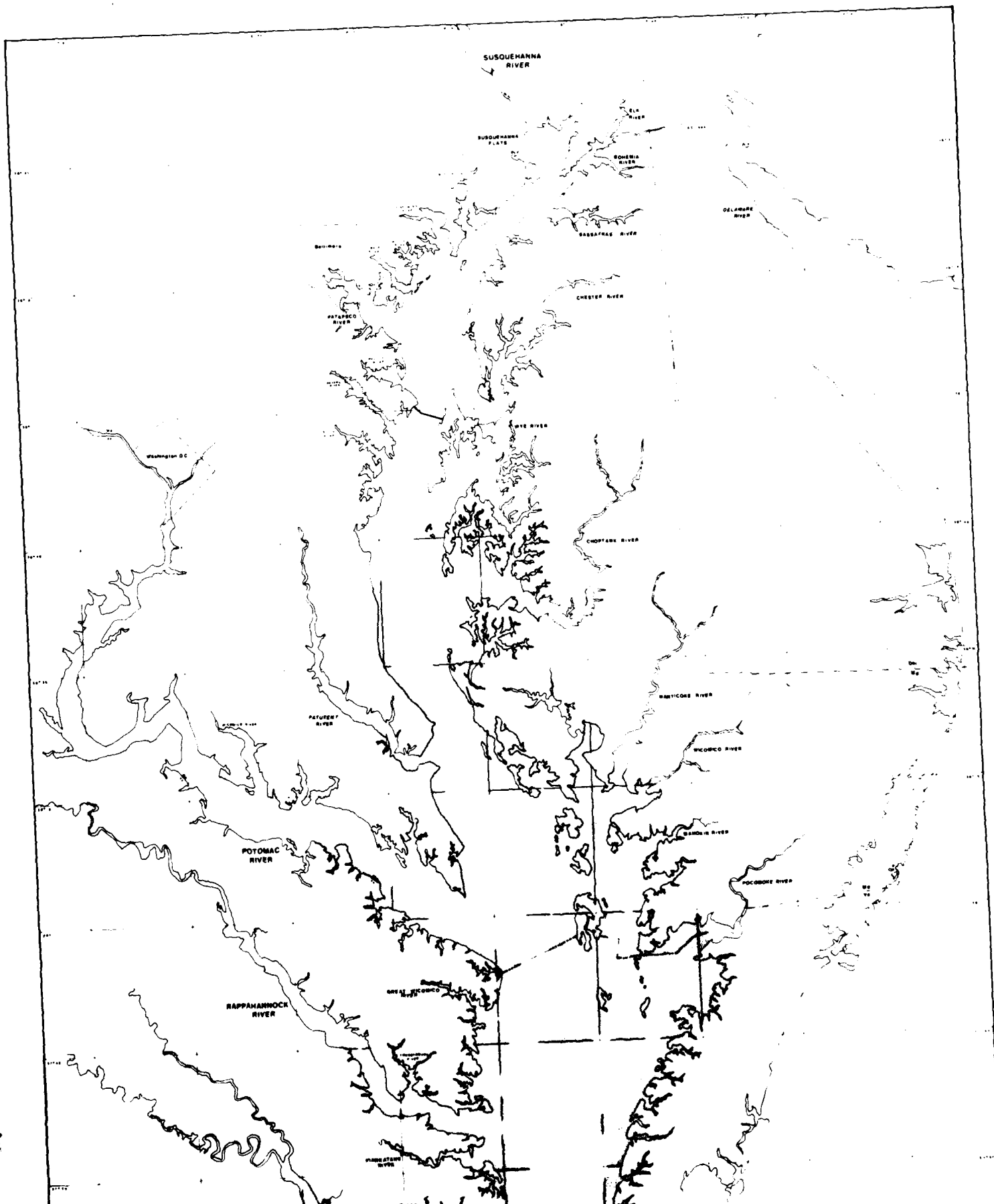
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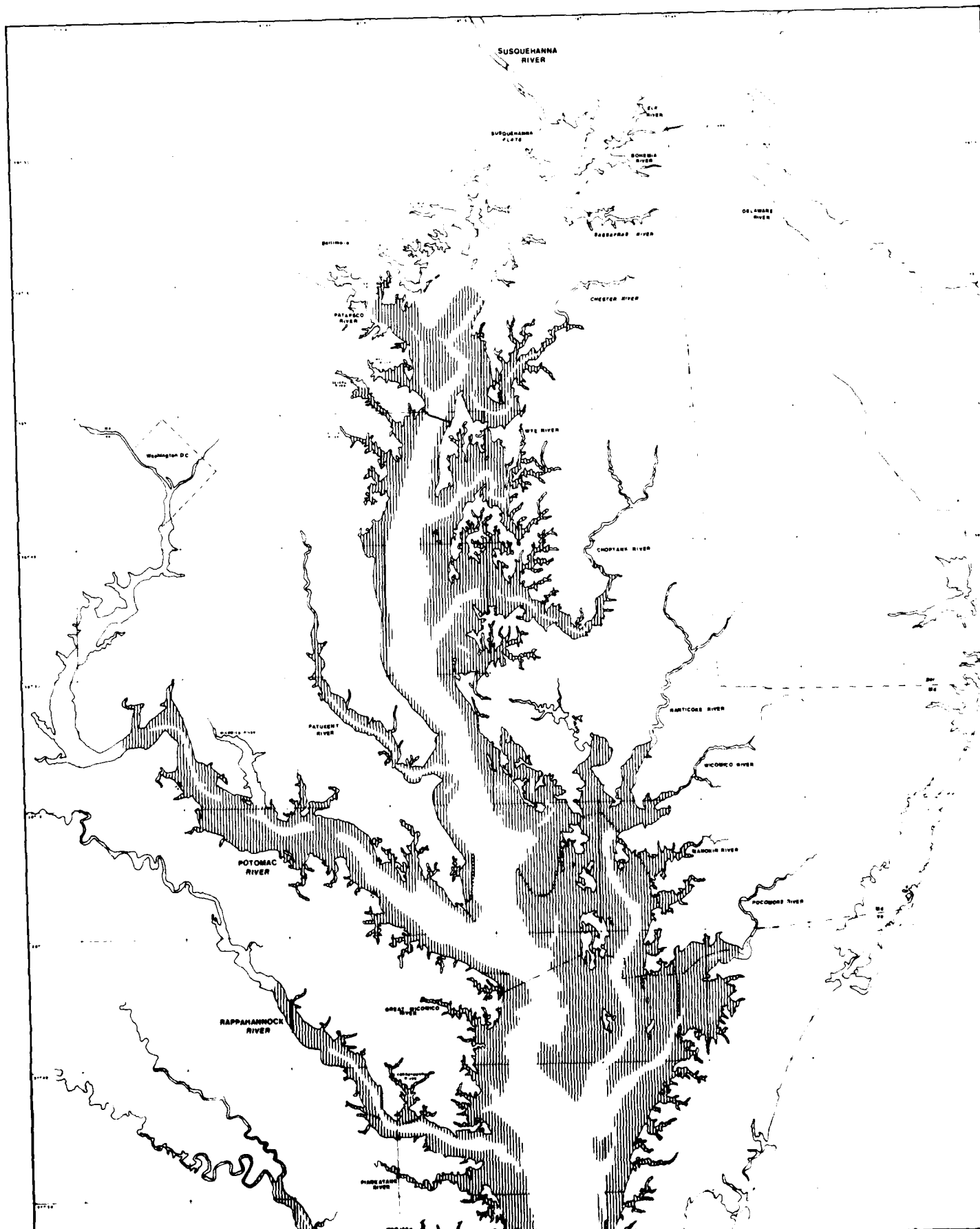


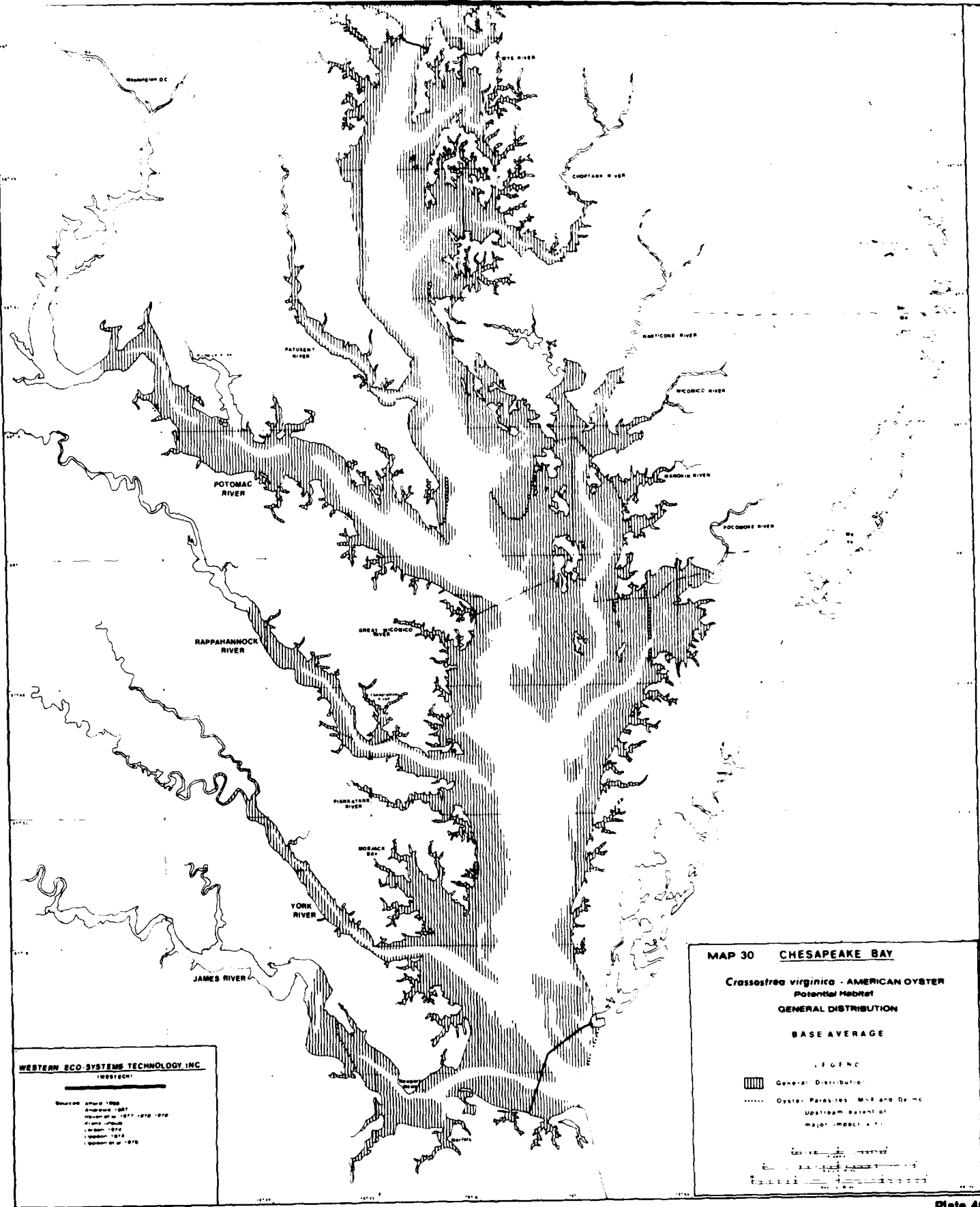


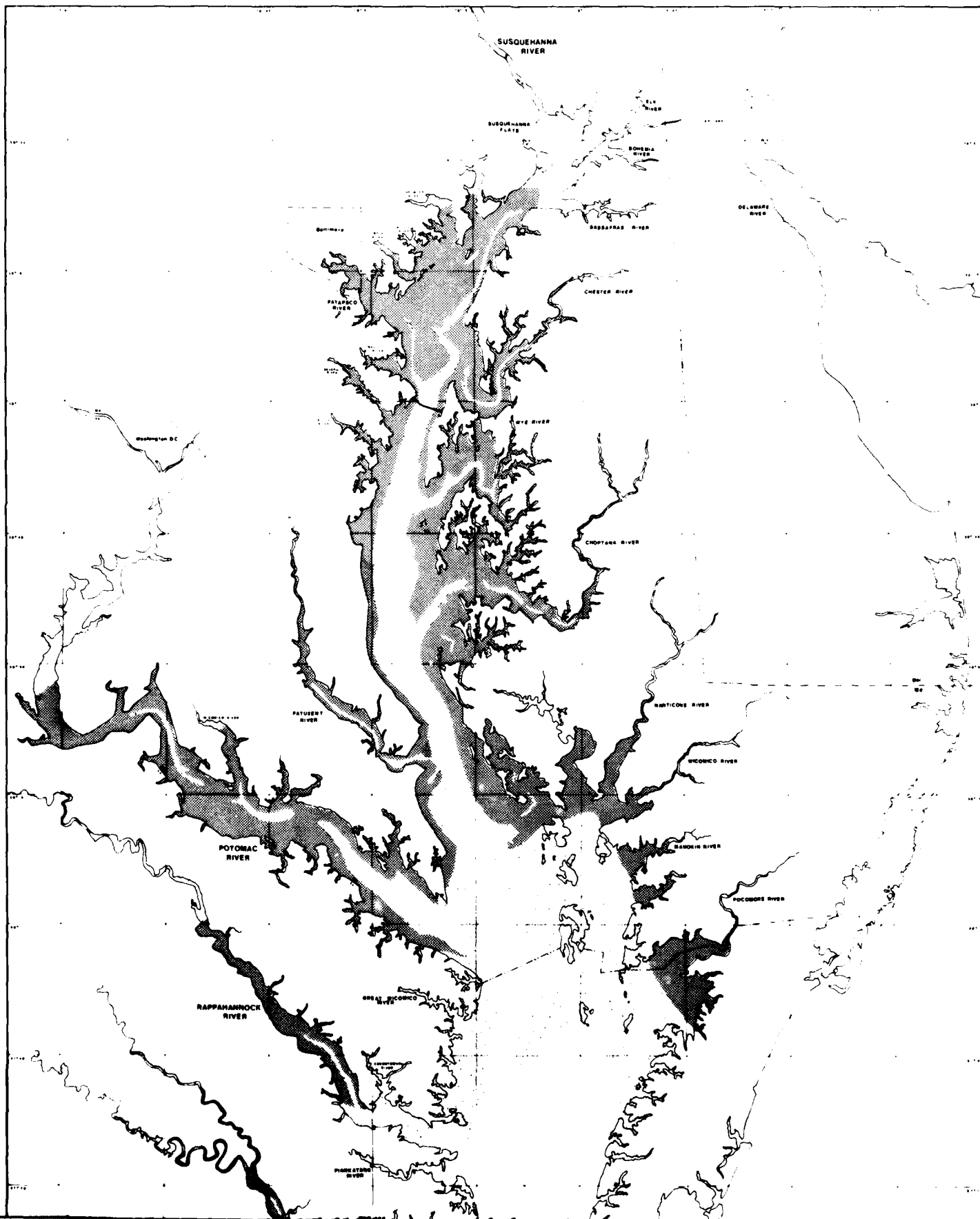


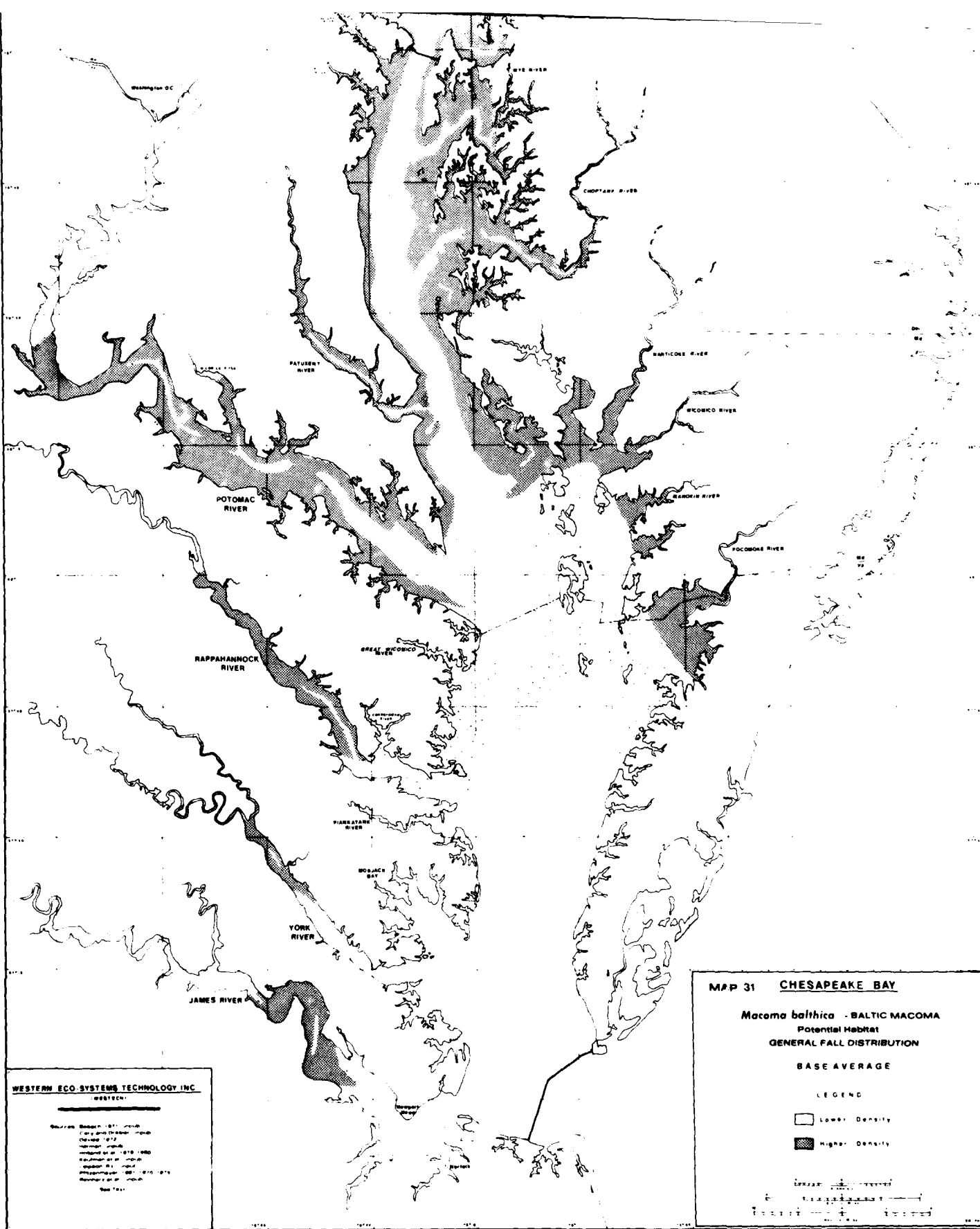


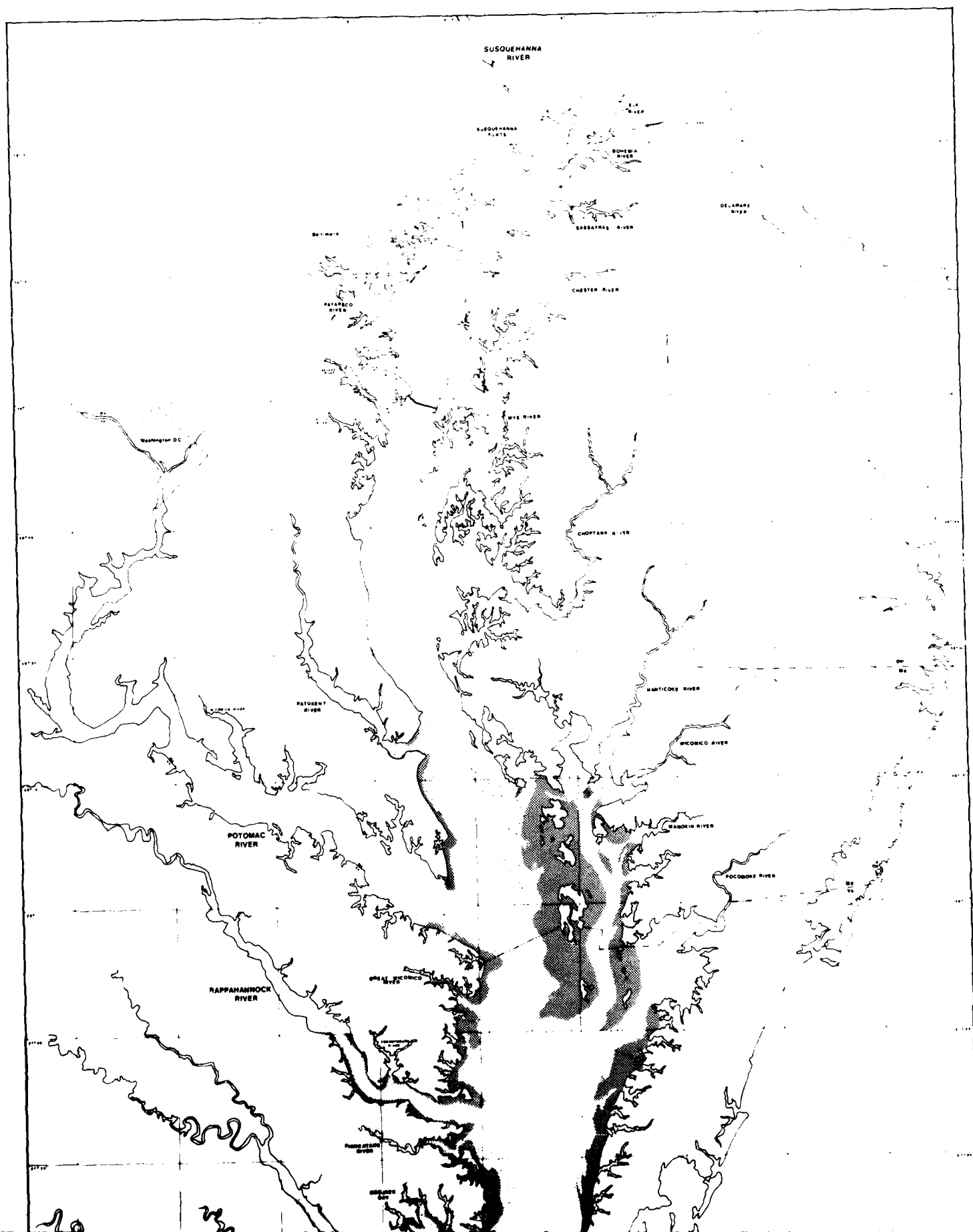


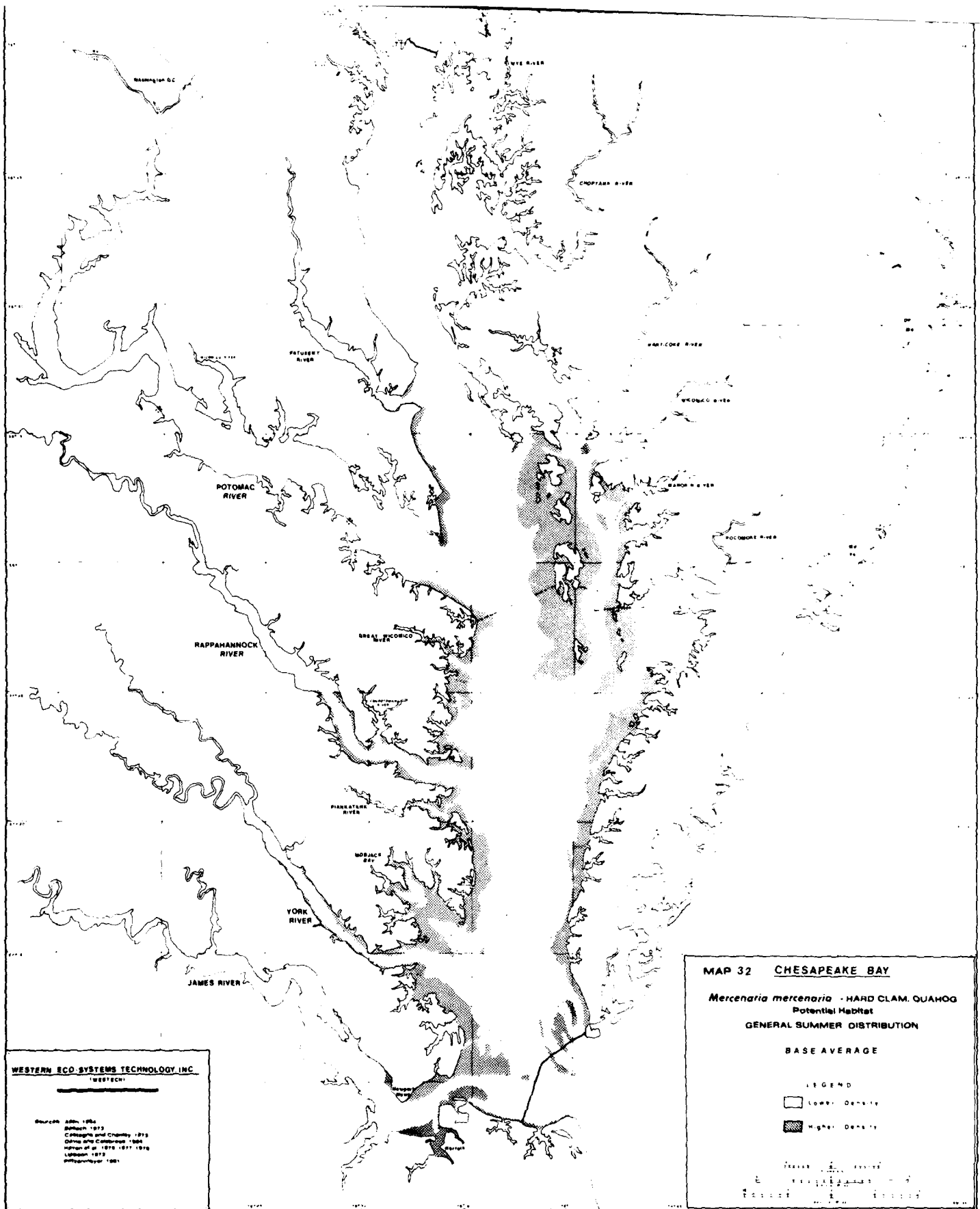




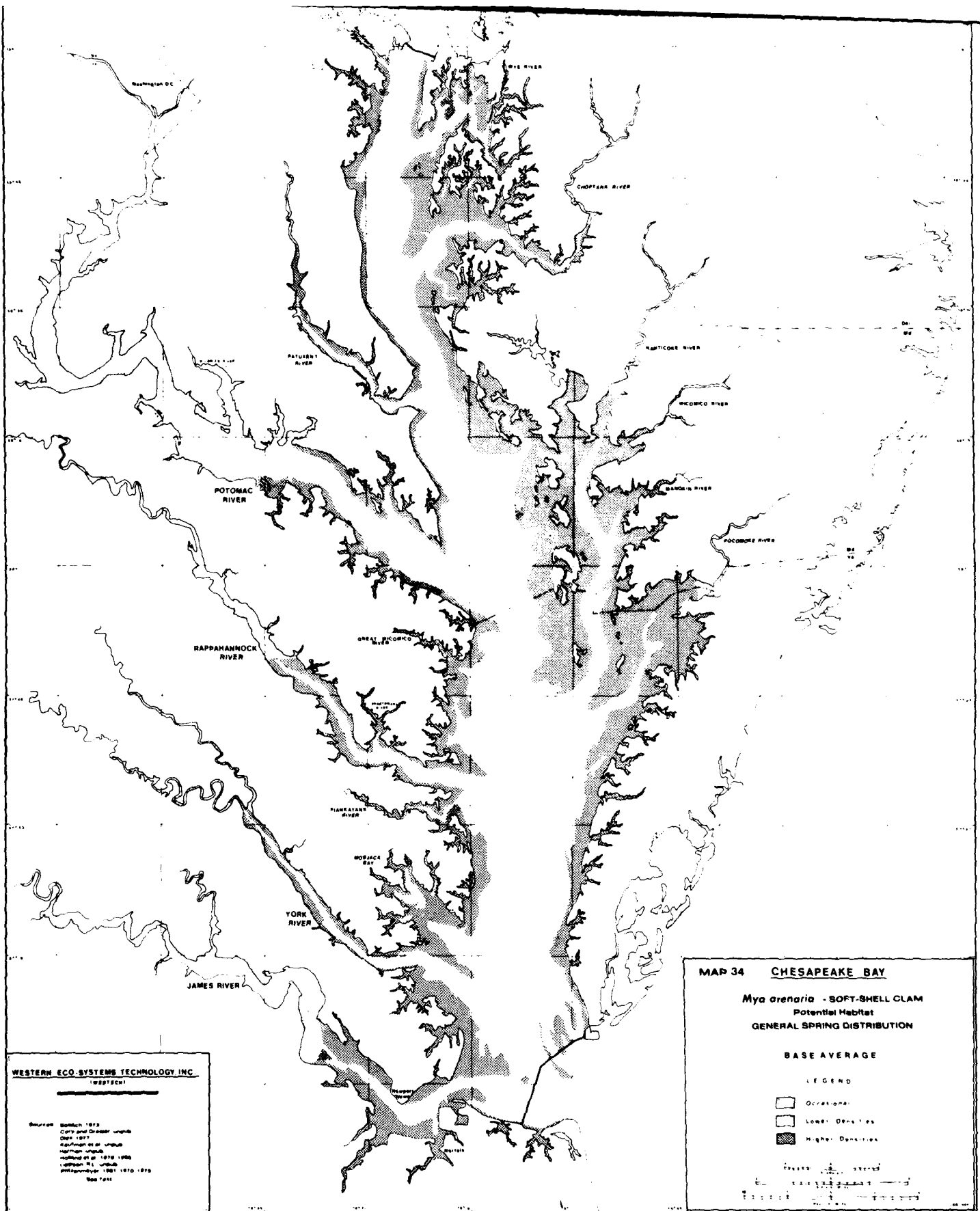


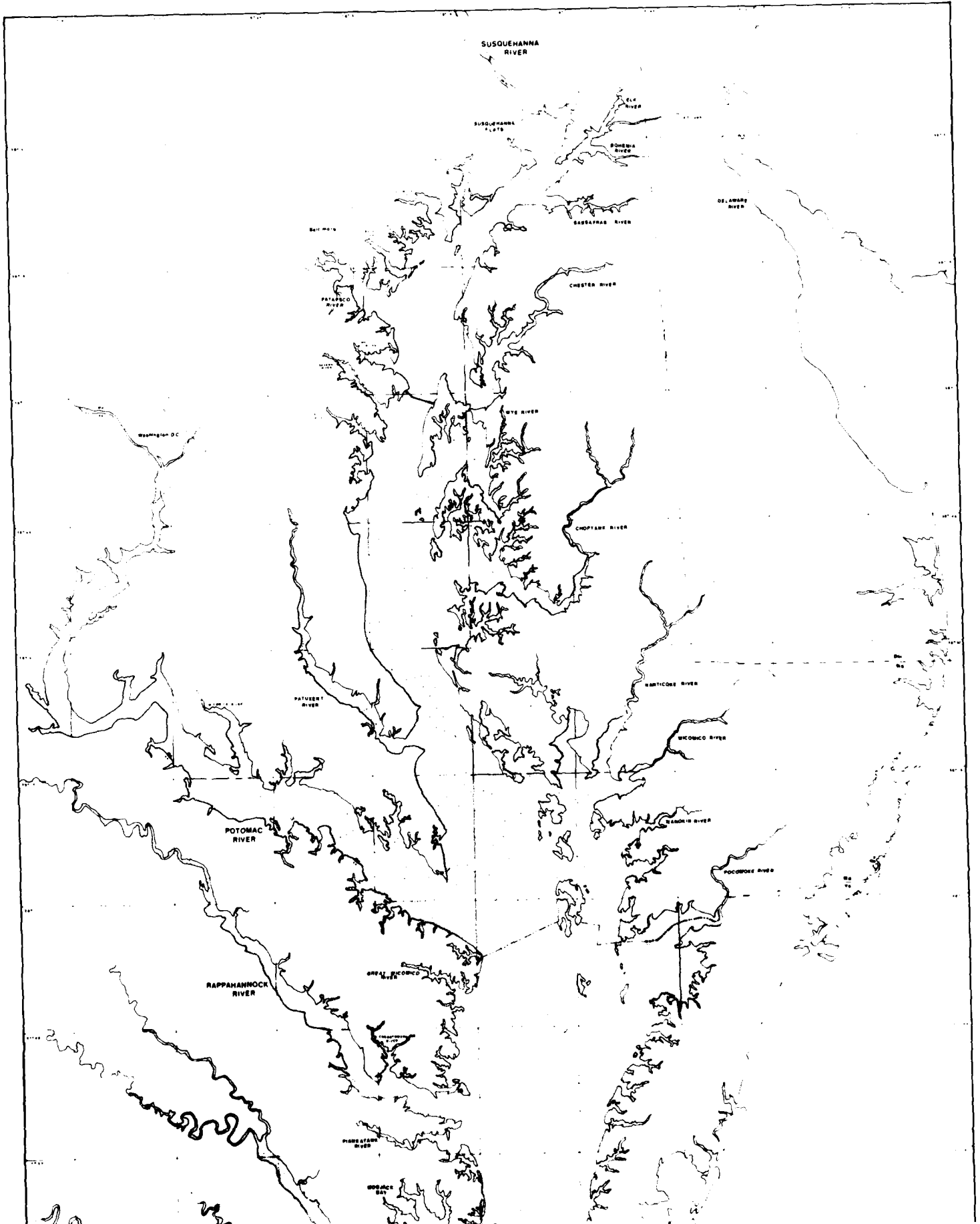


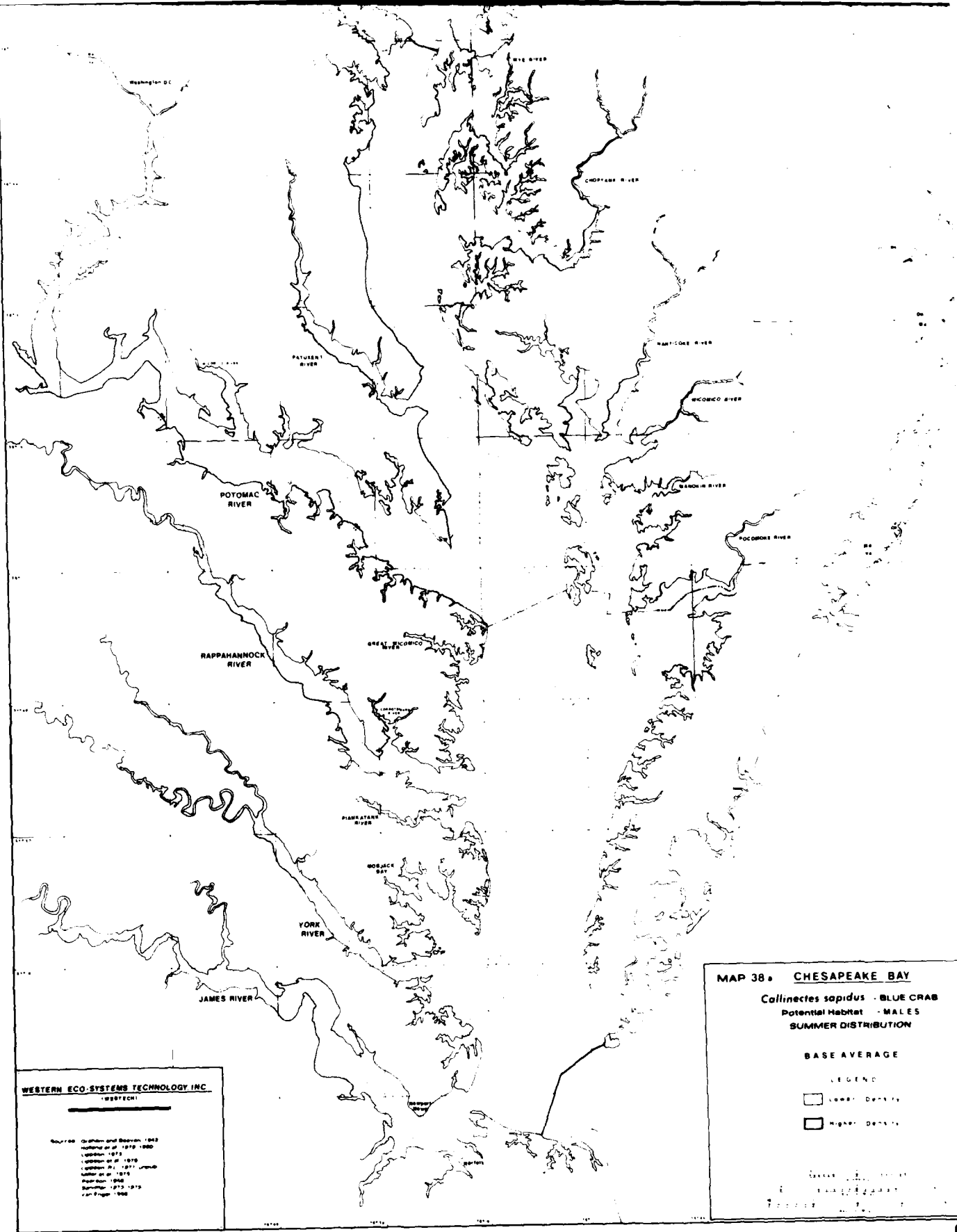


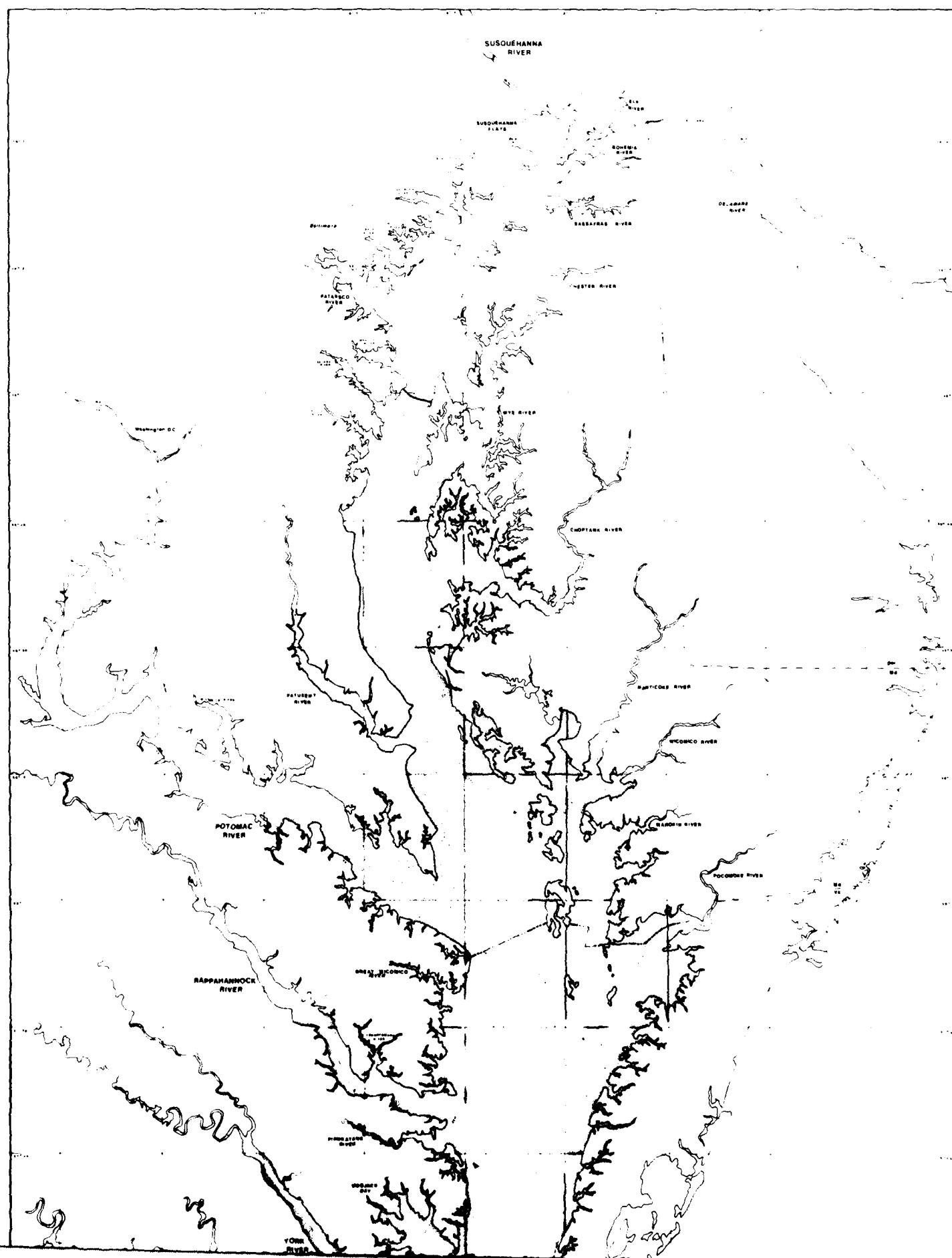


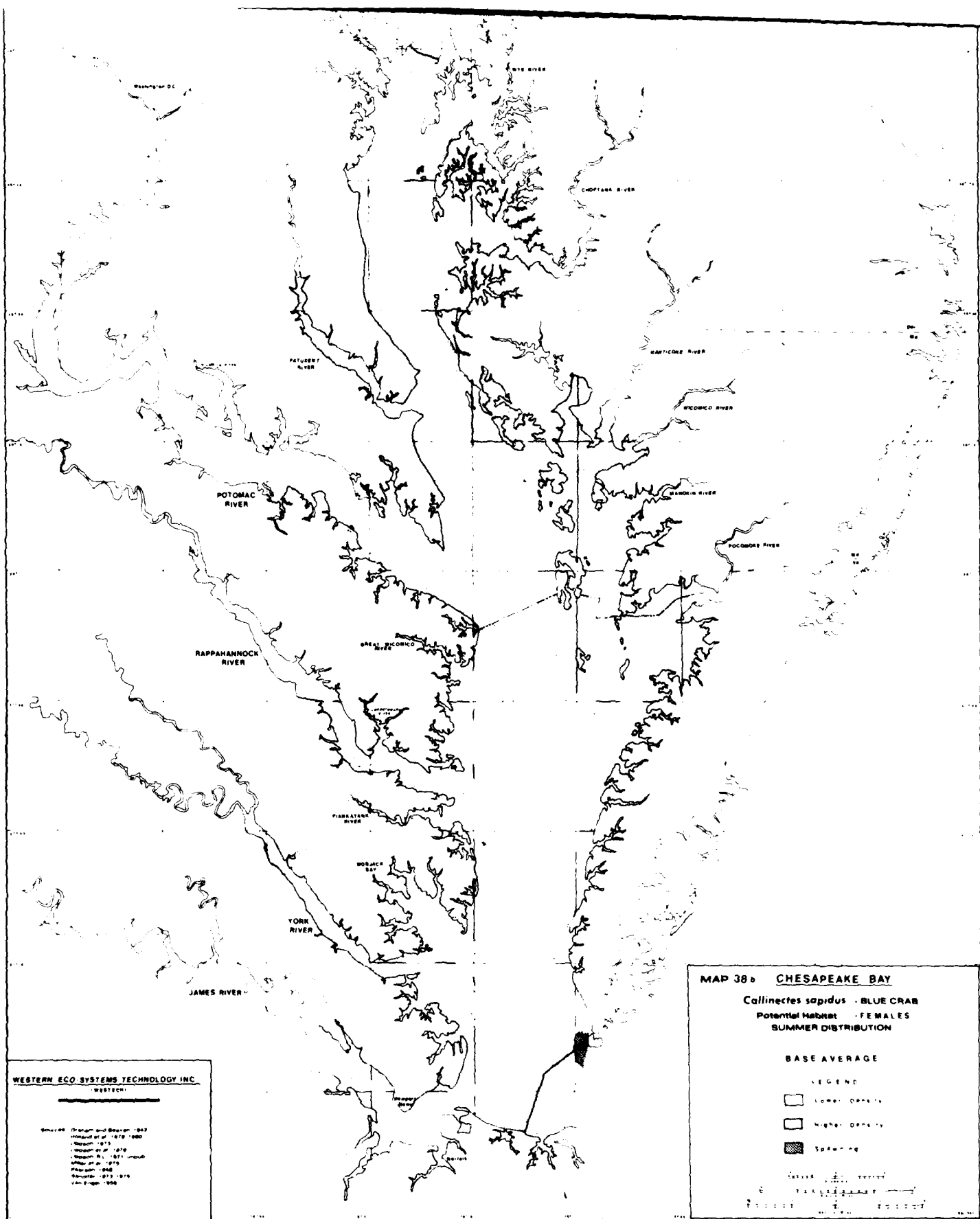


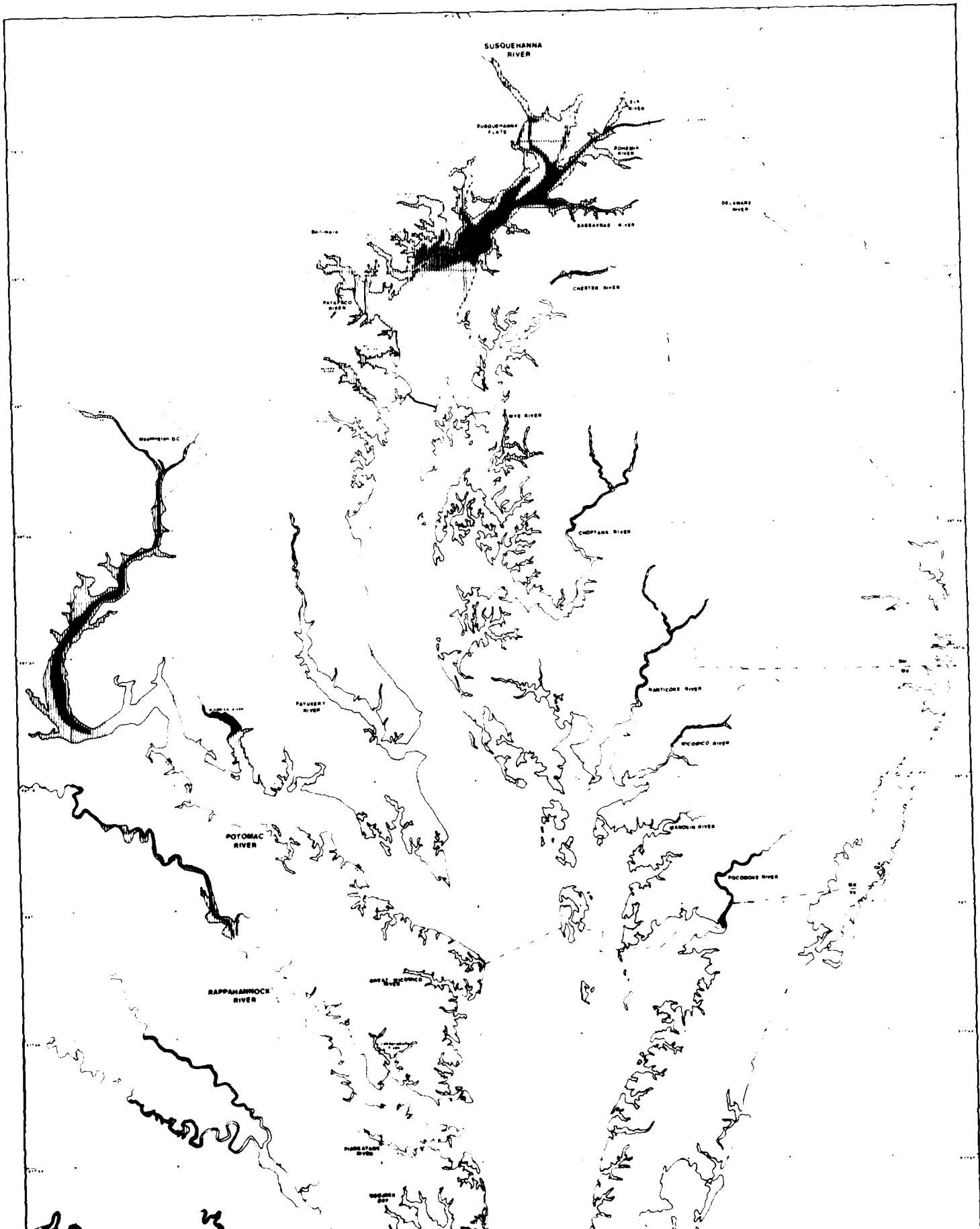


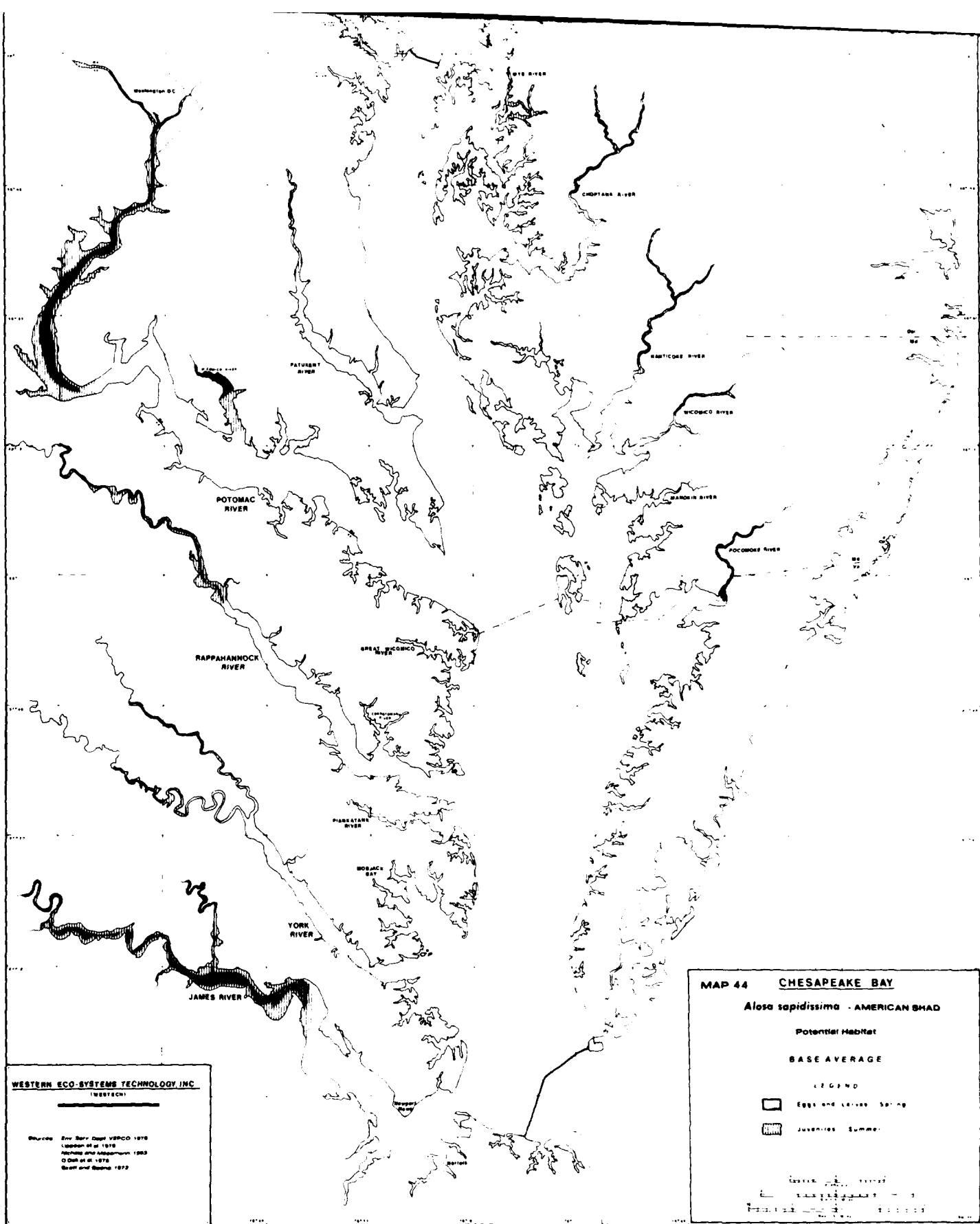


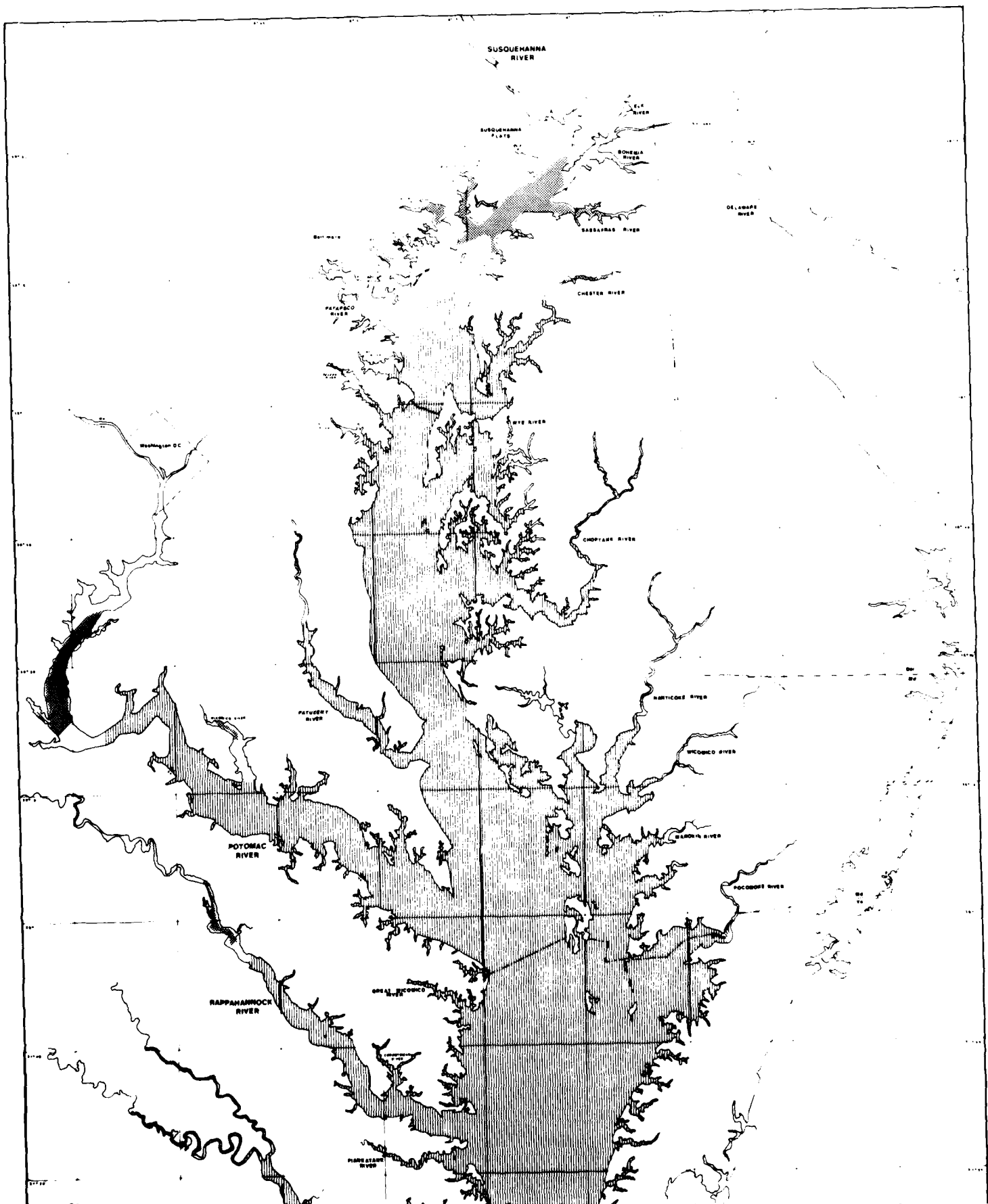


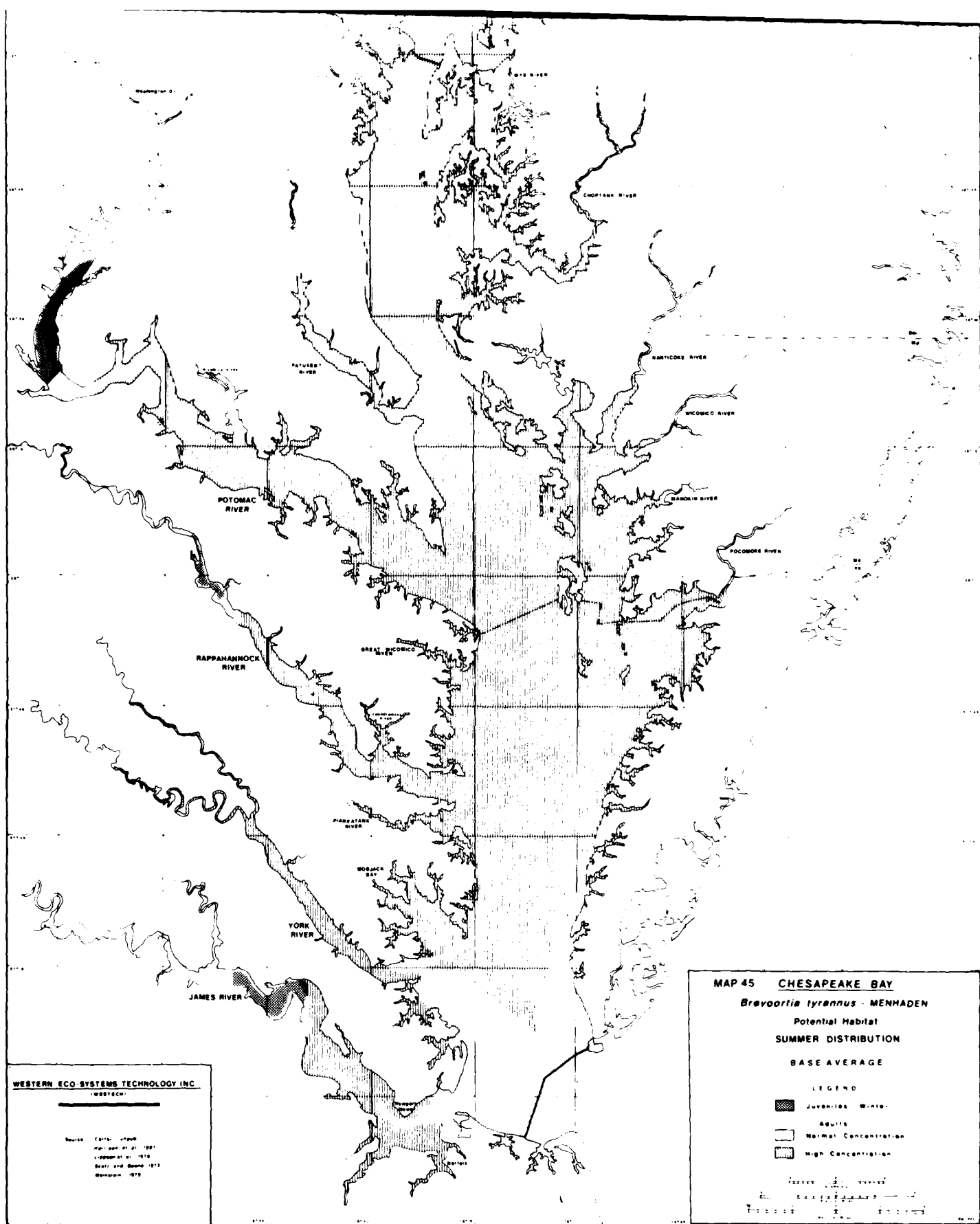


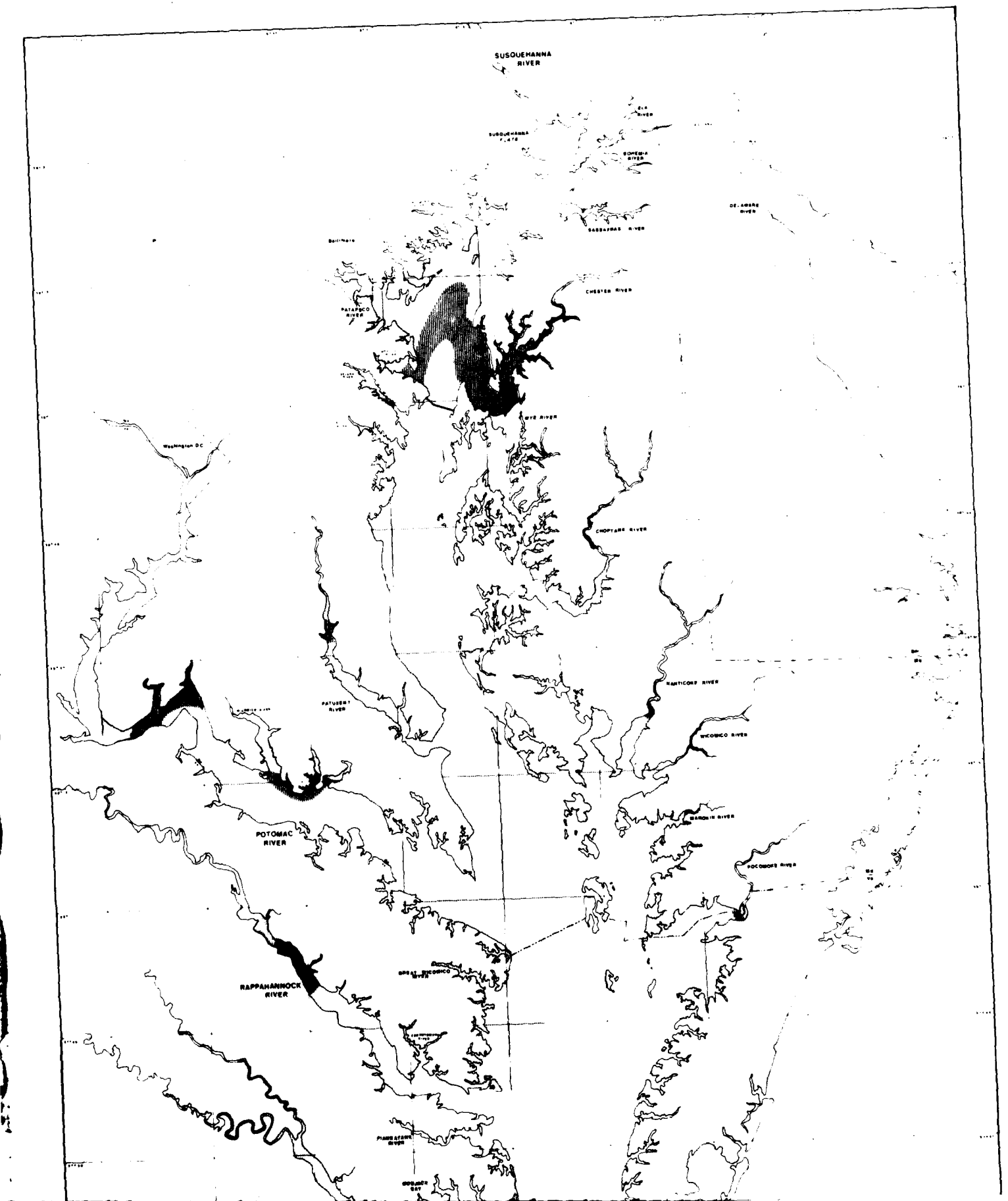


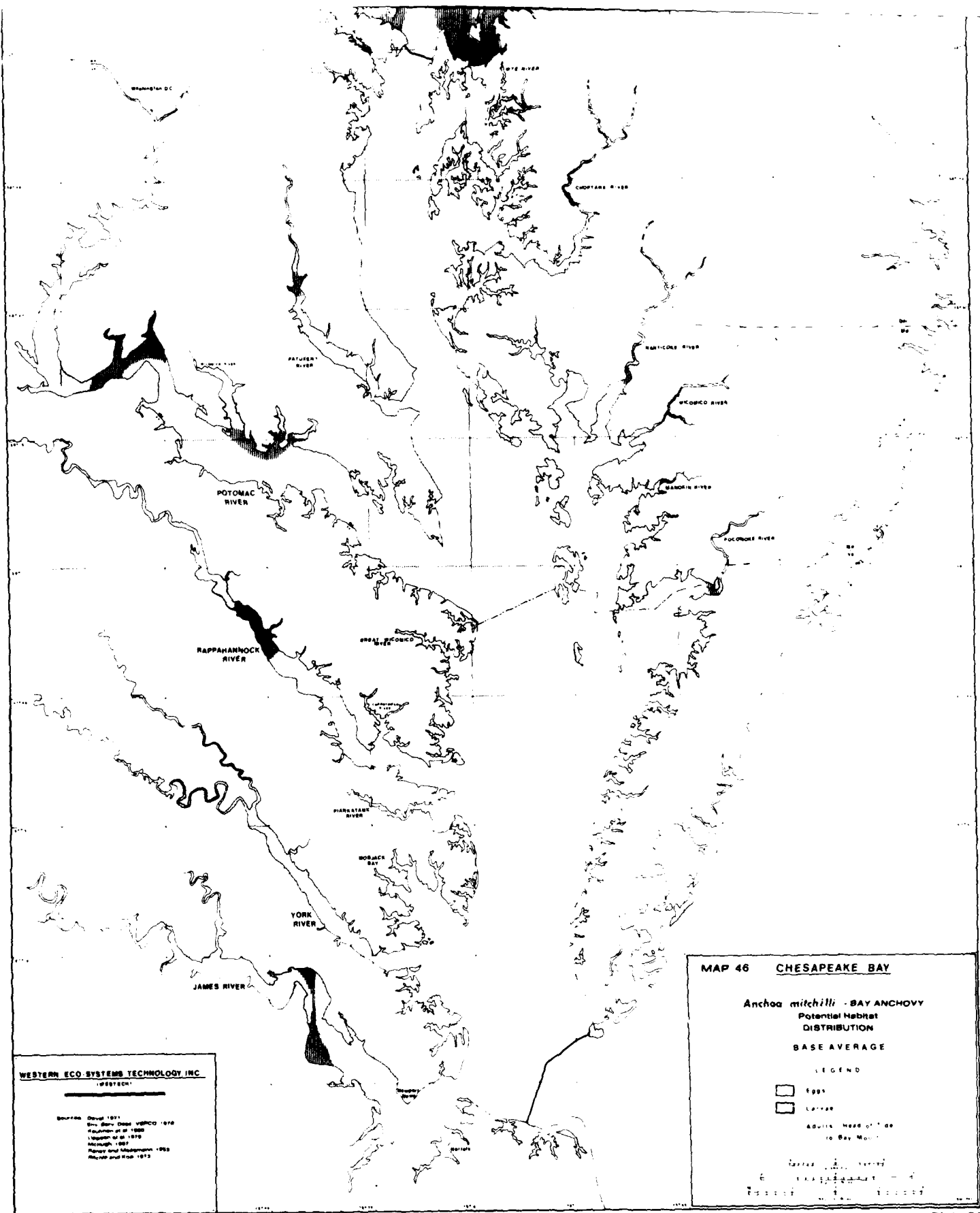


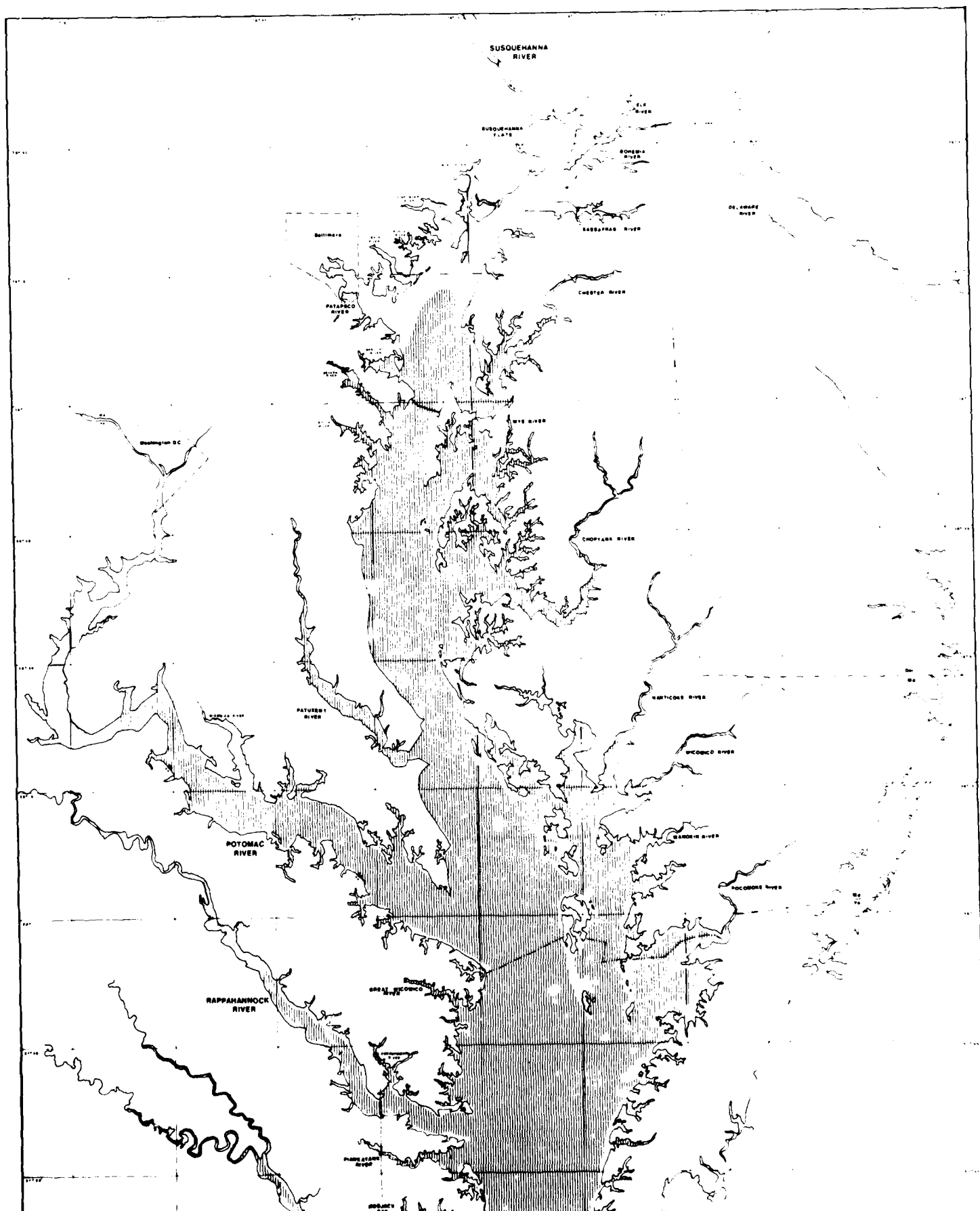


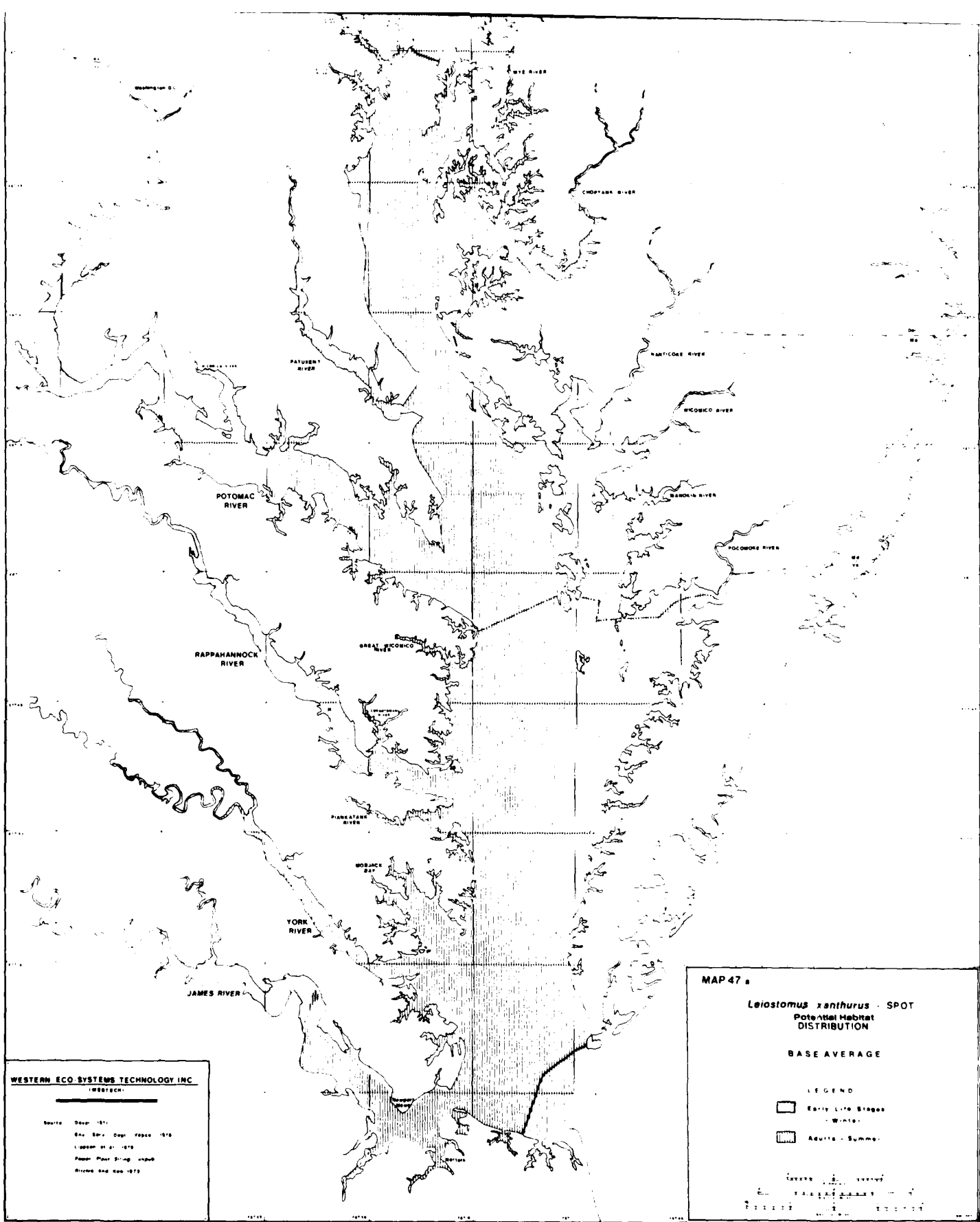


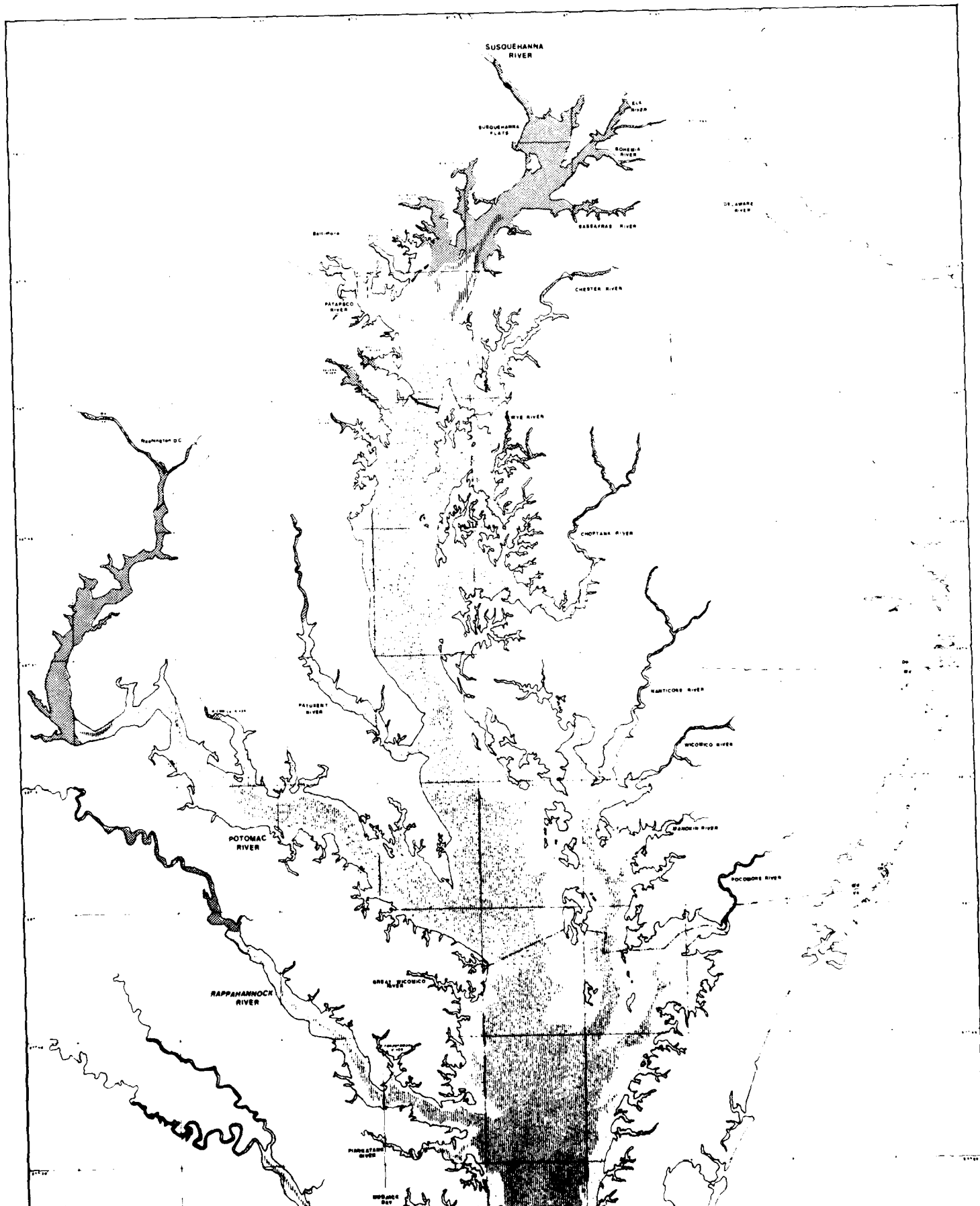


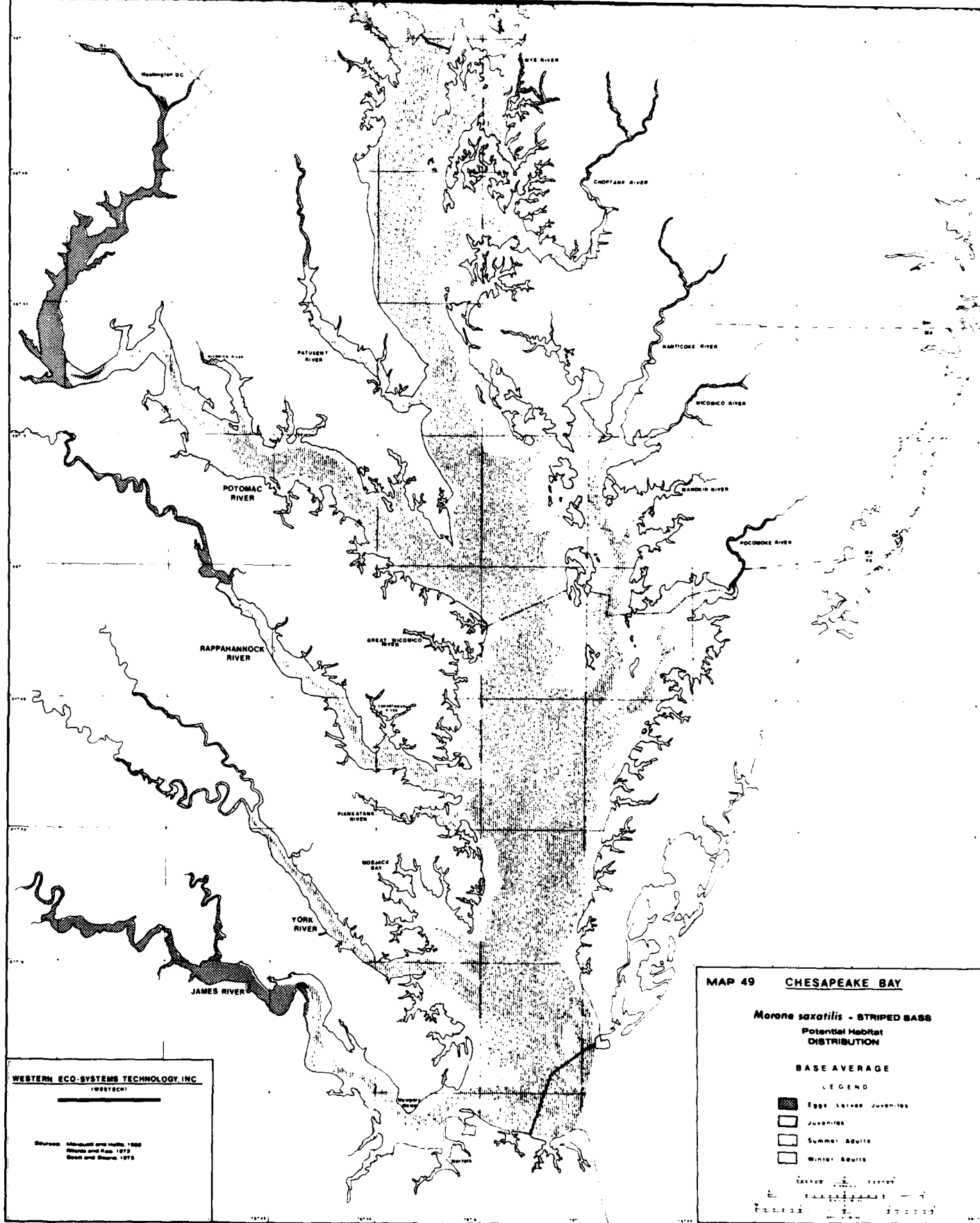


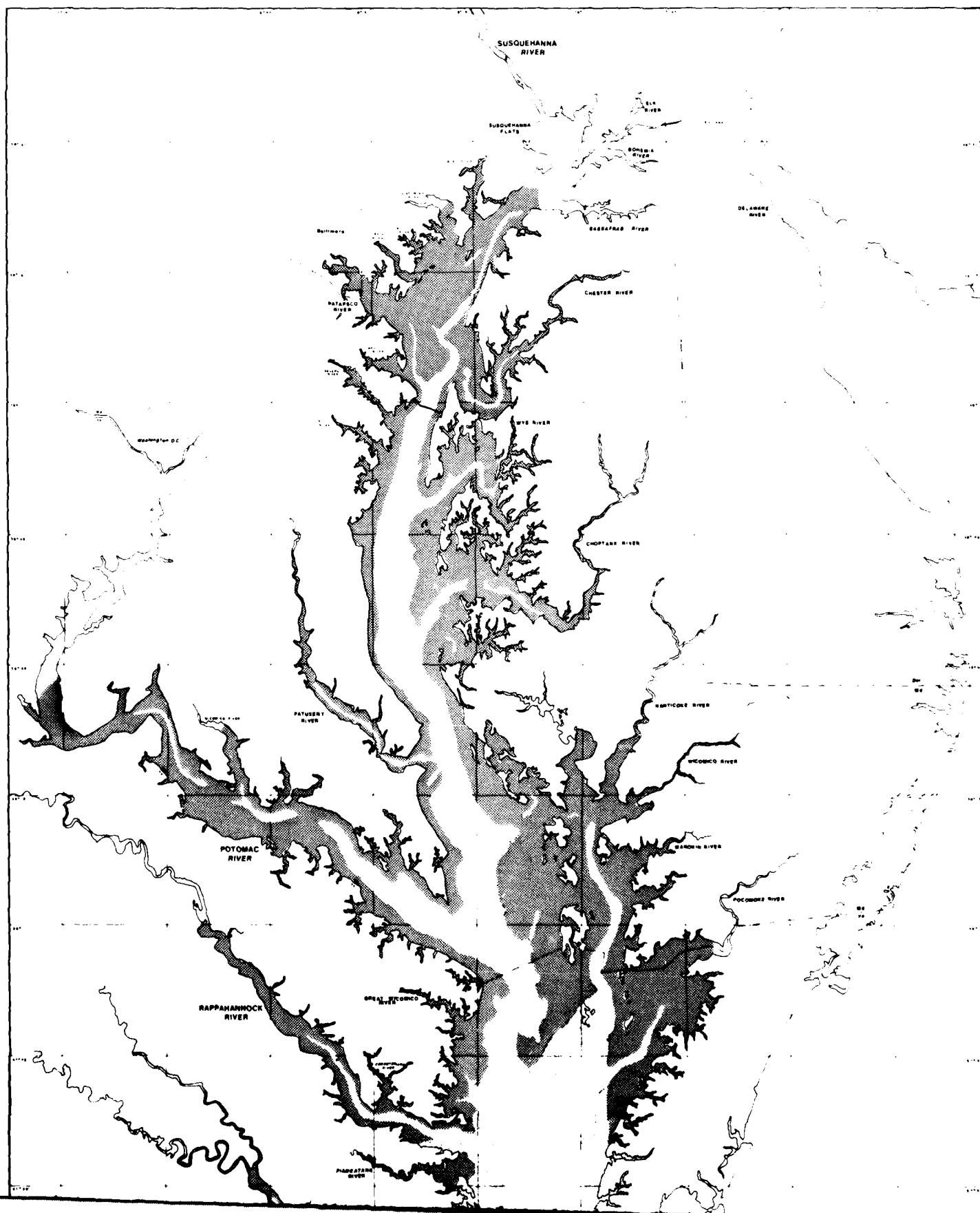


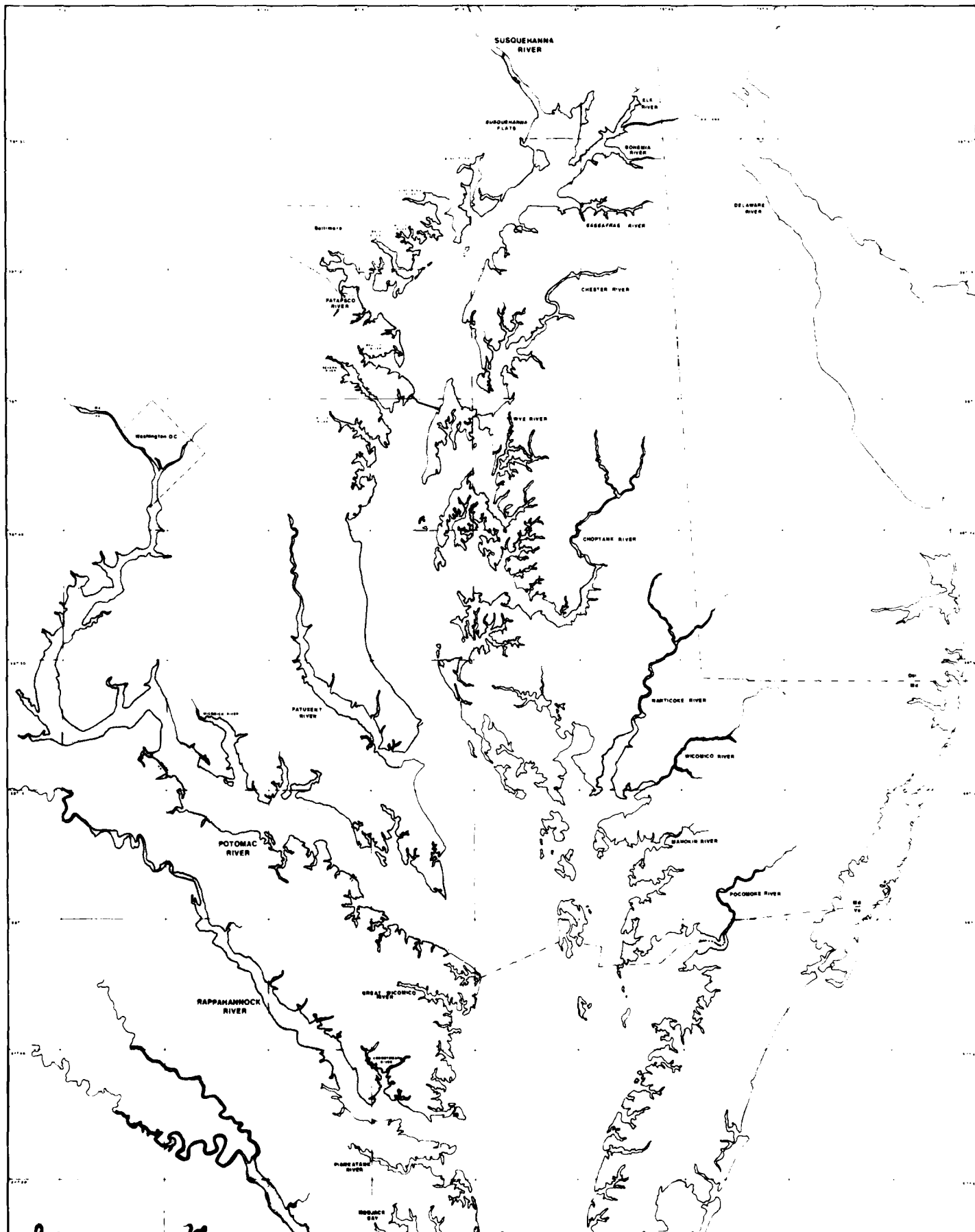


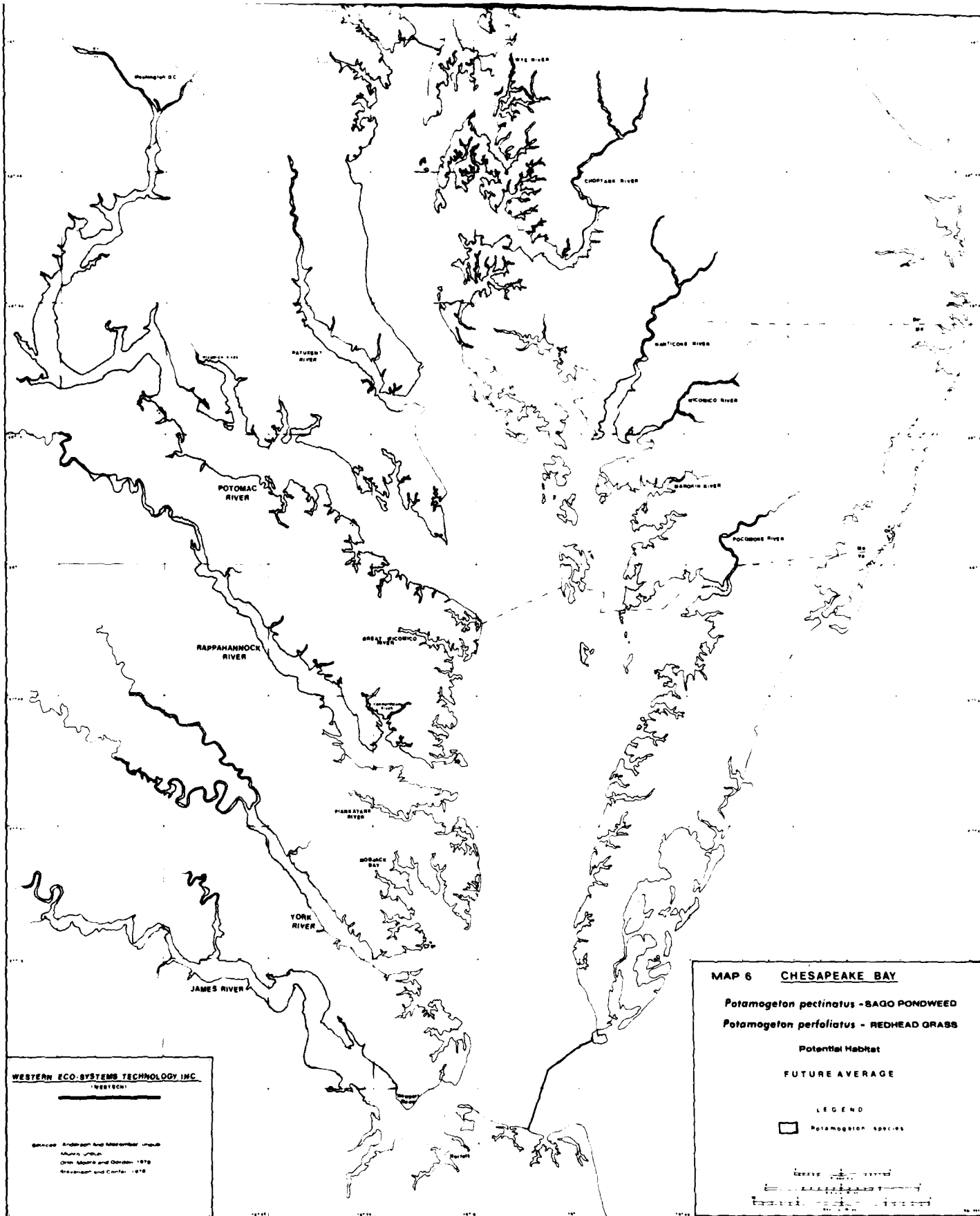






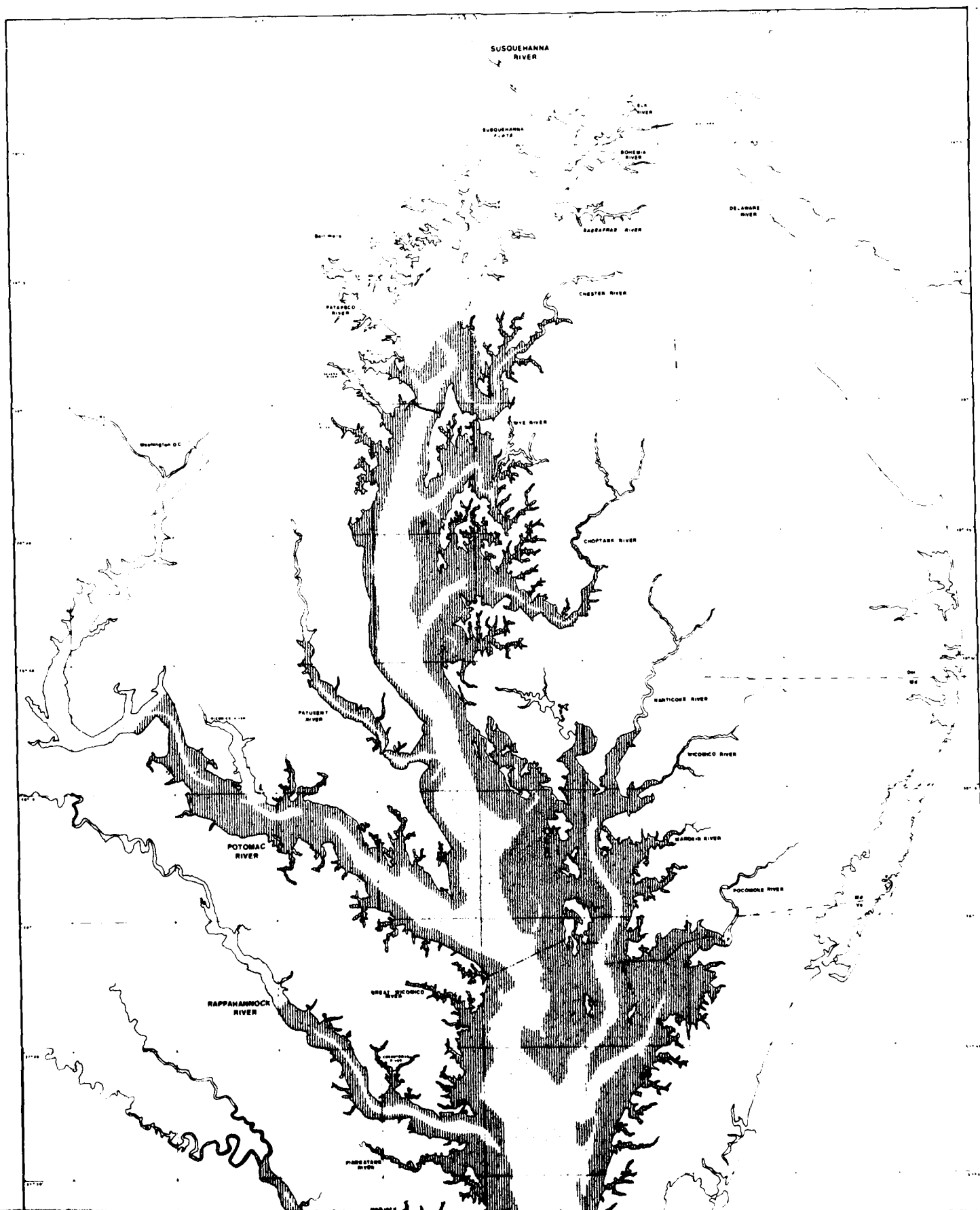


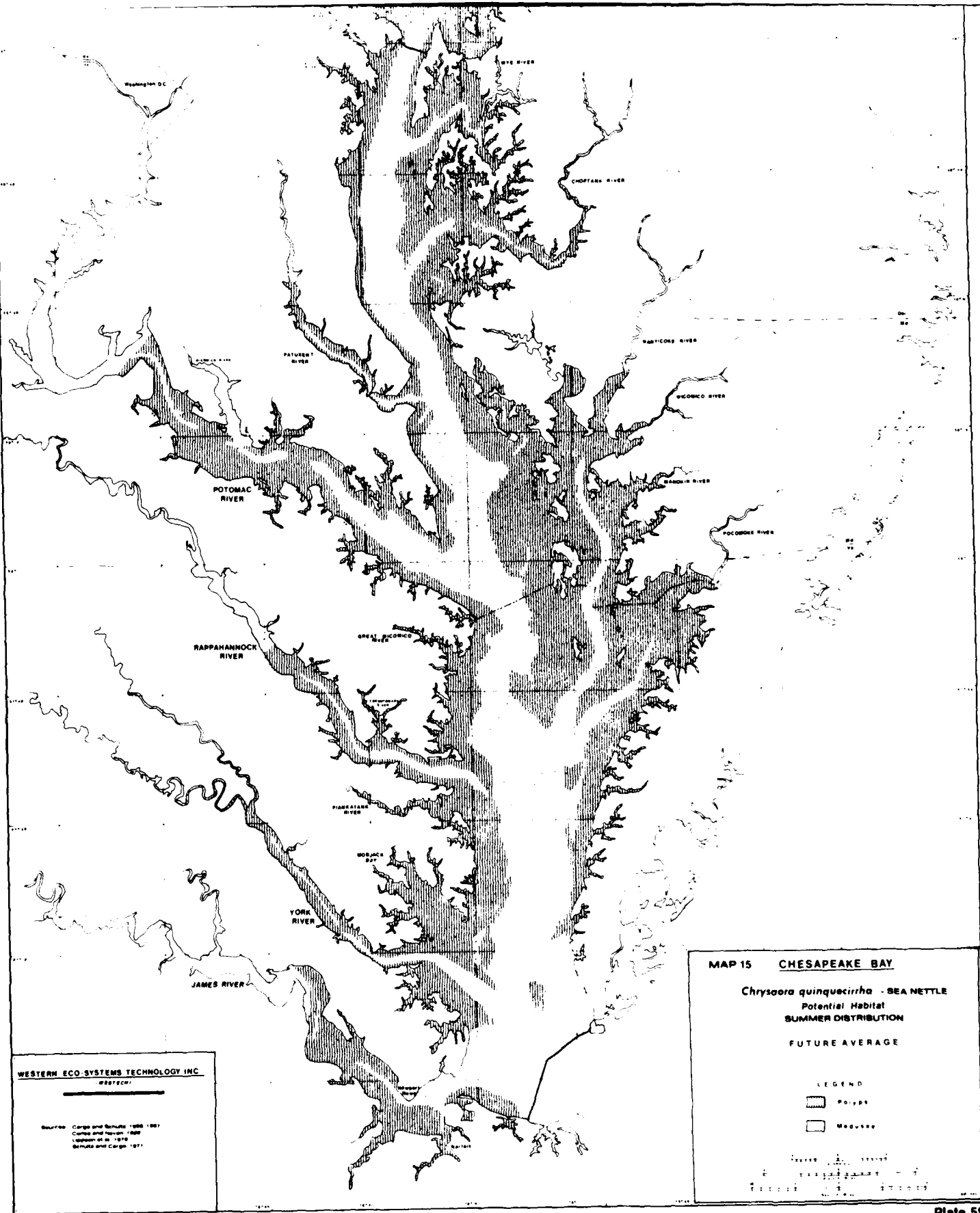


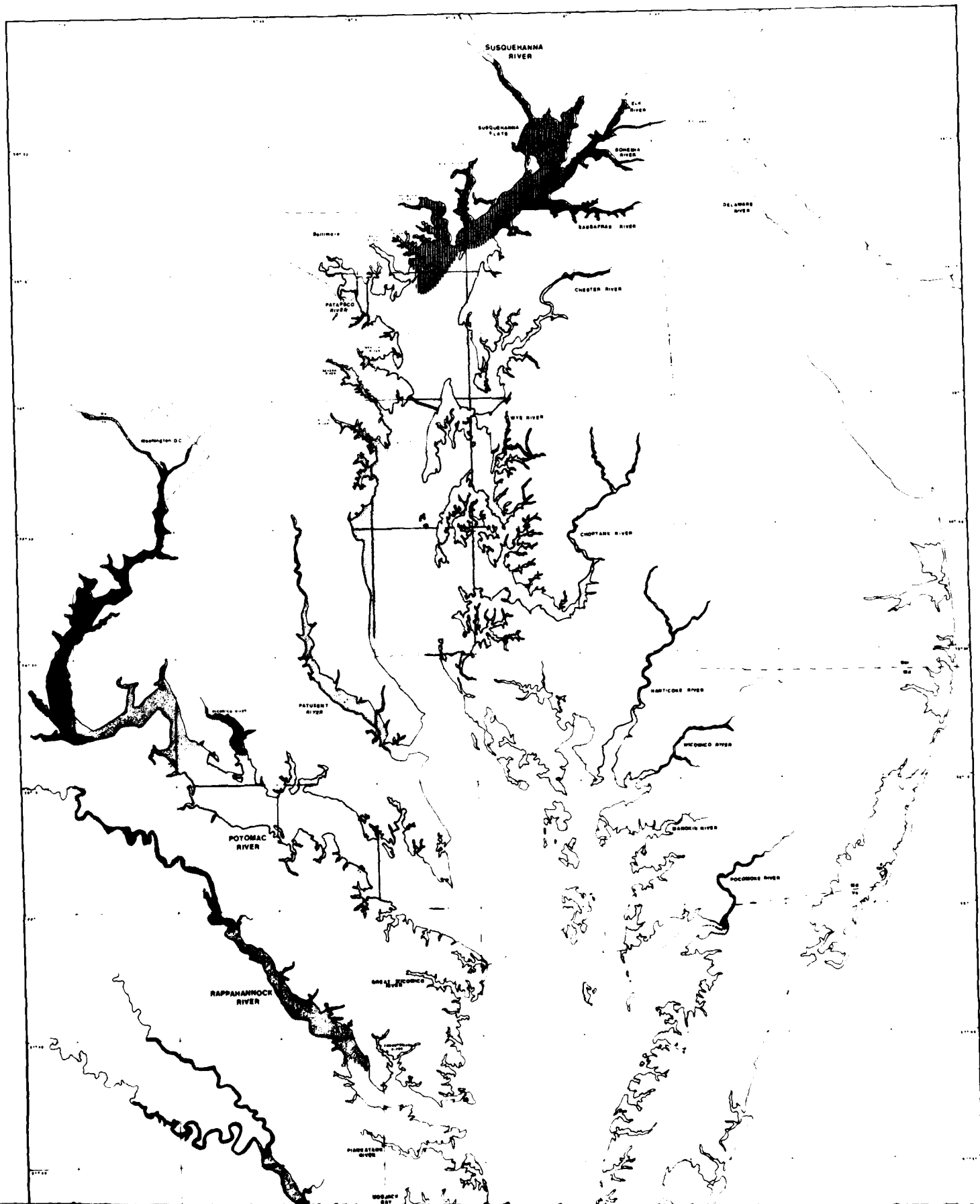


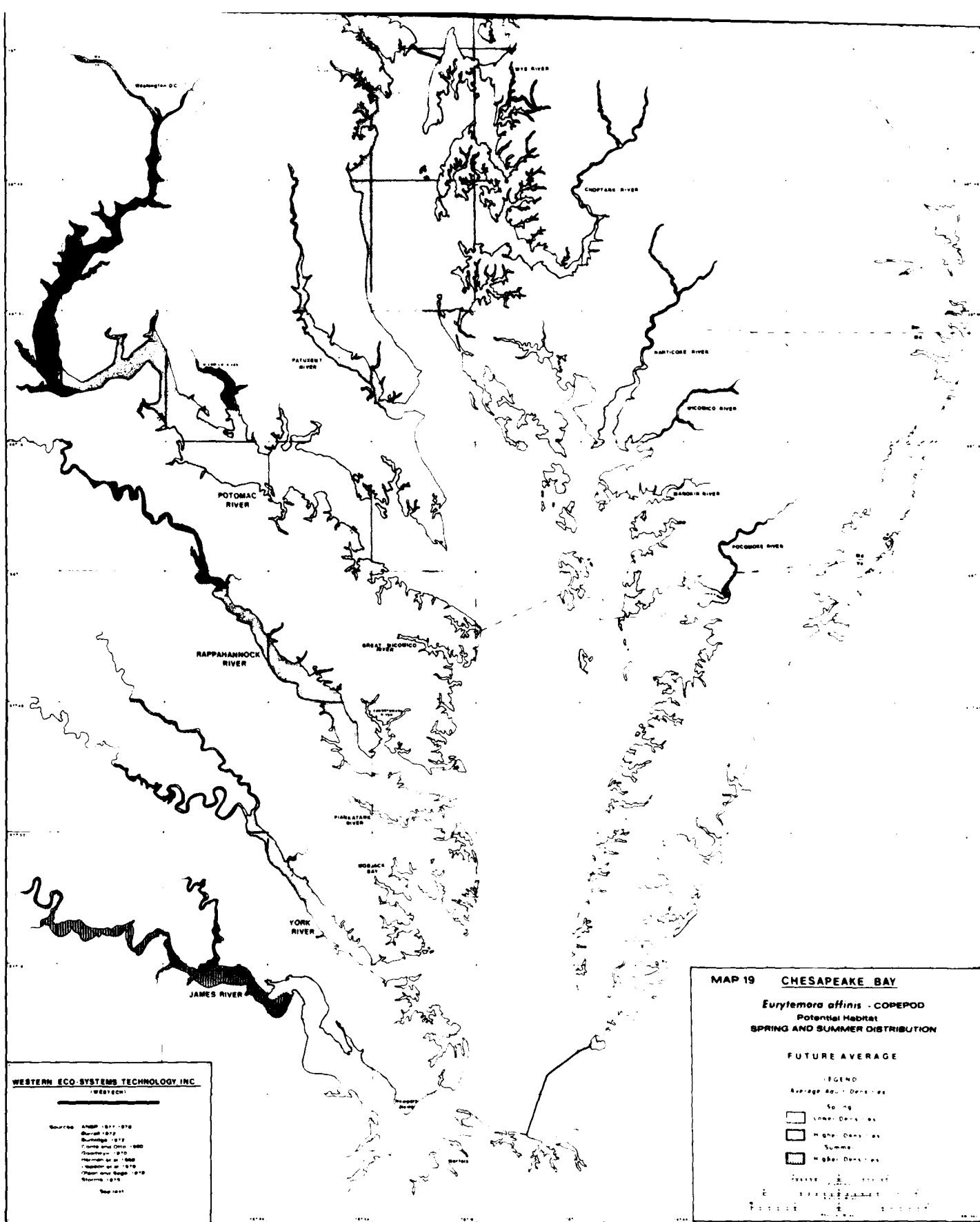
WESTERN ECO-SYSTEMS TECHNOLOGY INC.
 WESTECH

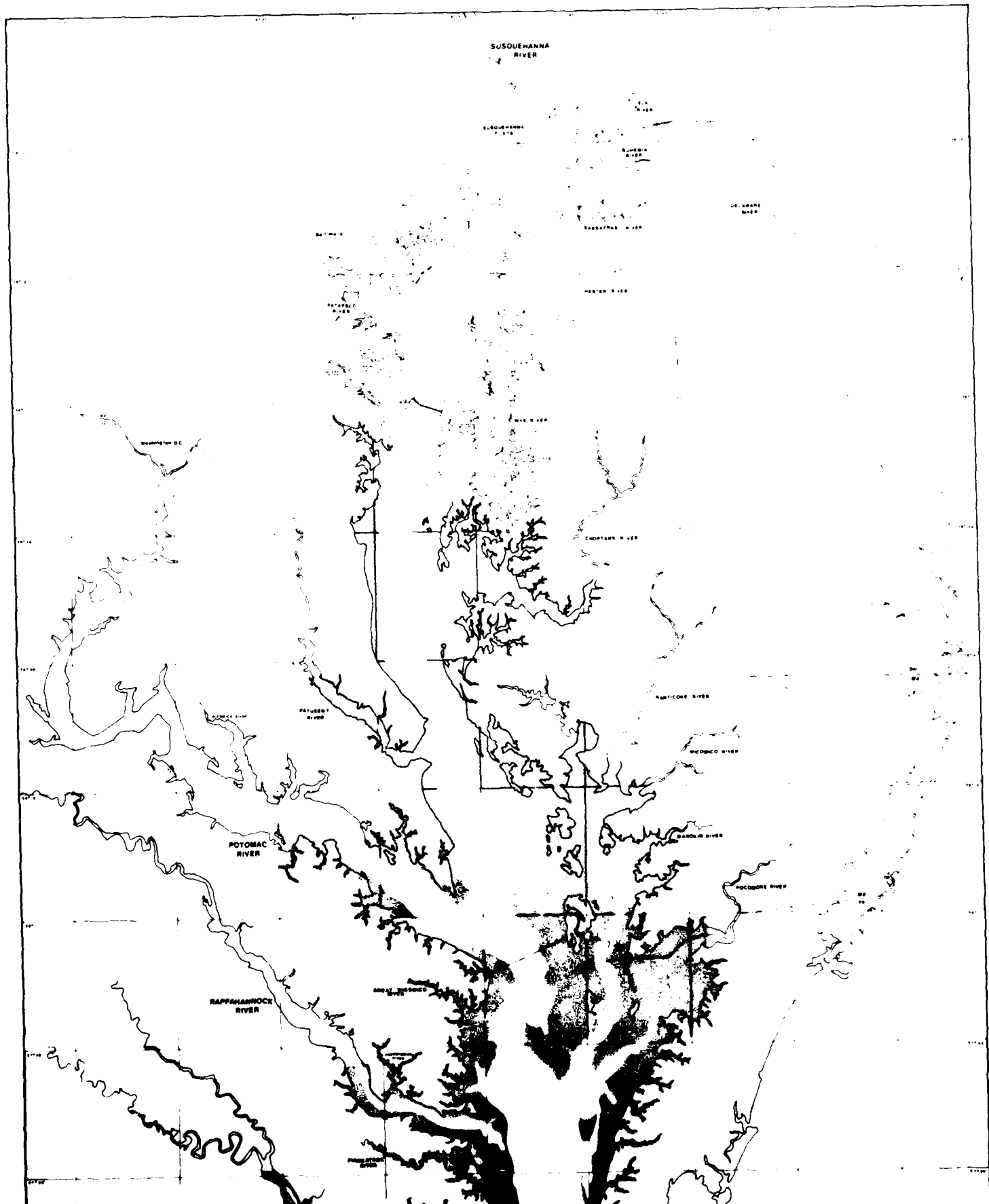
Source: Anderson and Macomber, 1964
 Allen, 1964
 Ohio, Moore and O'Brien, 1979
 Stevenson and Carter, 1978

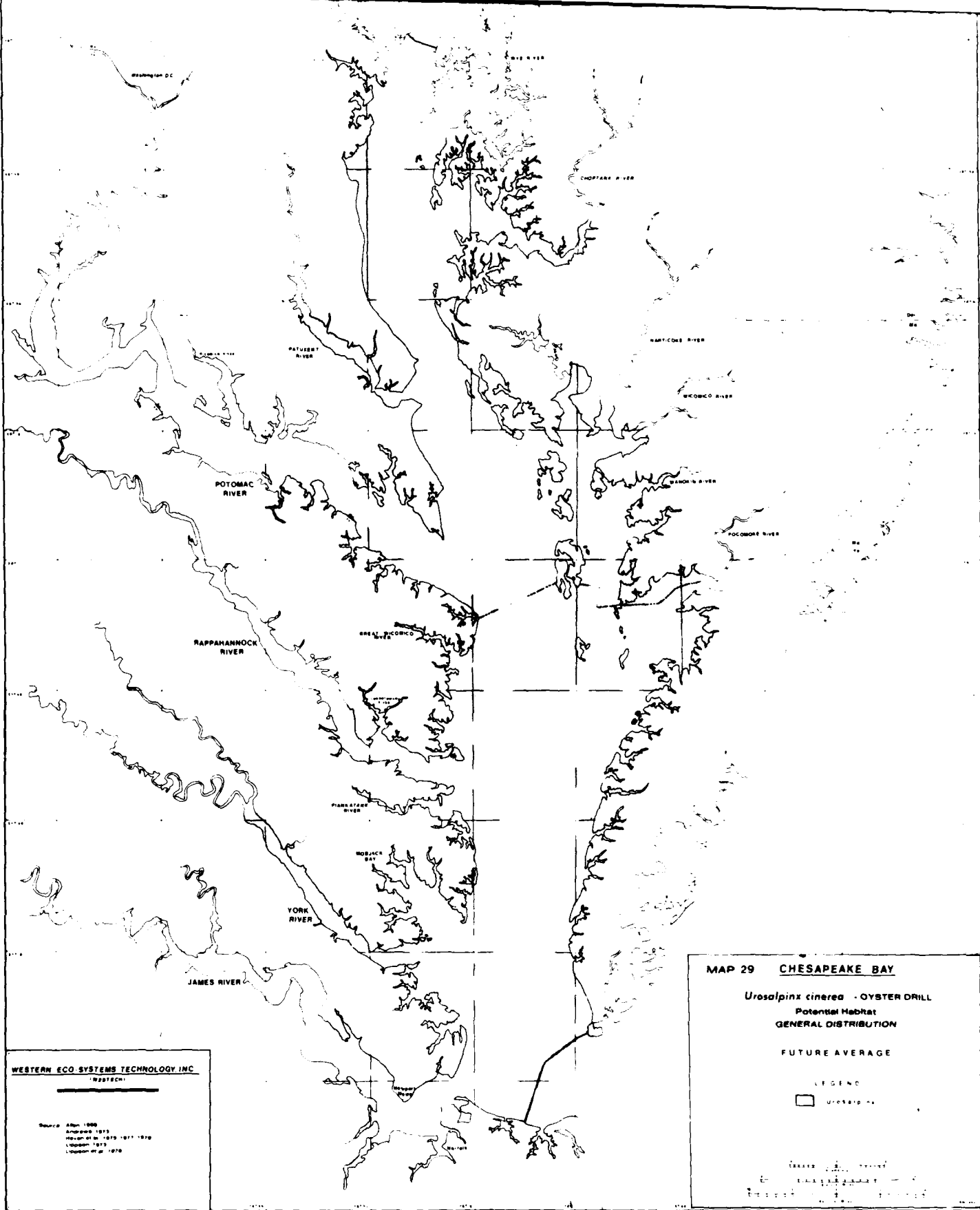




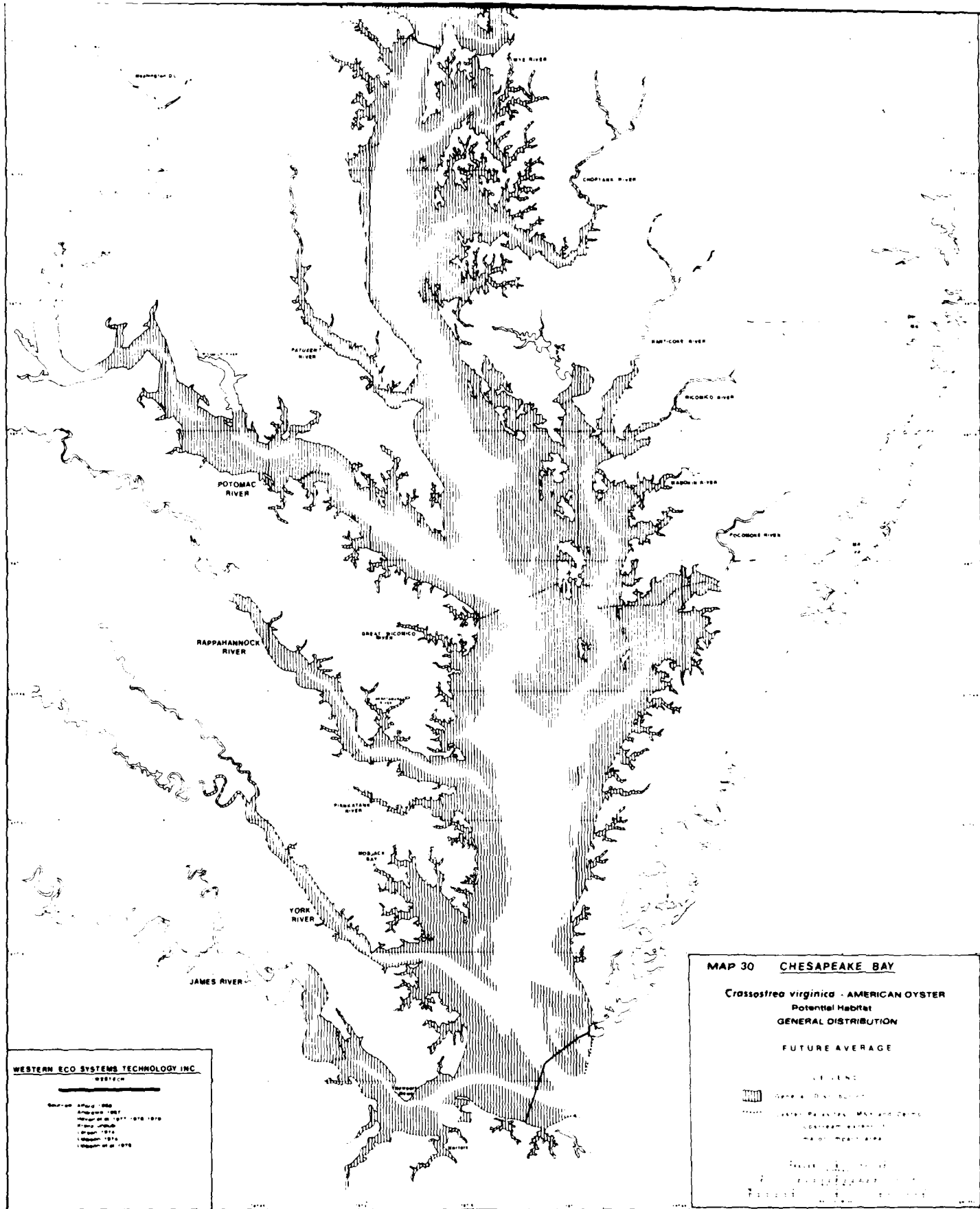




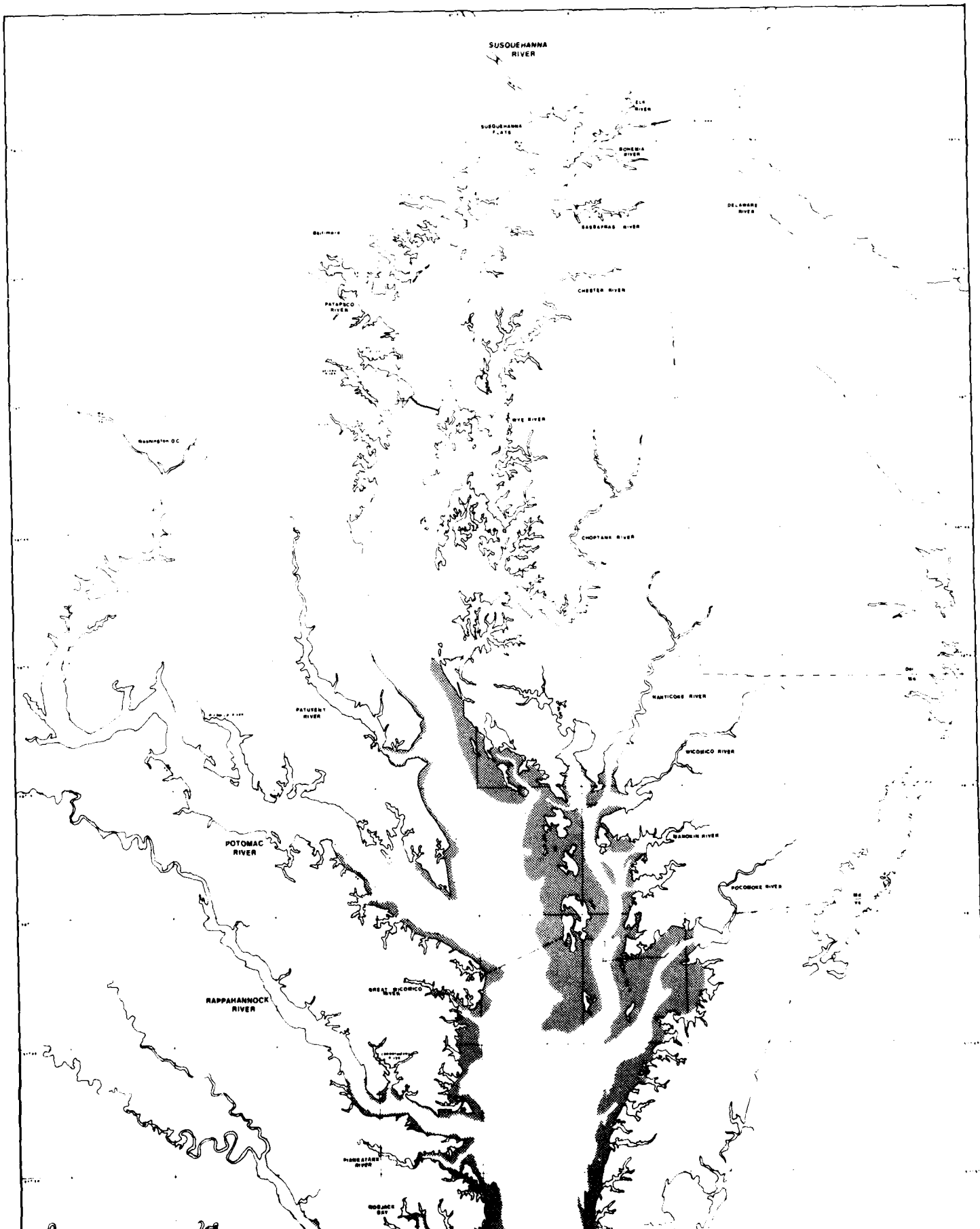


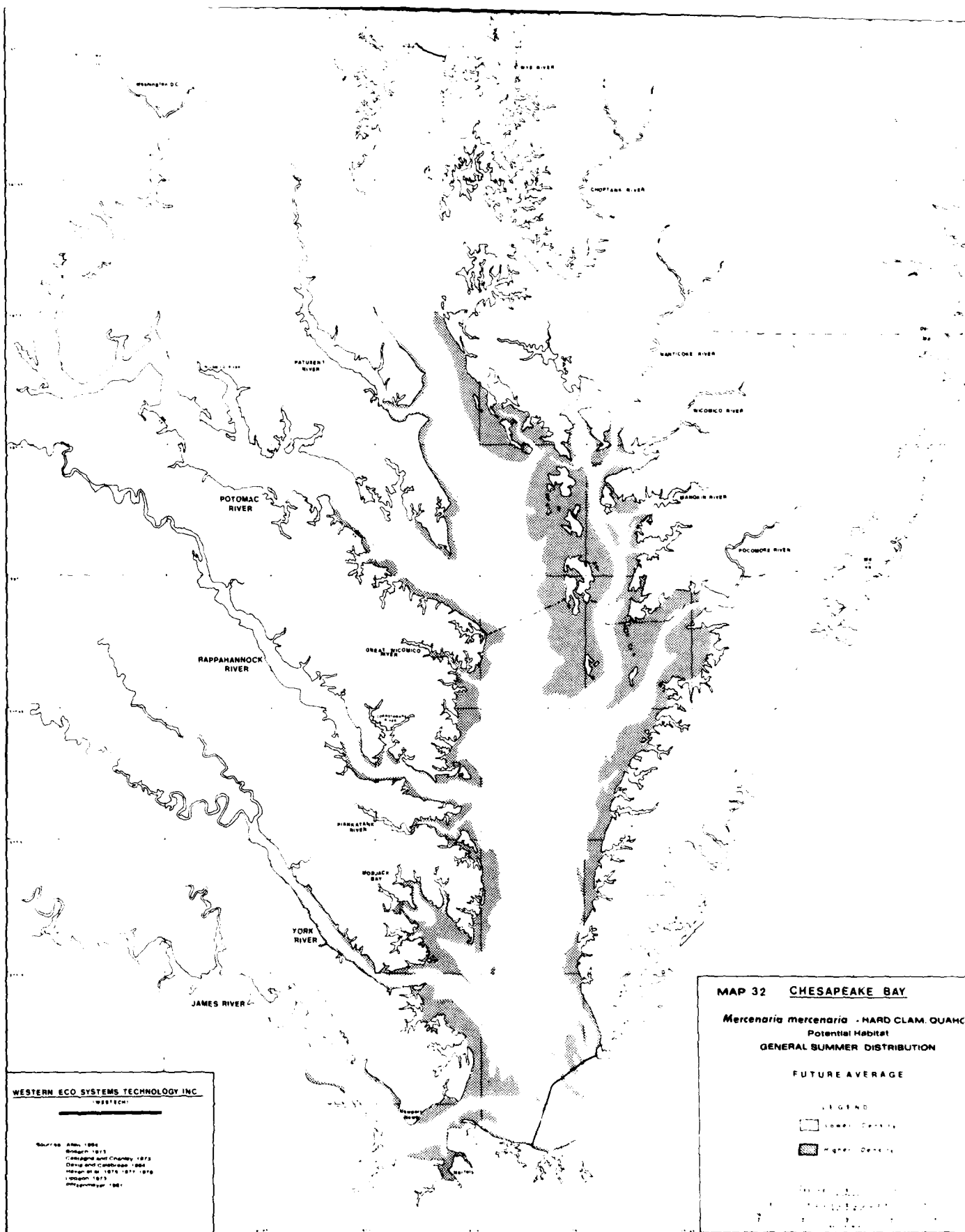


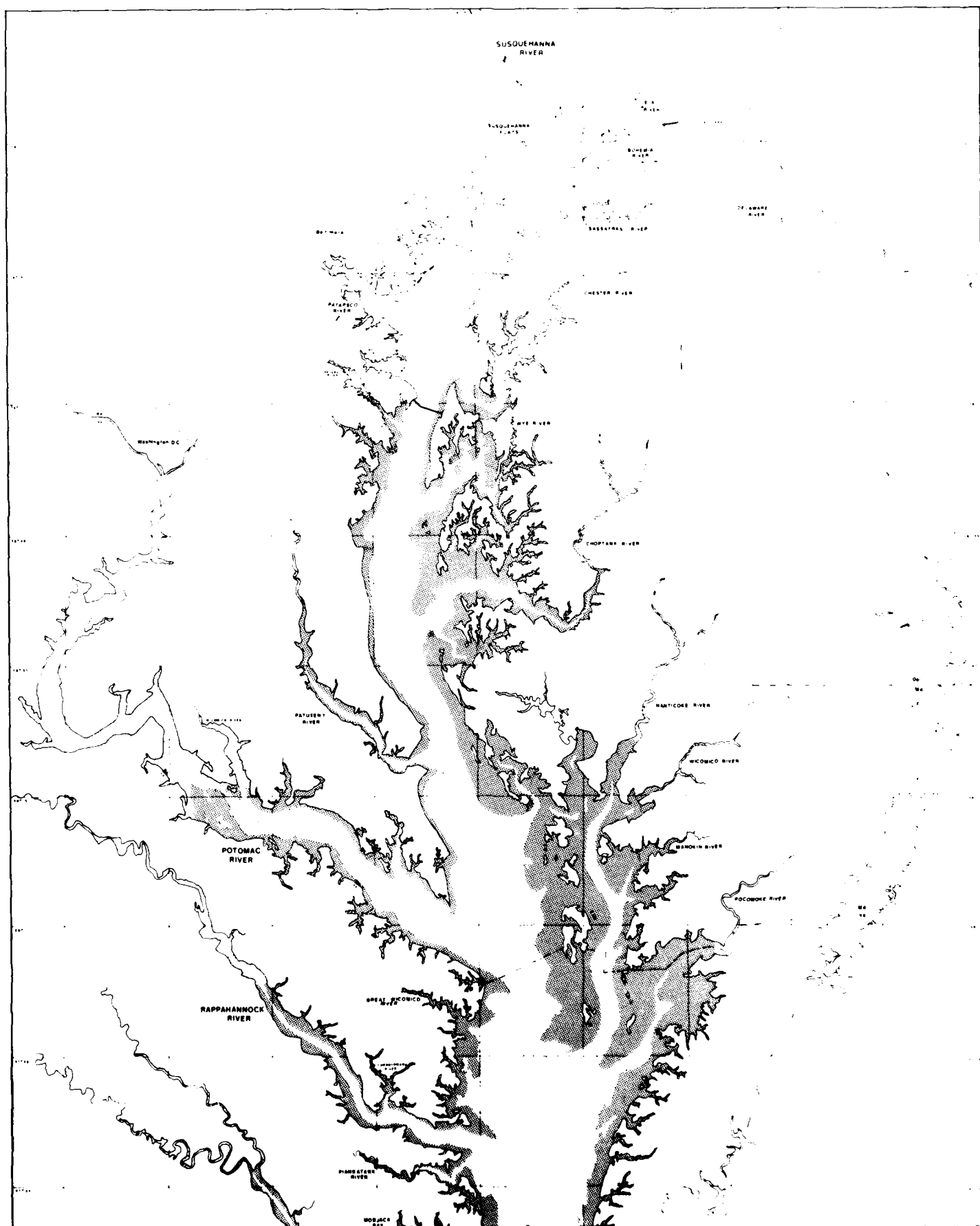


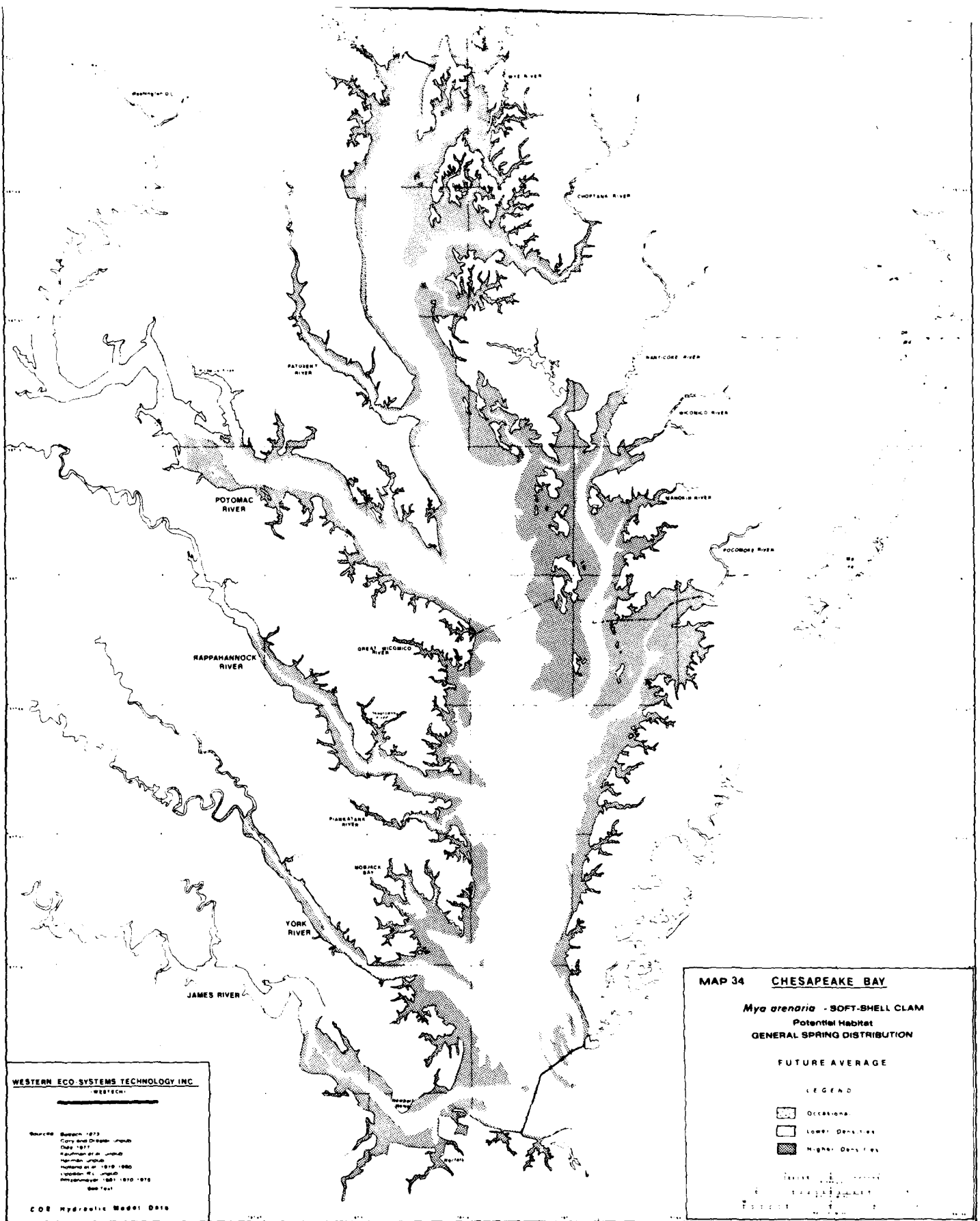


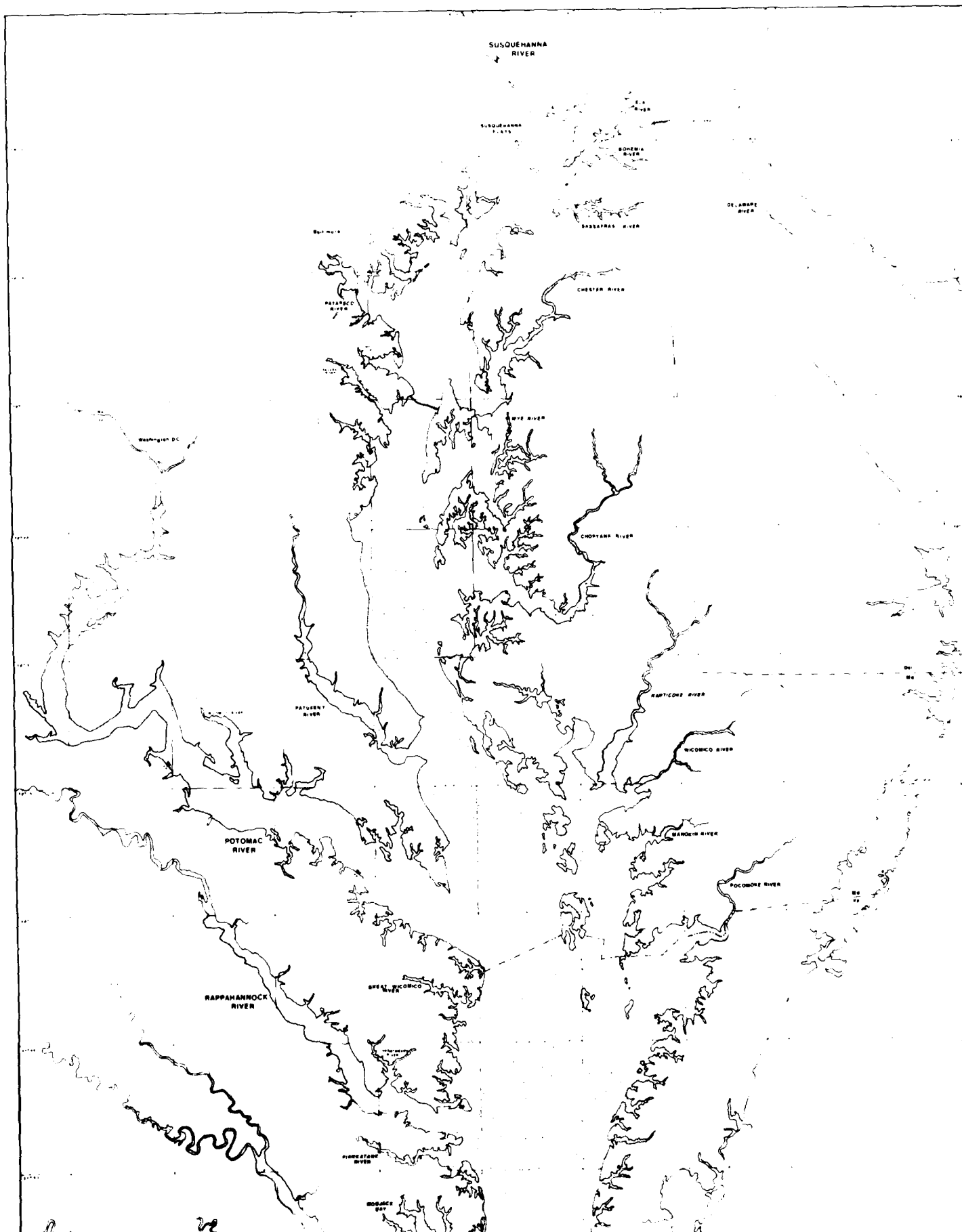


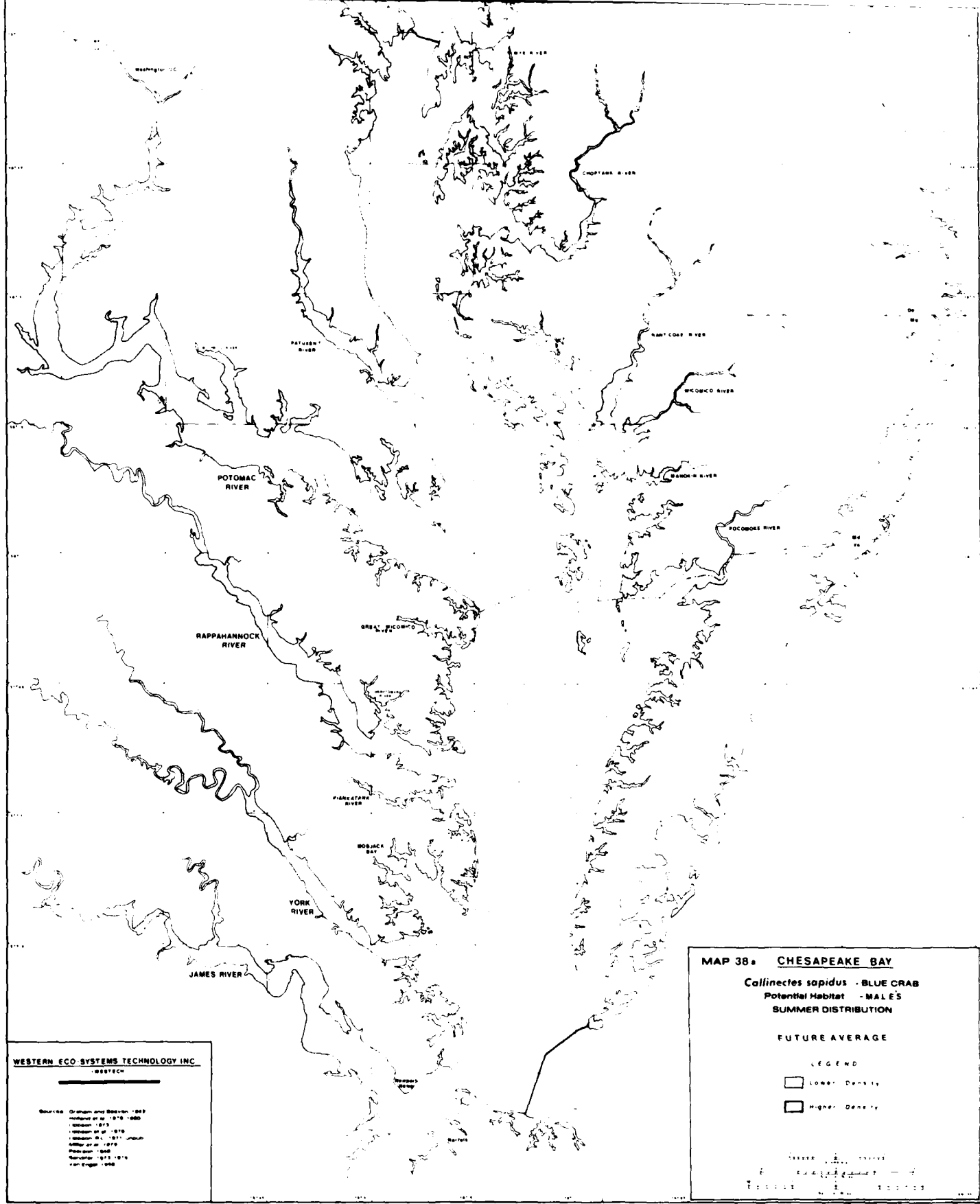






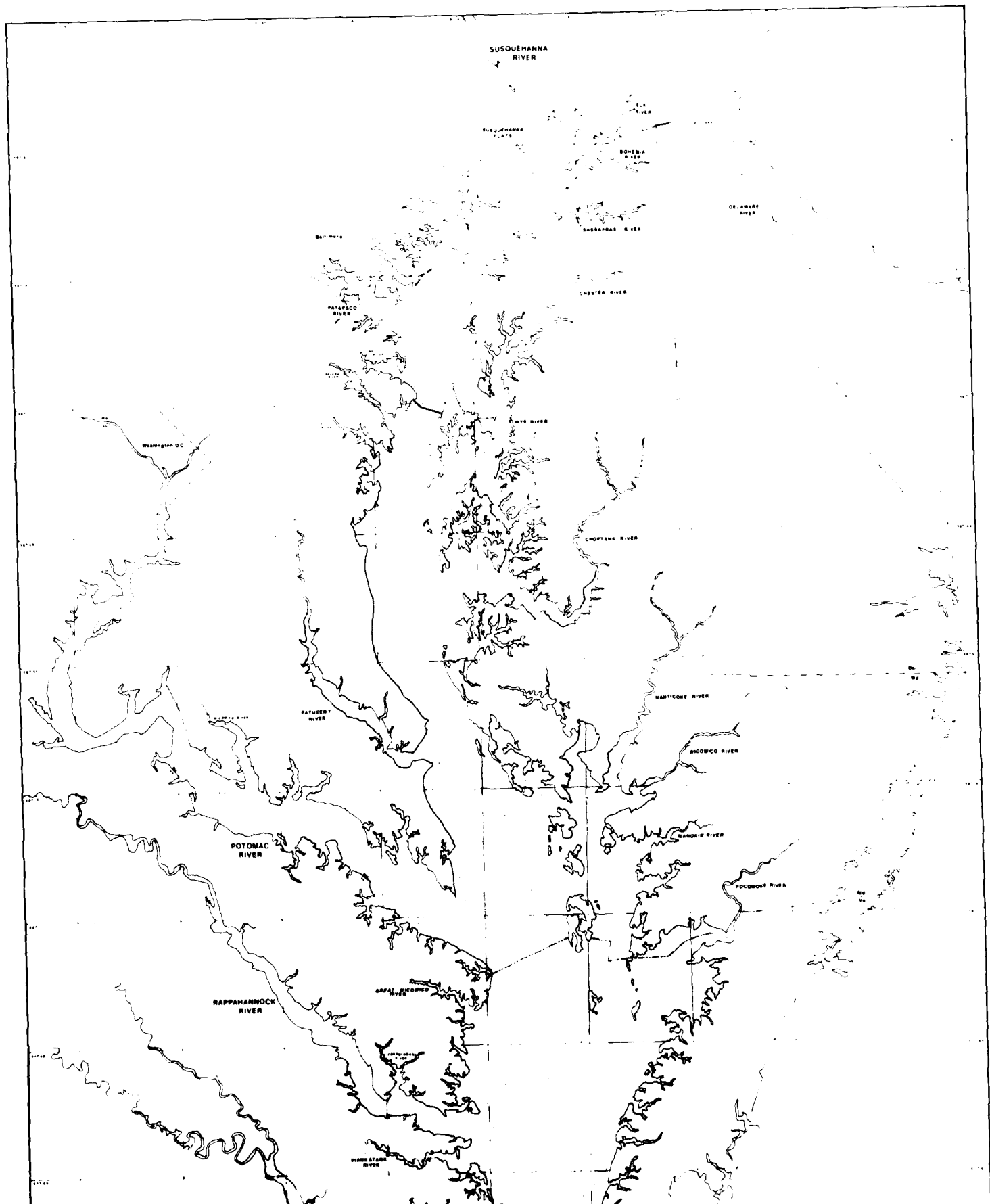


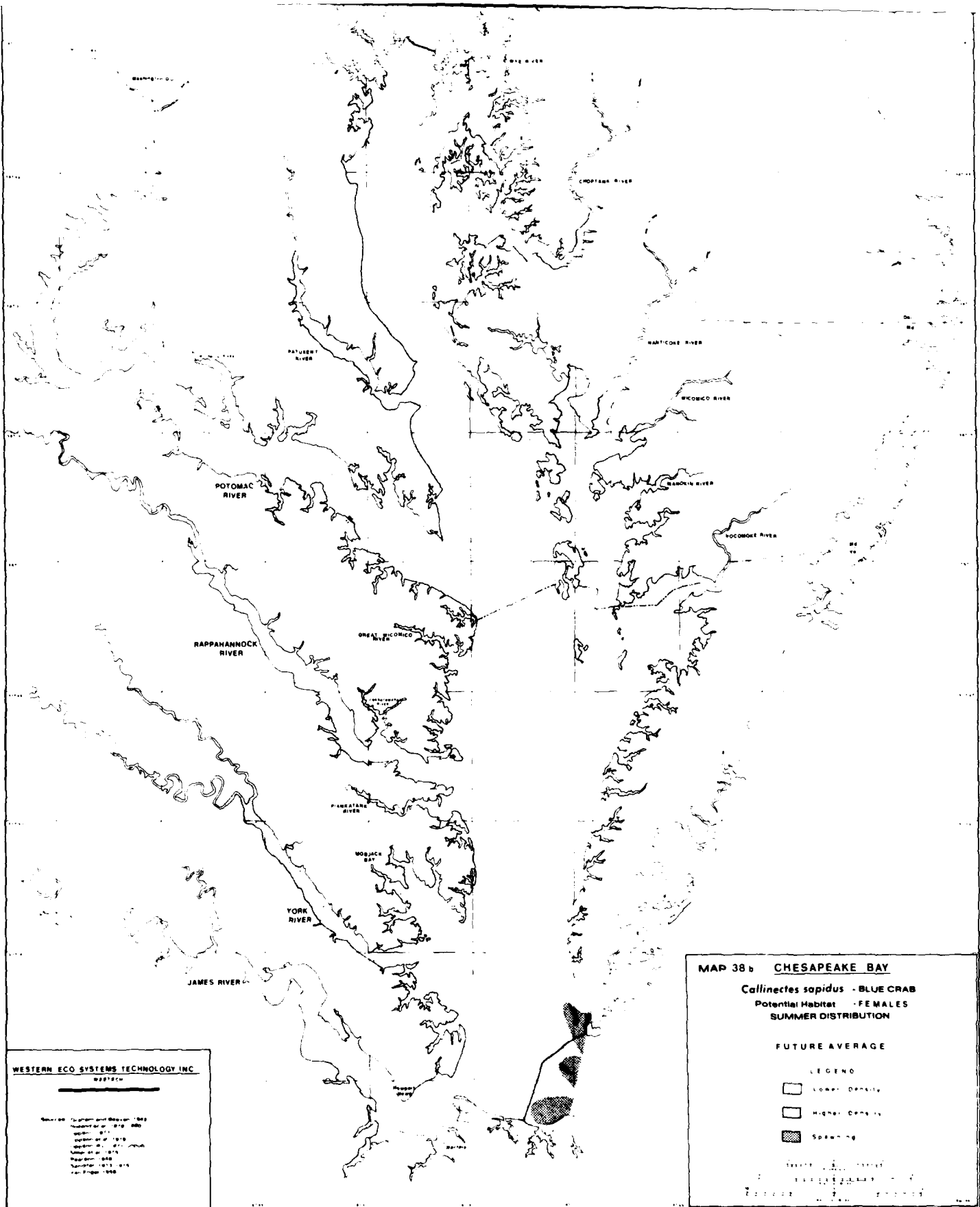


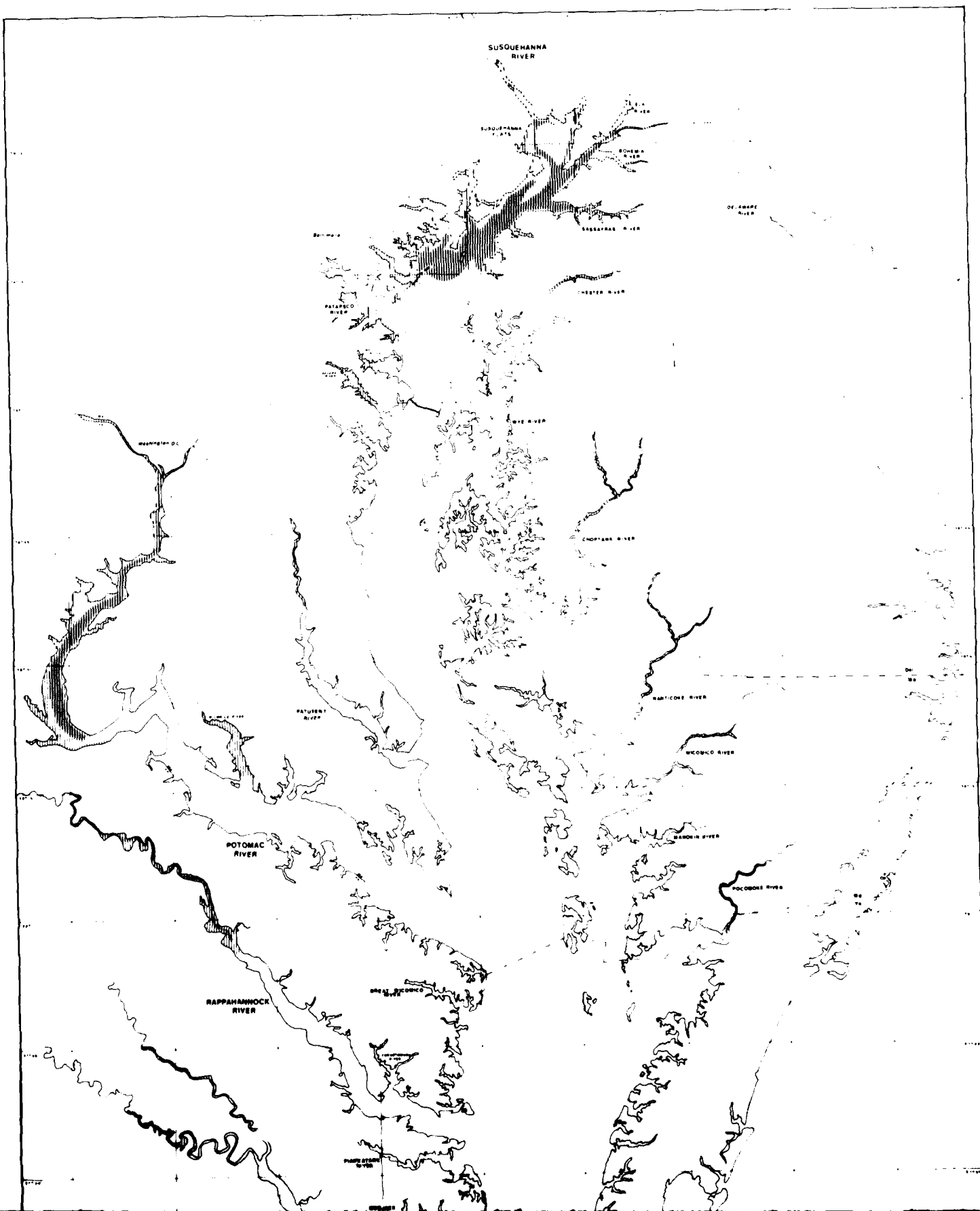


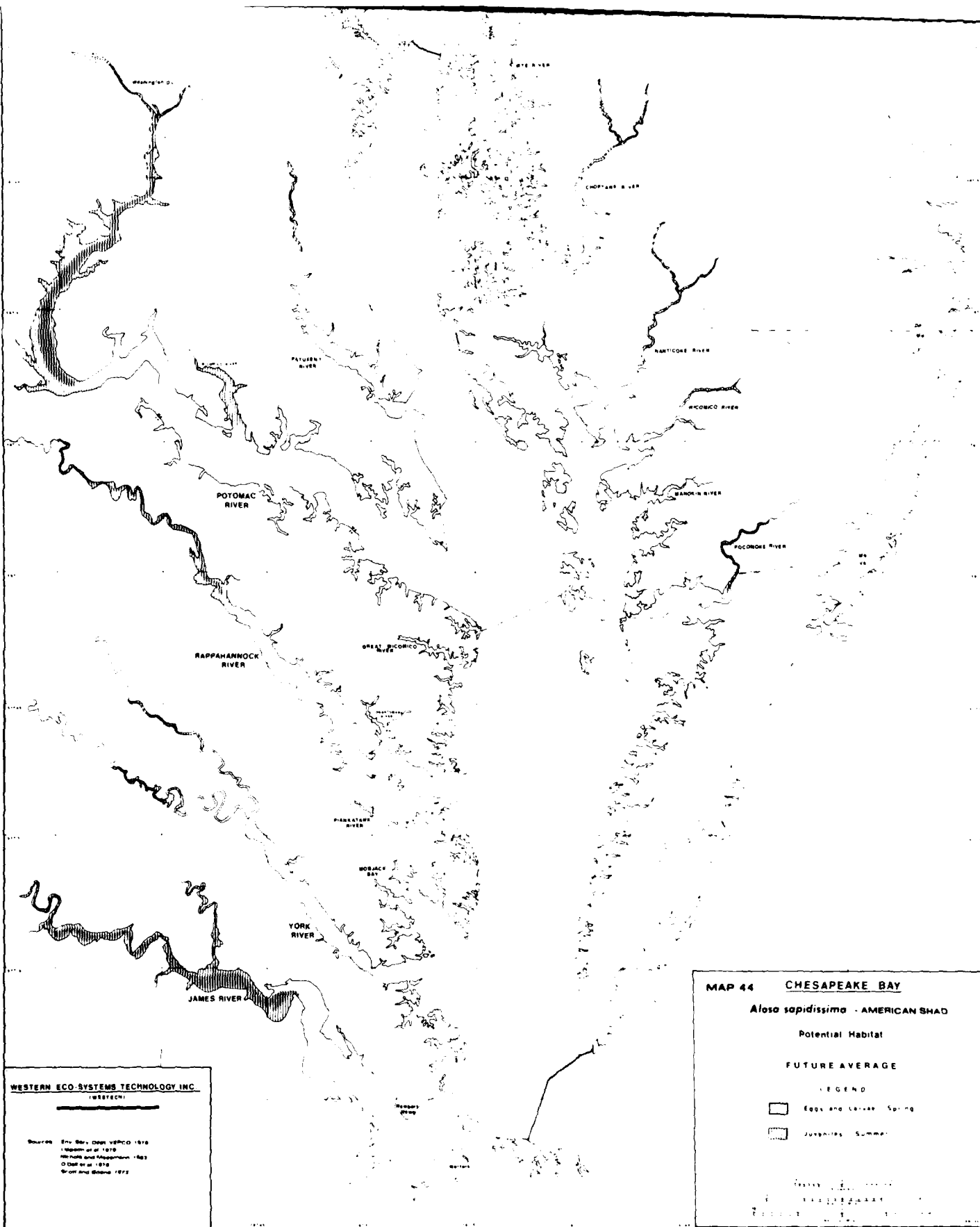
WESTERN ECO-SYSTEMS TECHNOLOGY INC.
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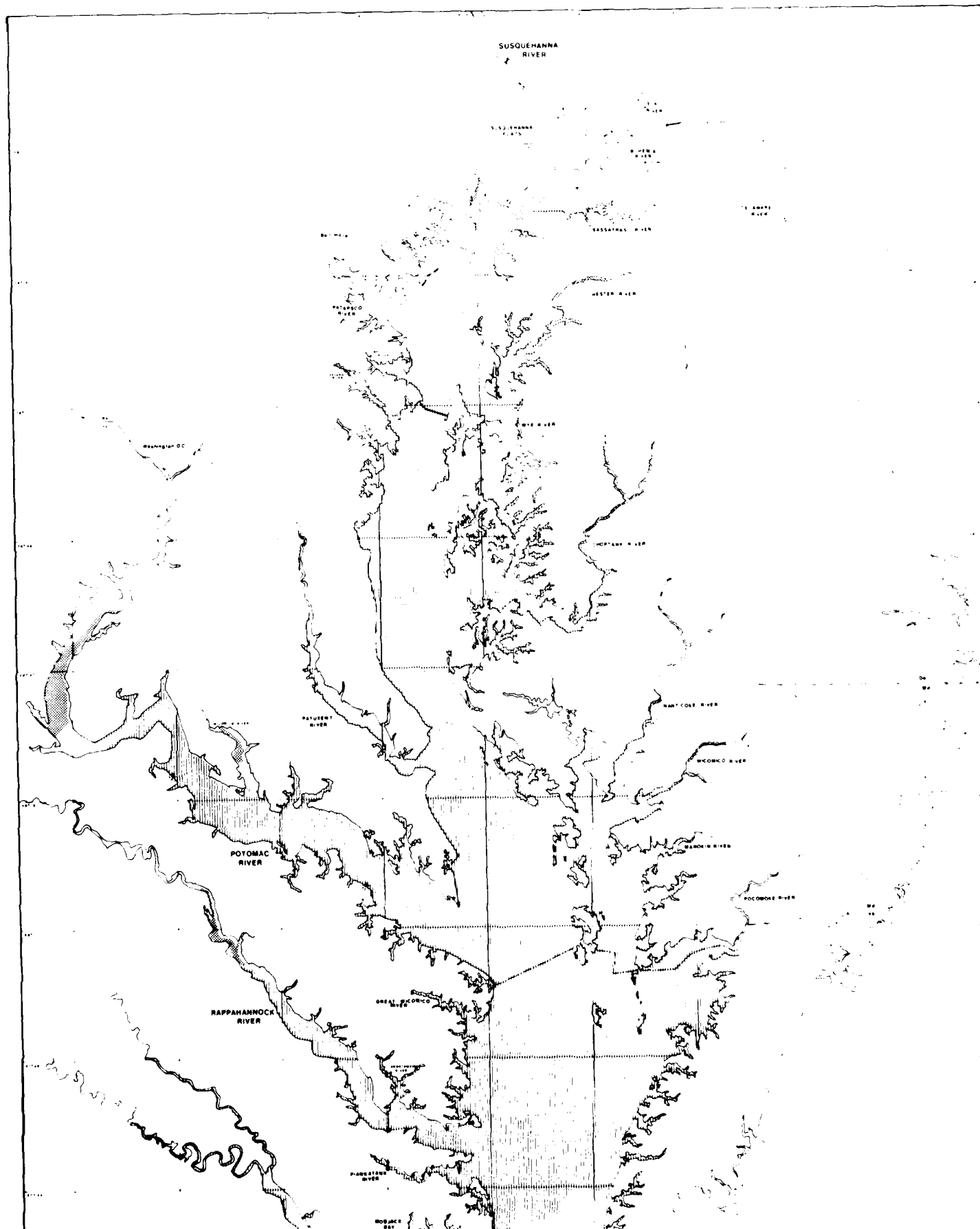
Sources: Graham and Bessley, 1969
 Hoffman et al., 1970-1980
 Johnson, 1975
 Johnson et al., 1976
 Johnson et al., 1977
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 Johnson et al., 2022
 Johnson et al., 2023
 Johnson et al., 2024
 Johnson et al., 2025

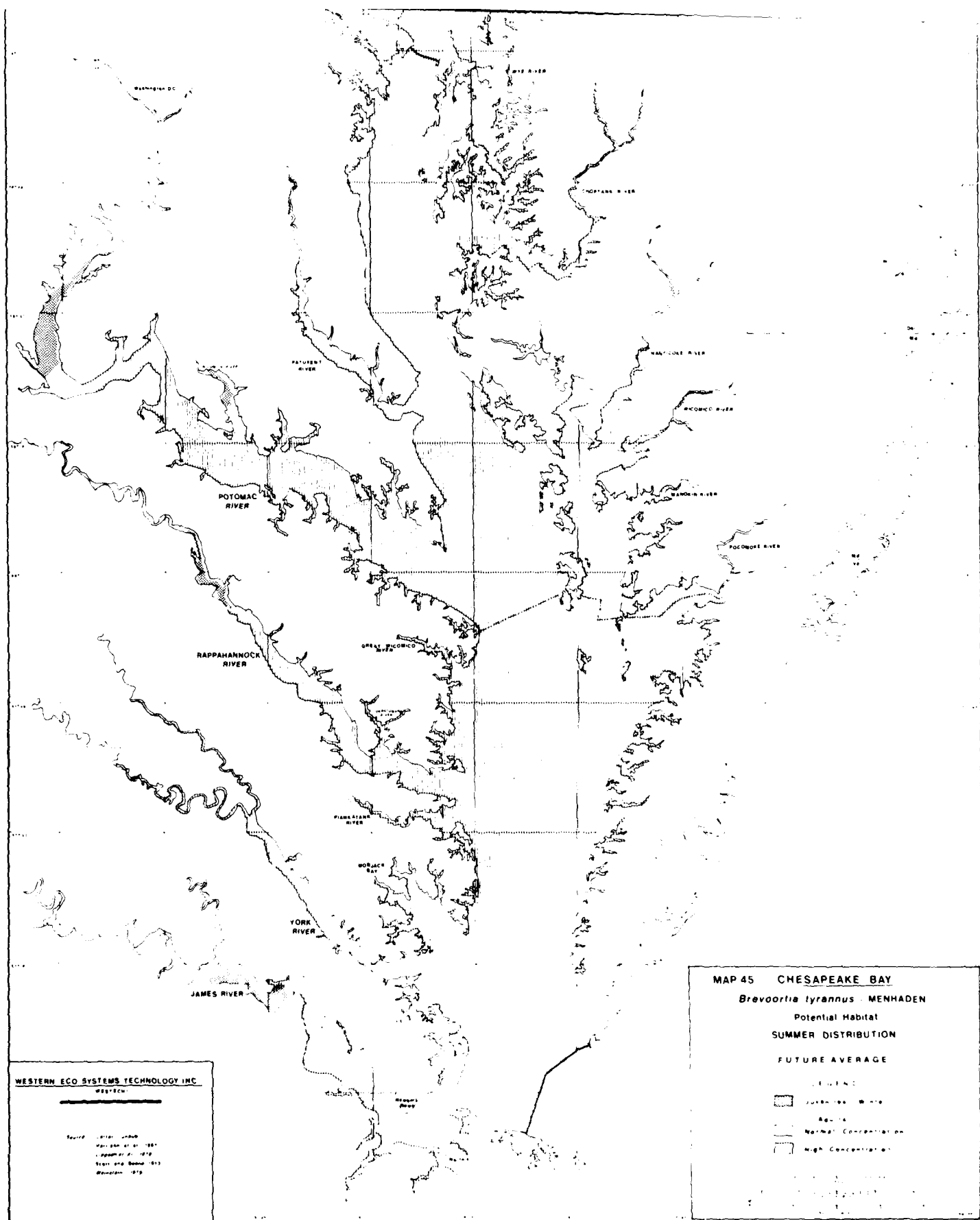




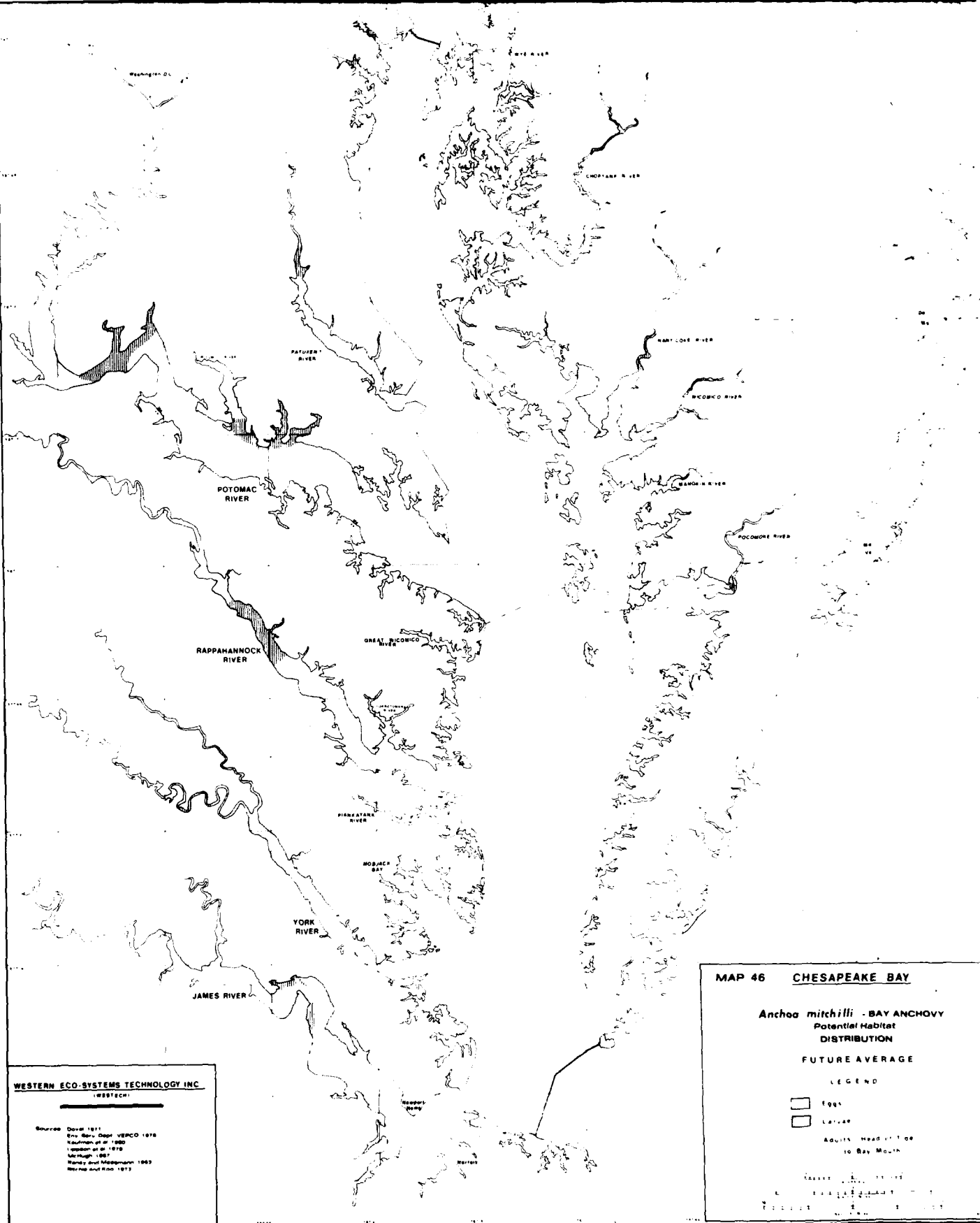


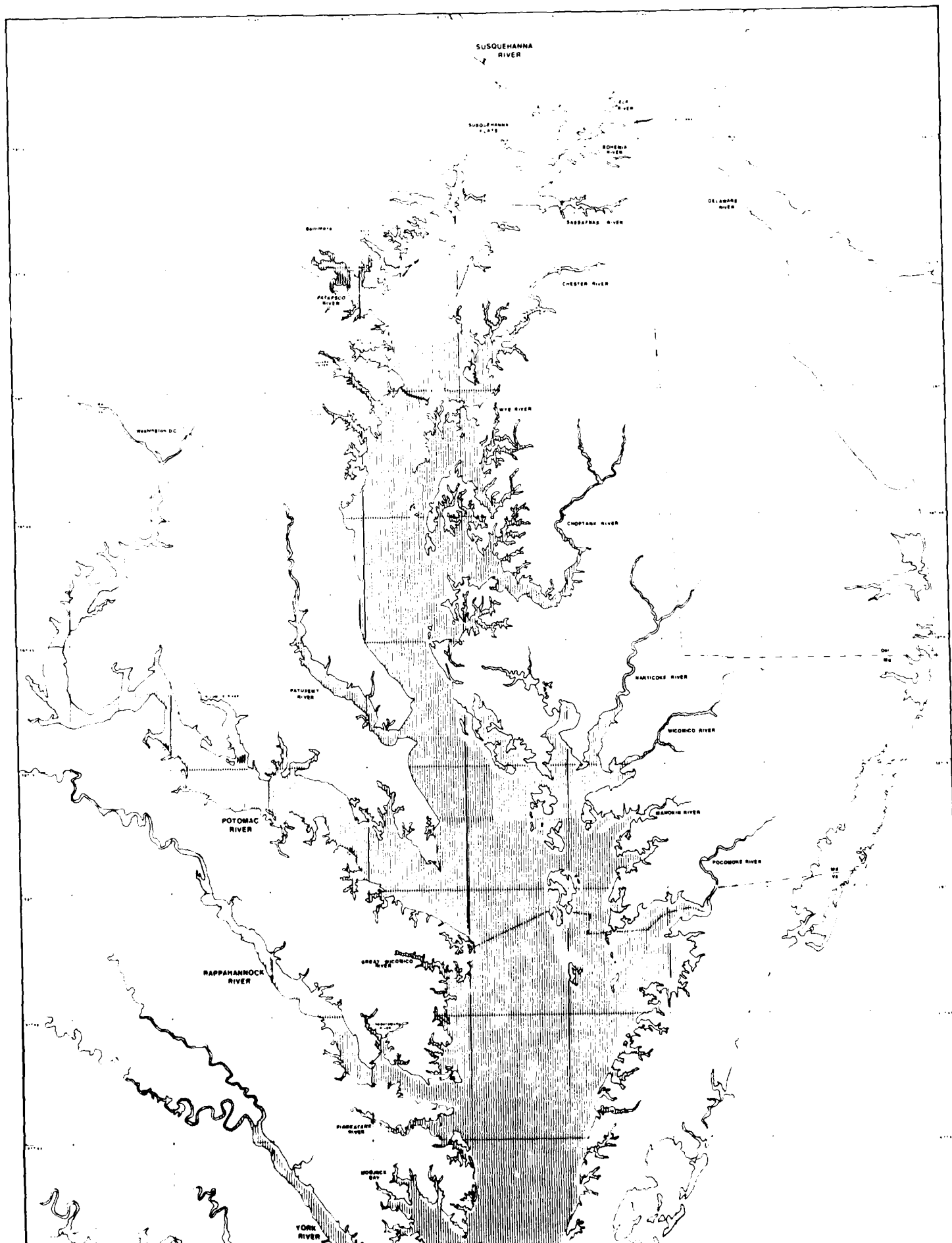


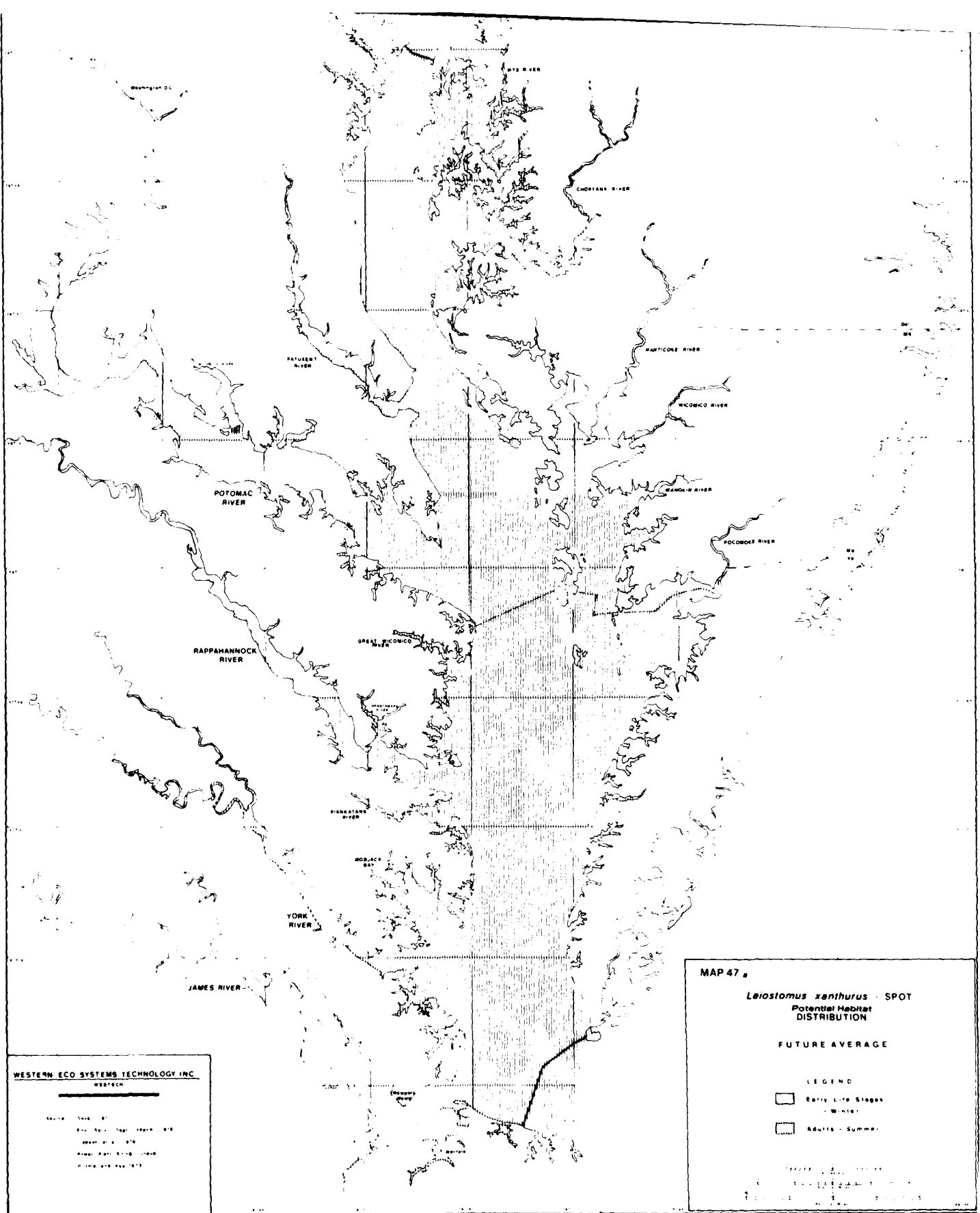


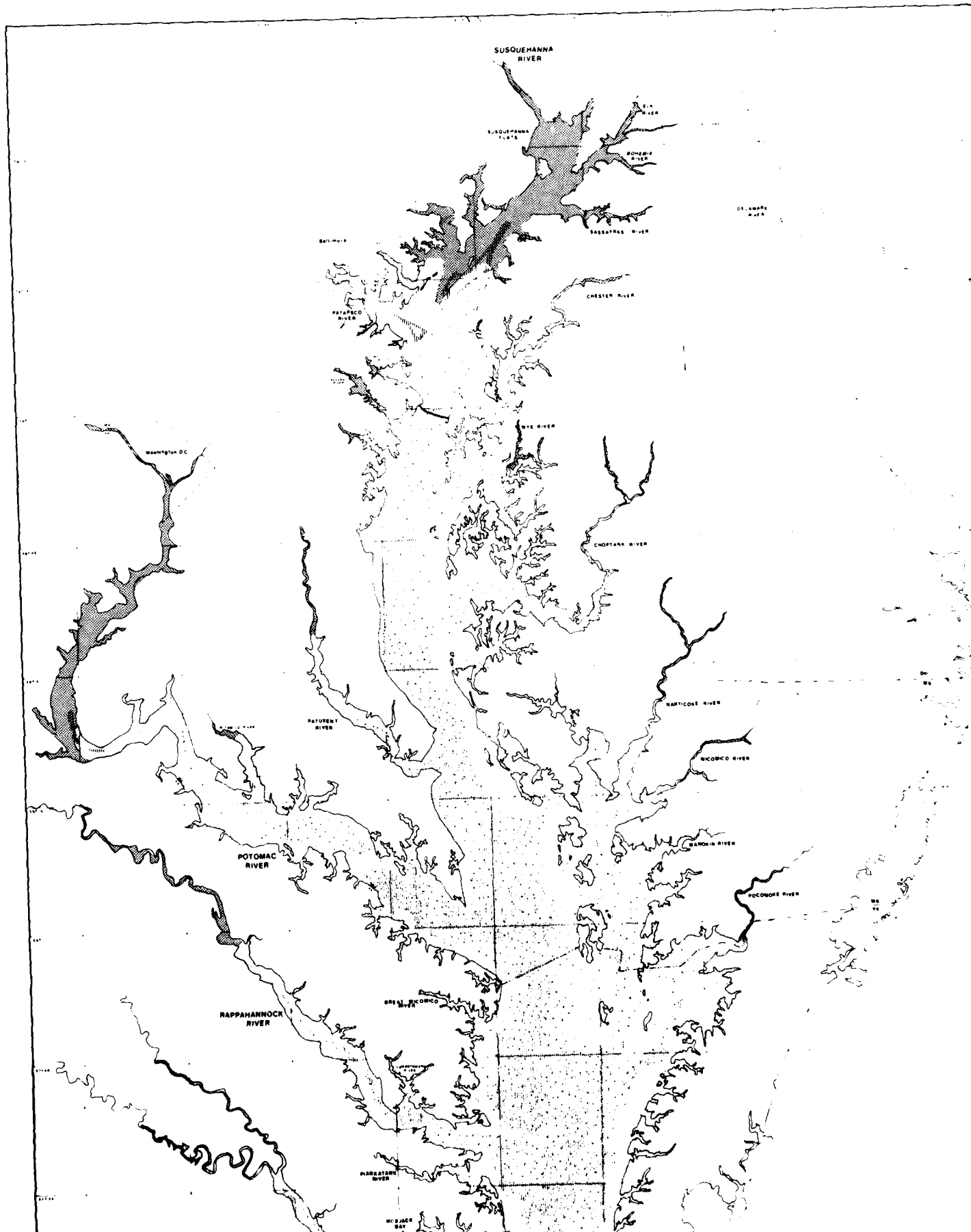


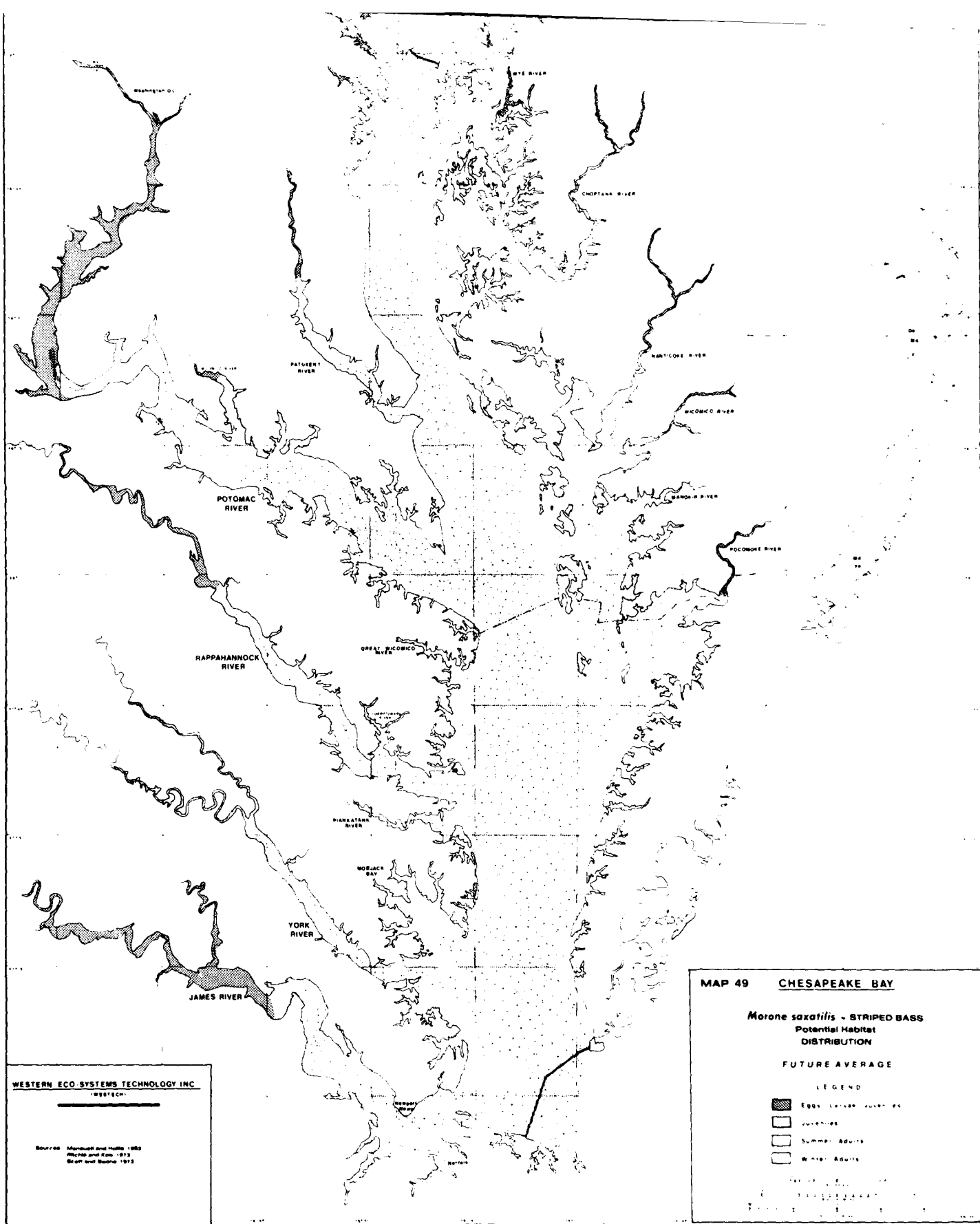




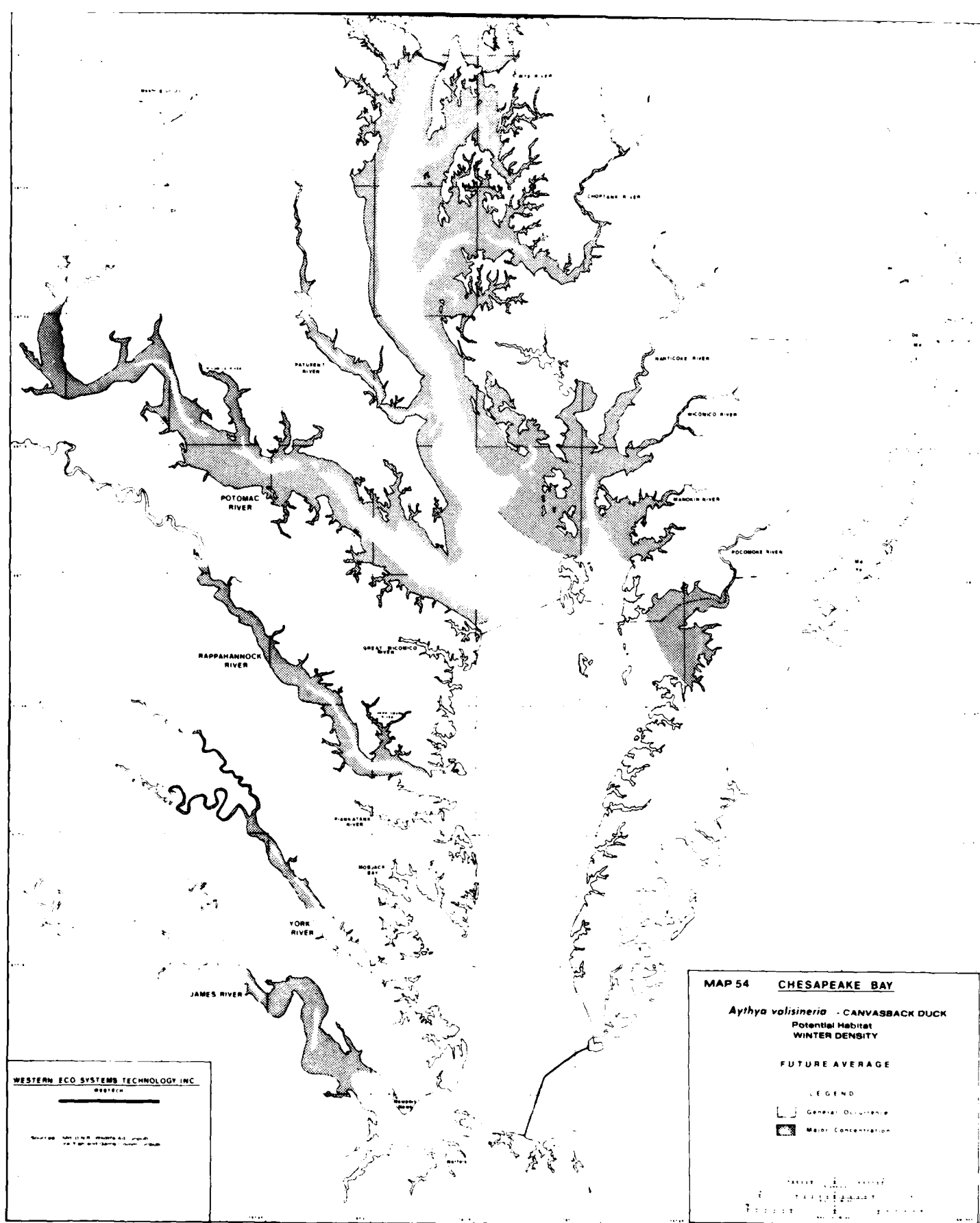


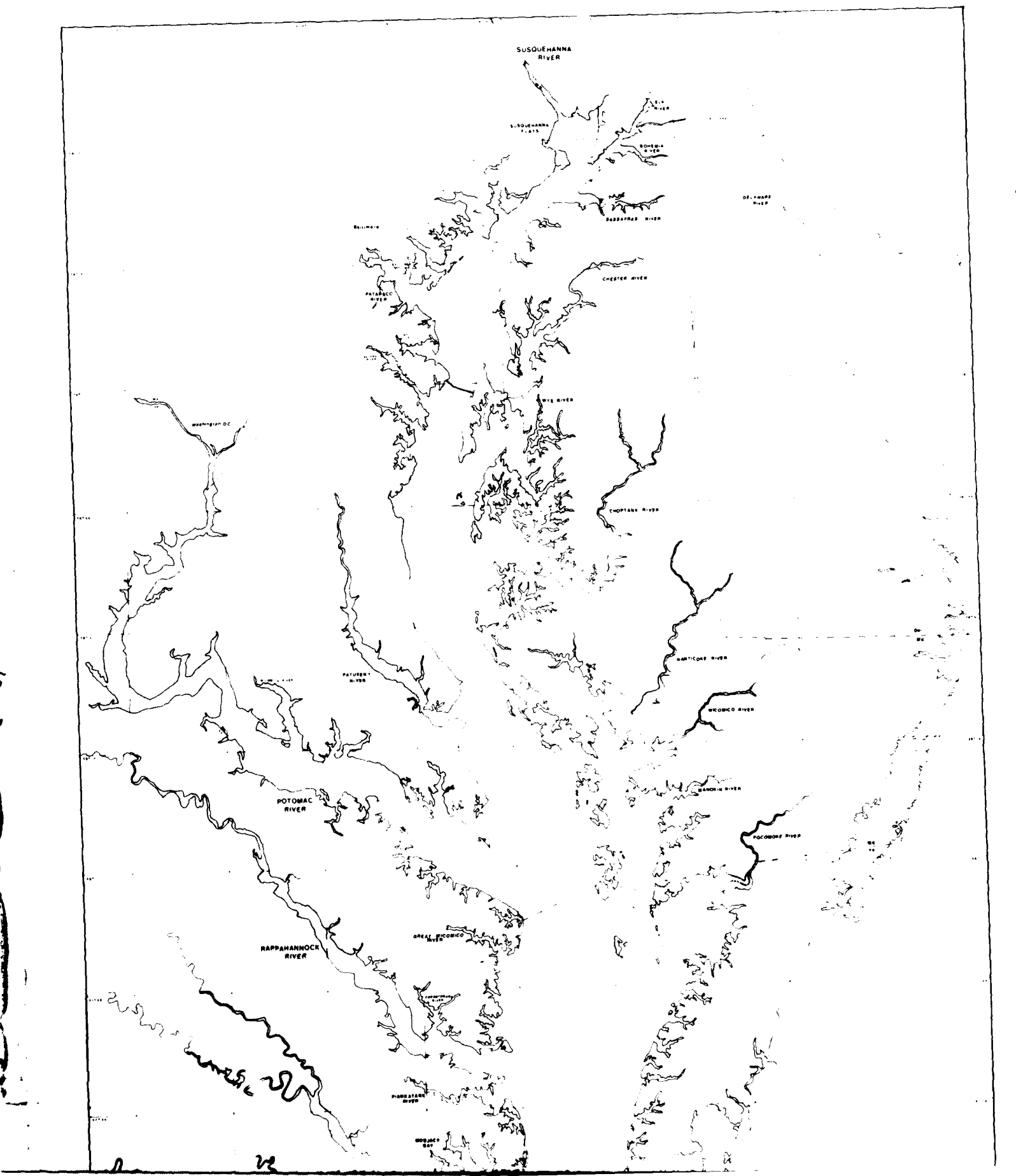


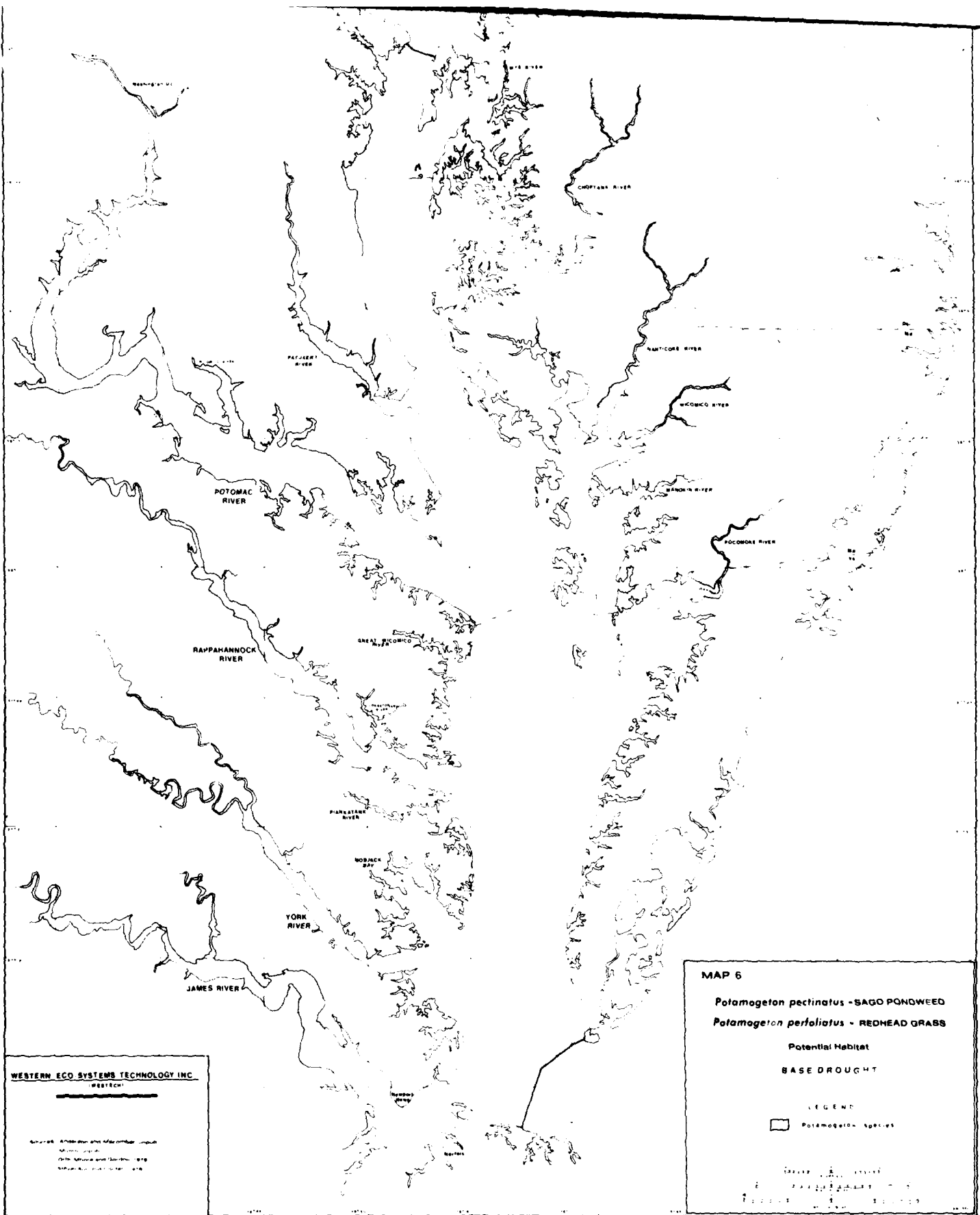




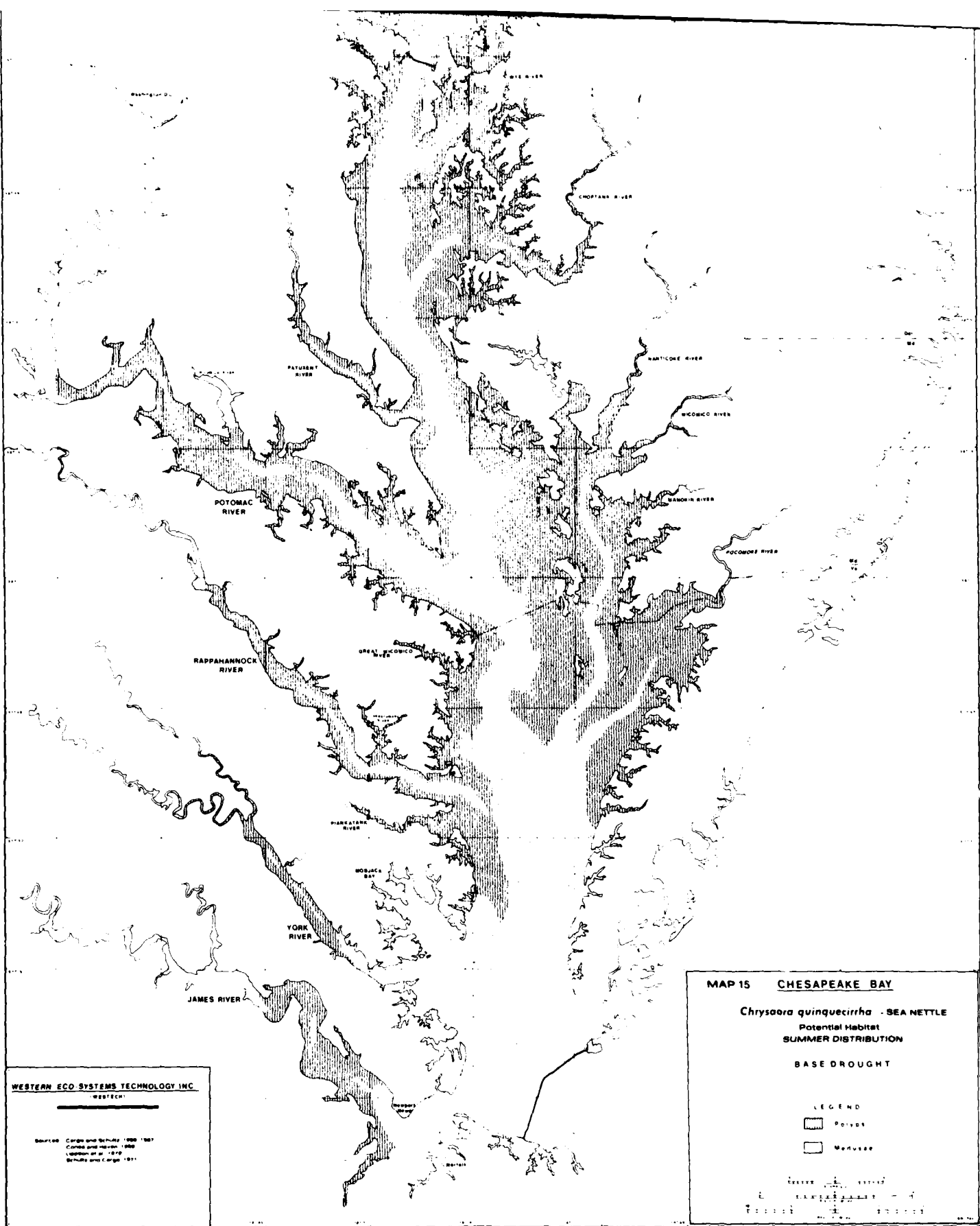


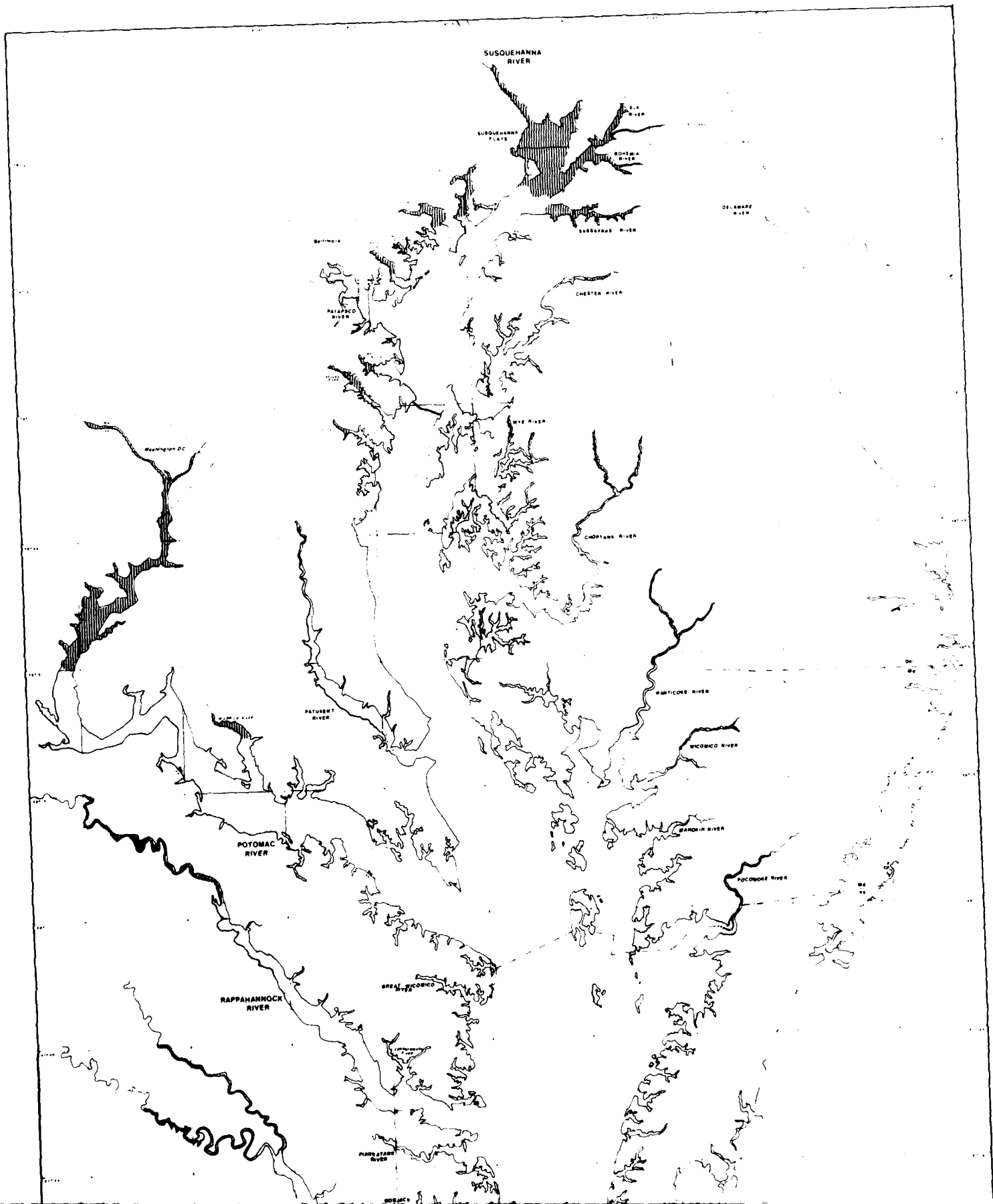


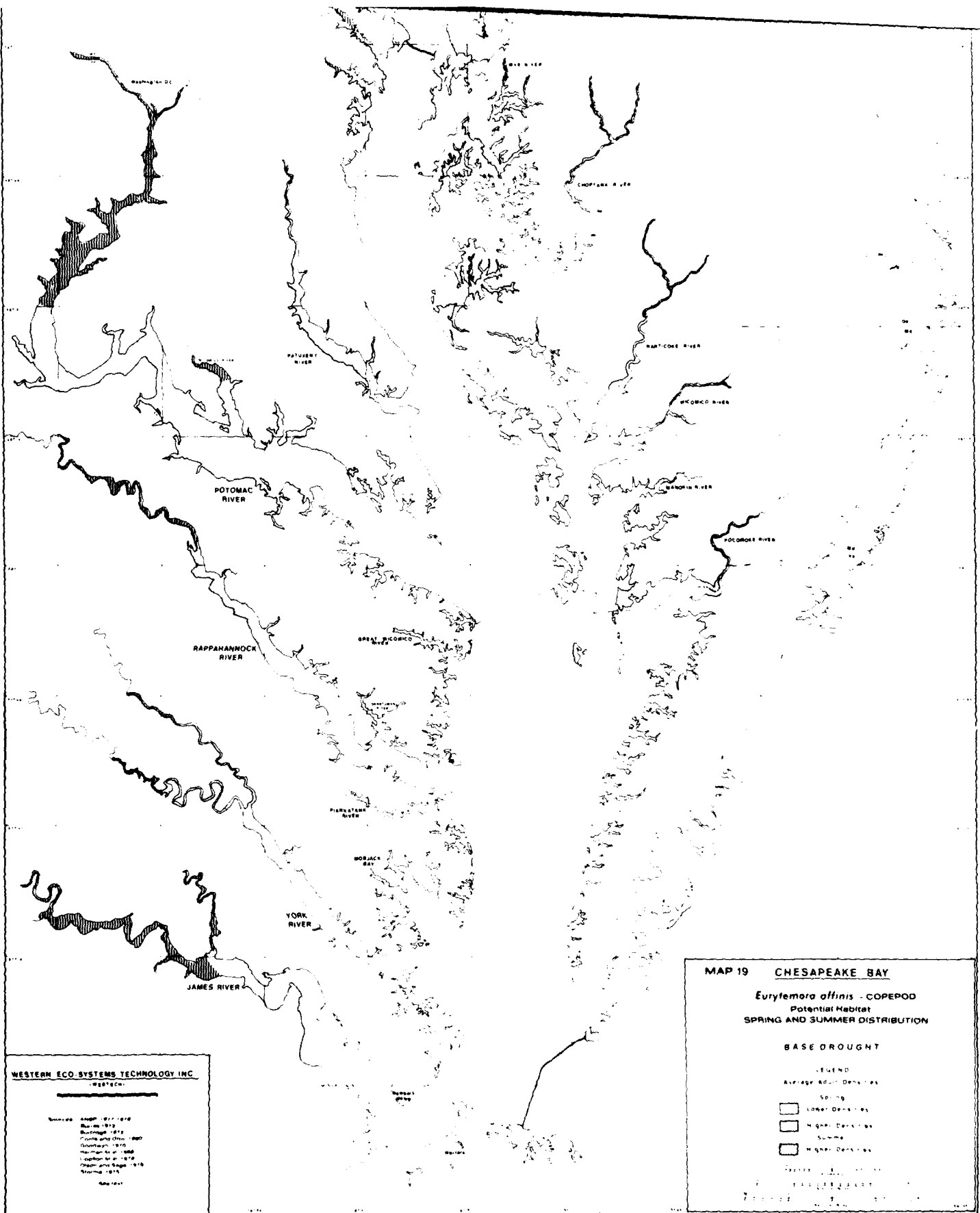


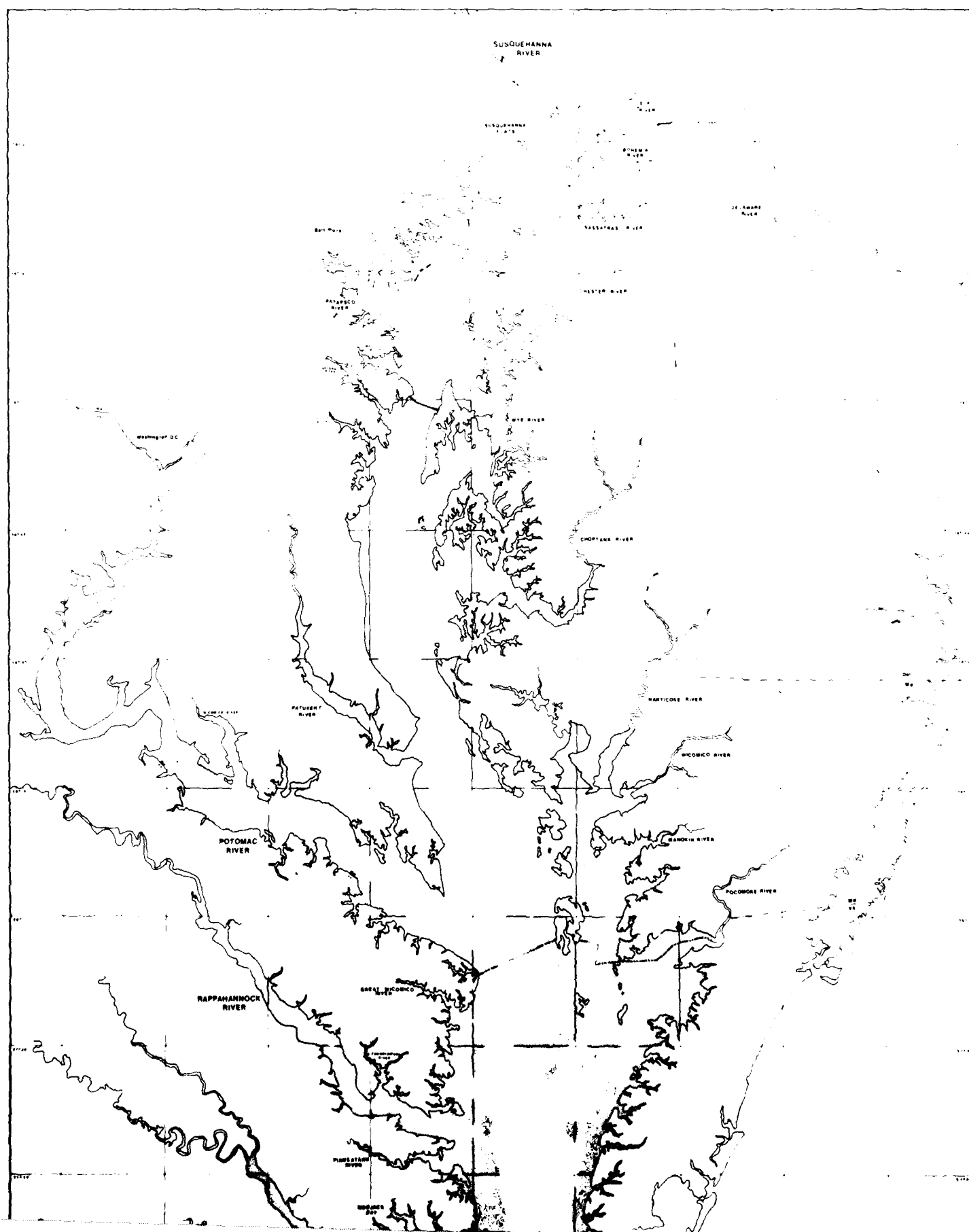


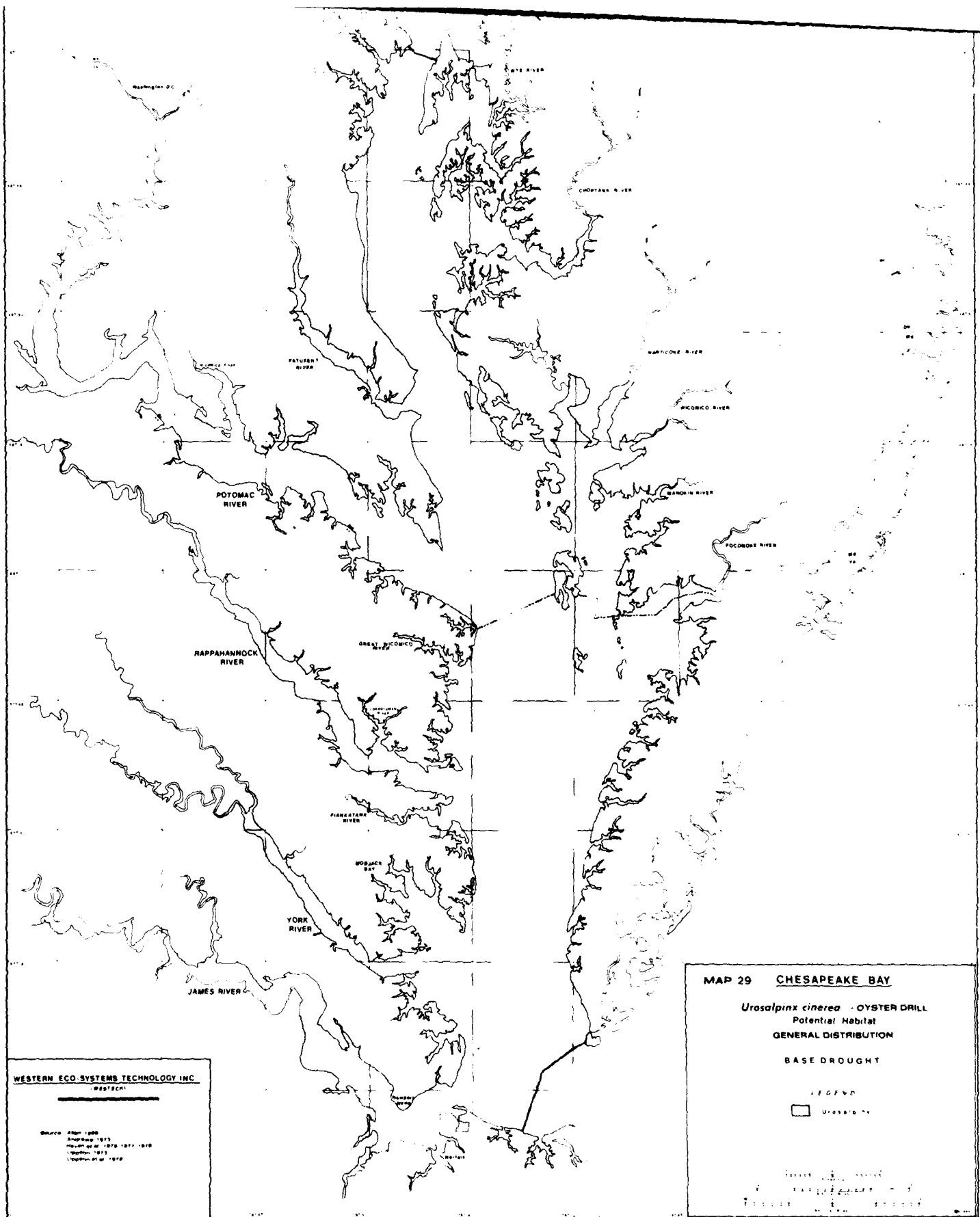


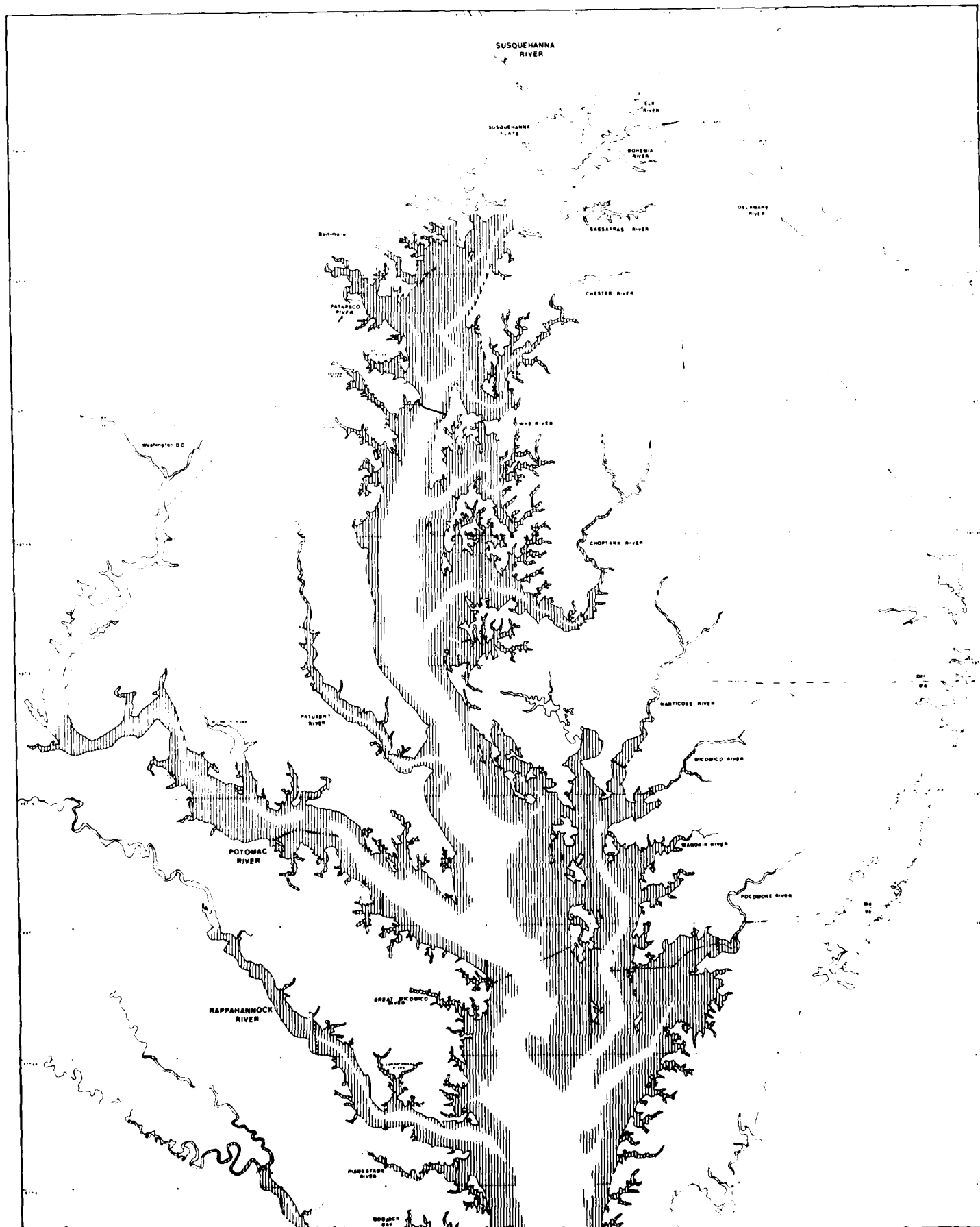


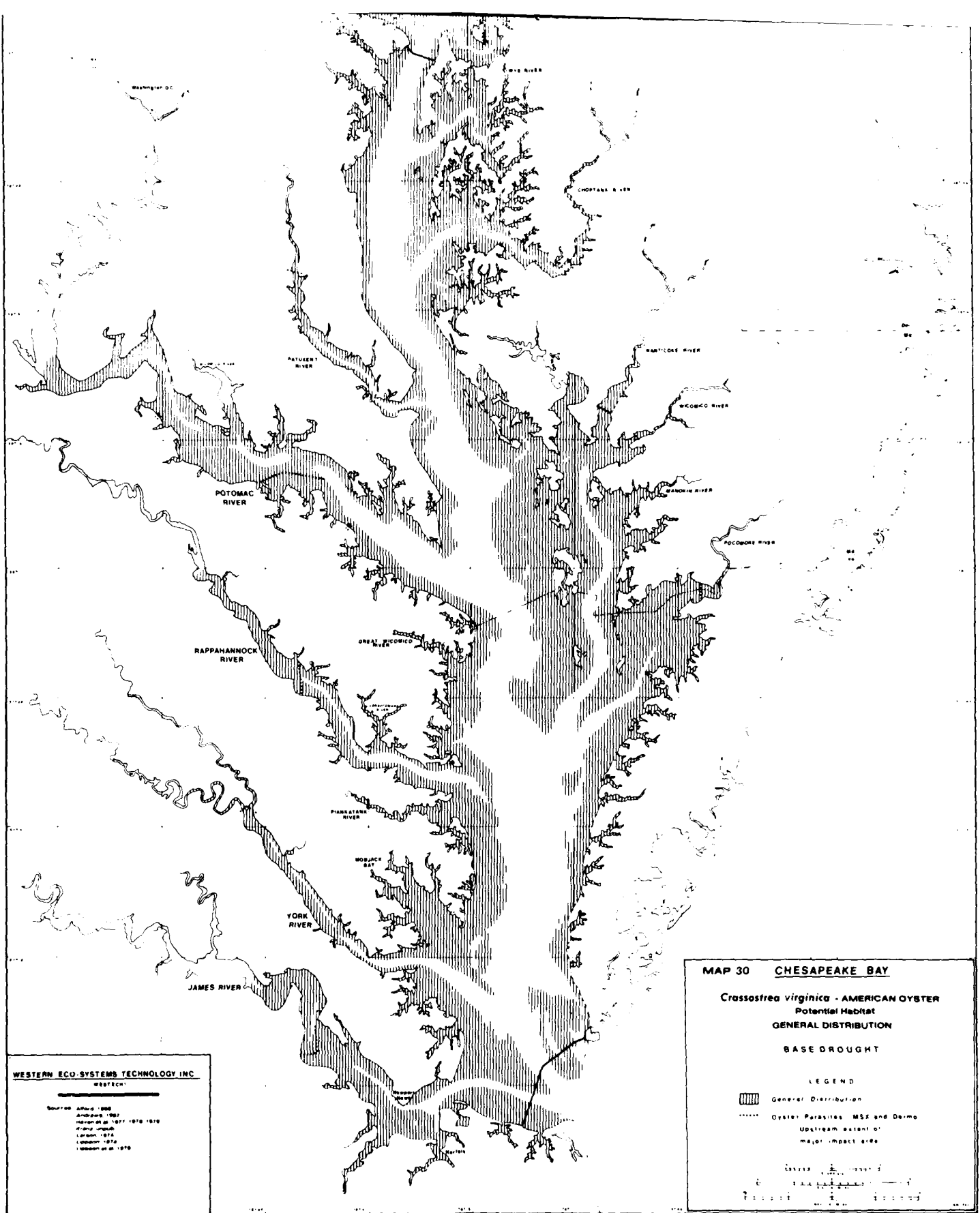


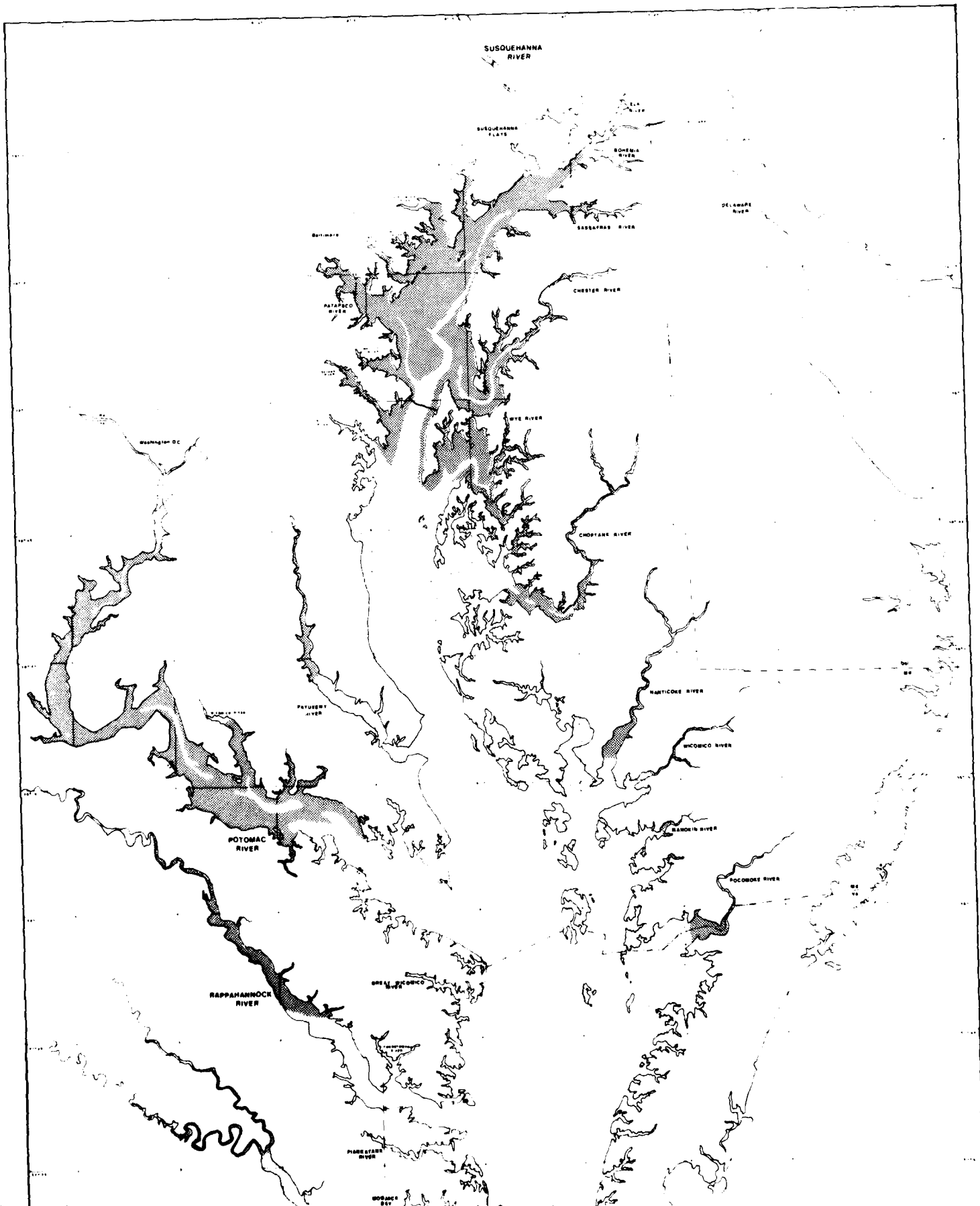


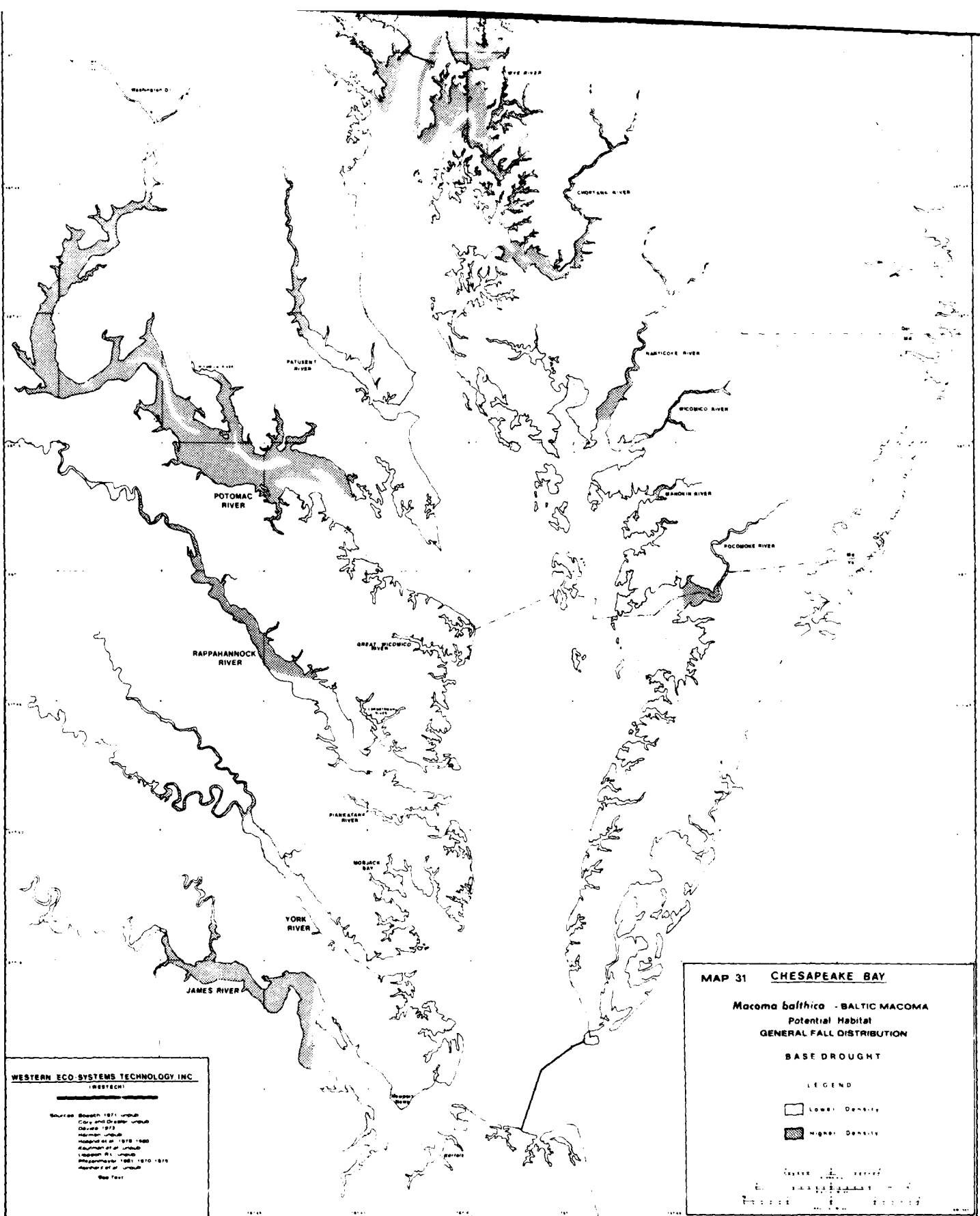


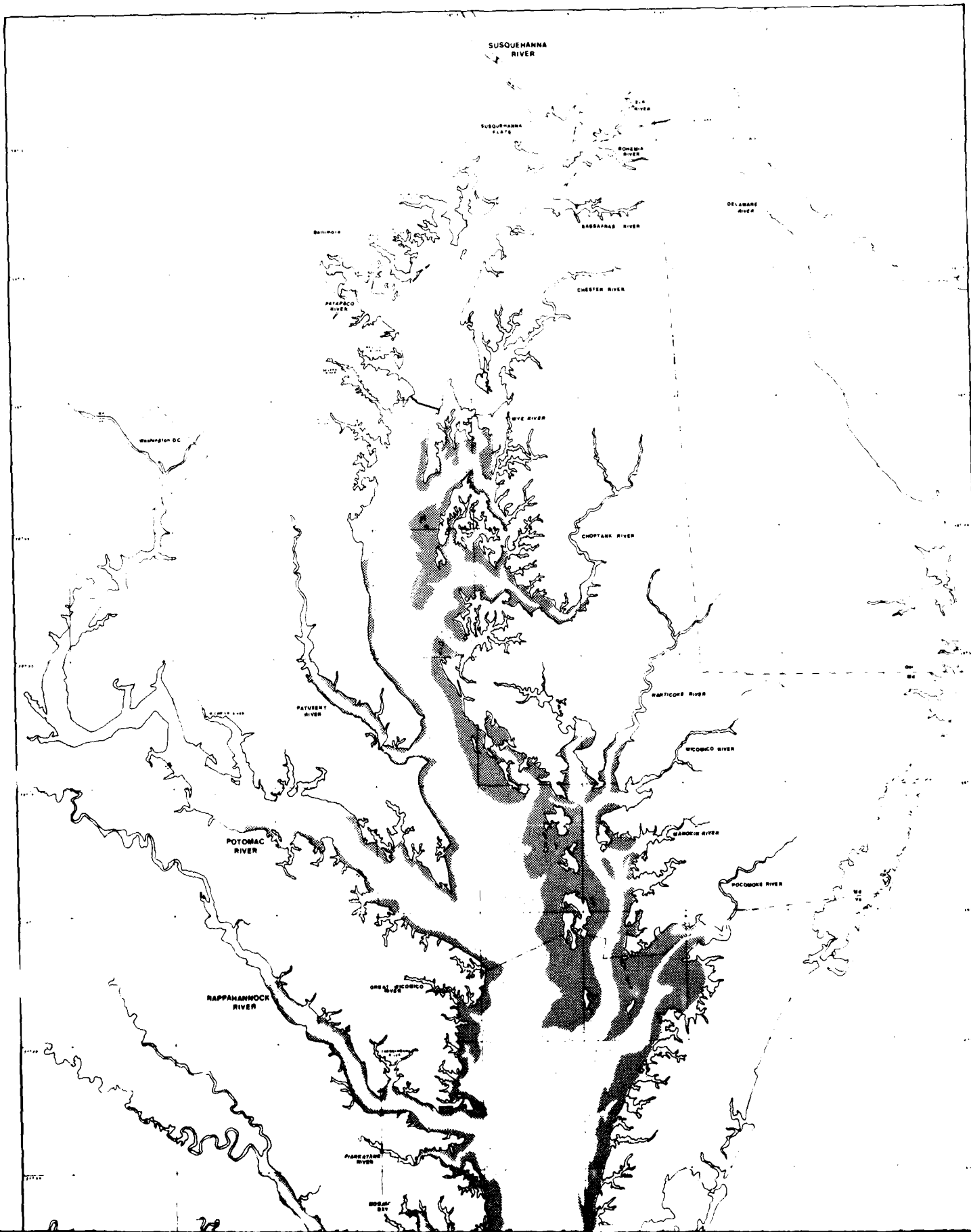


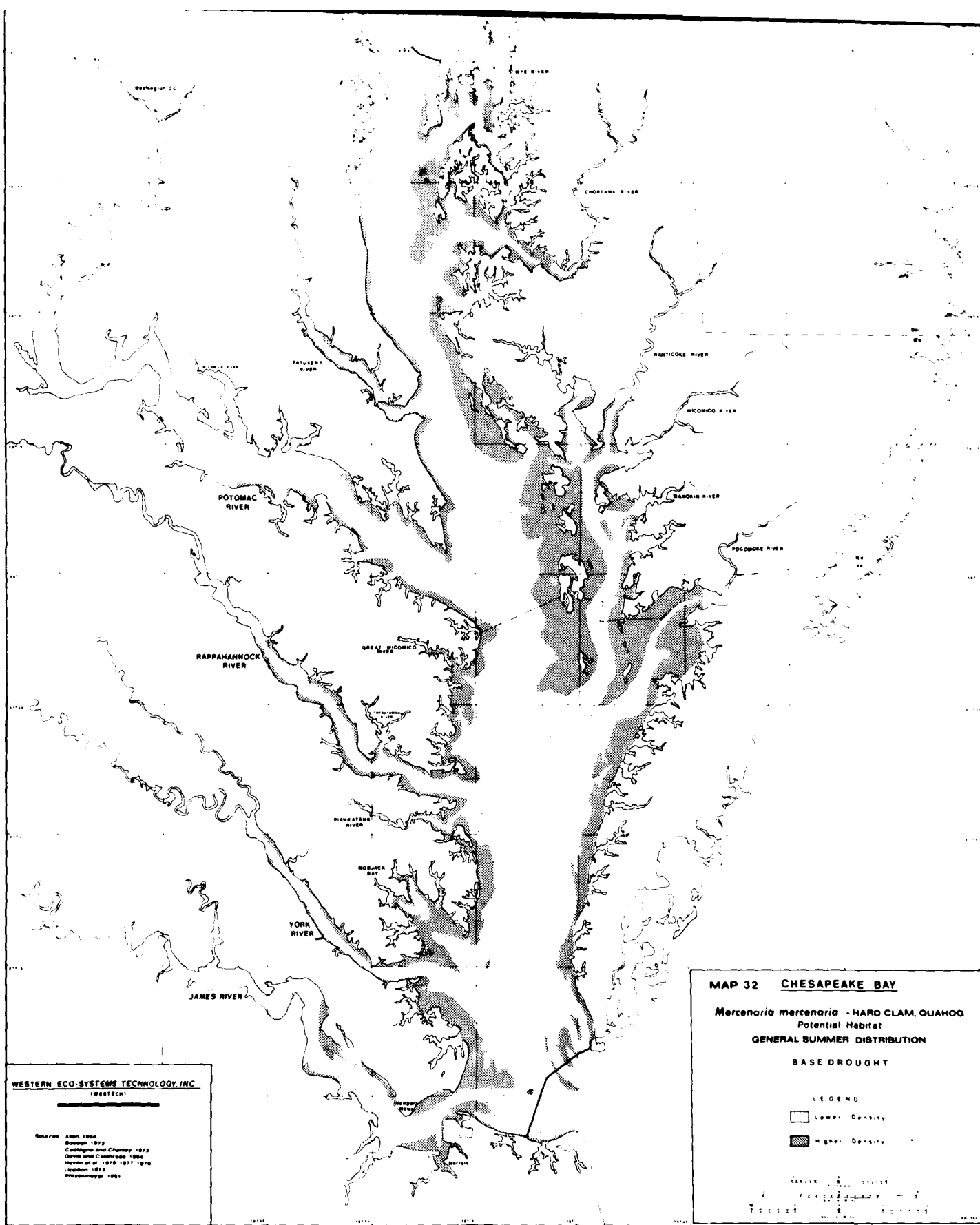


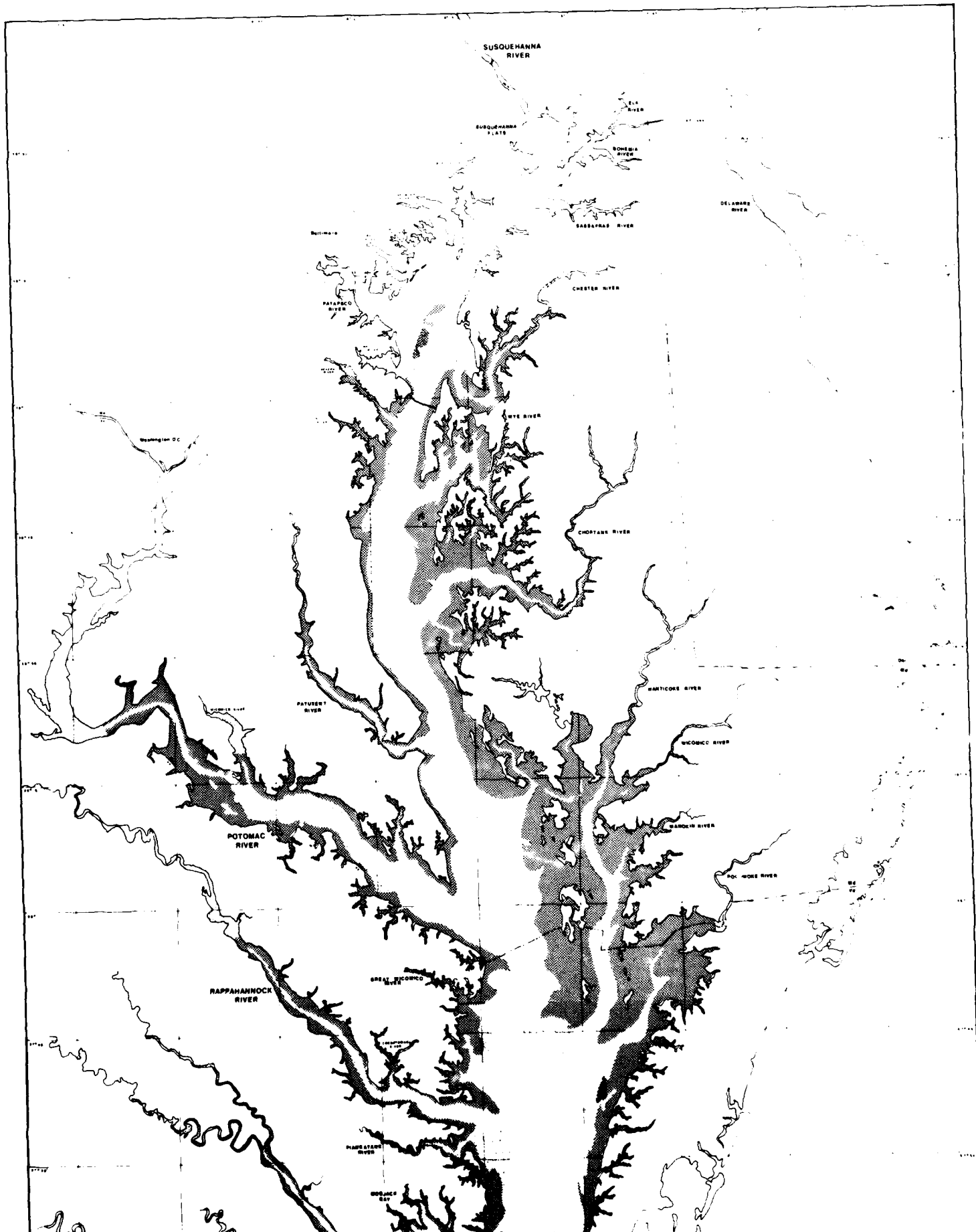


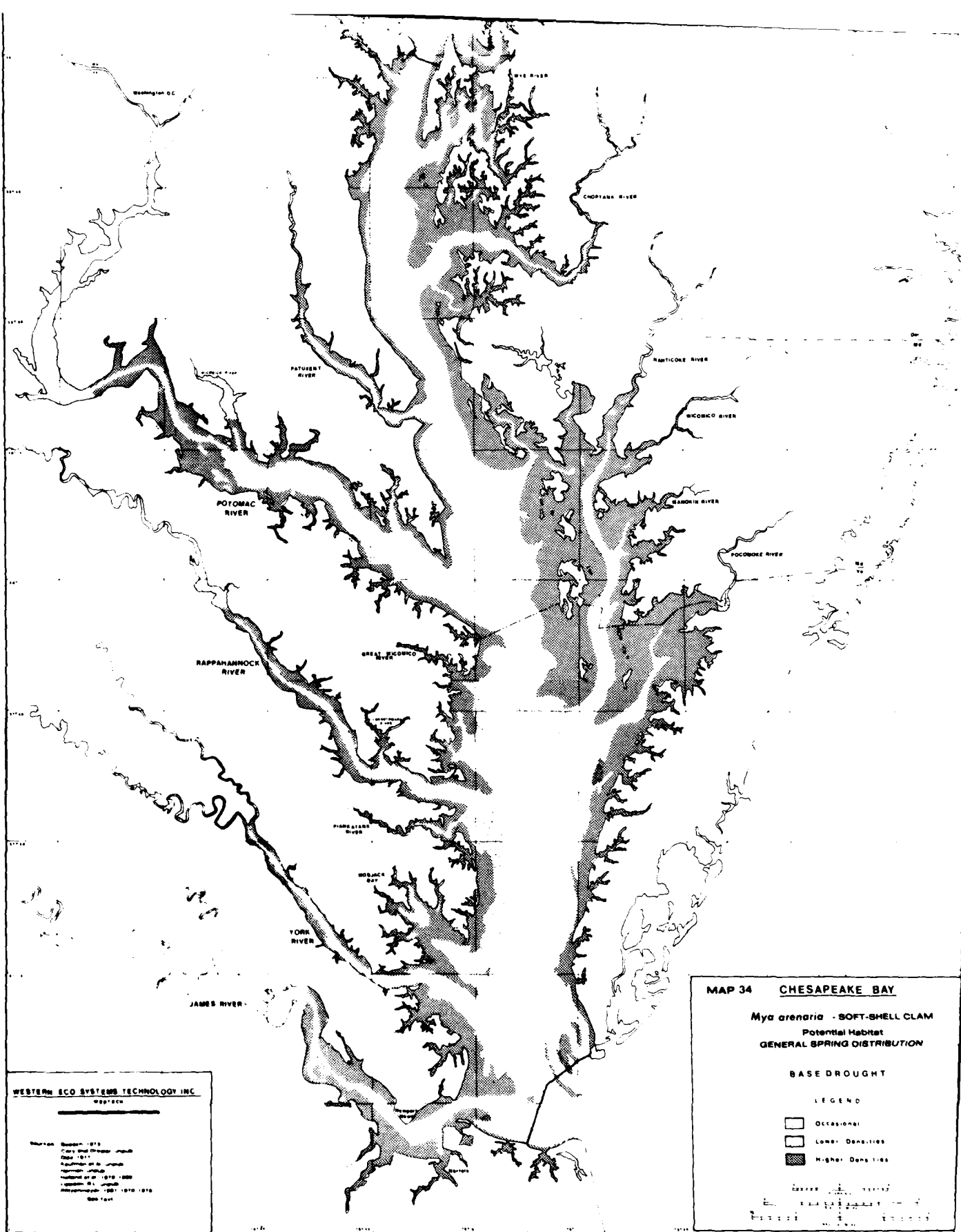


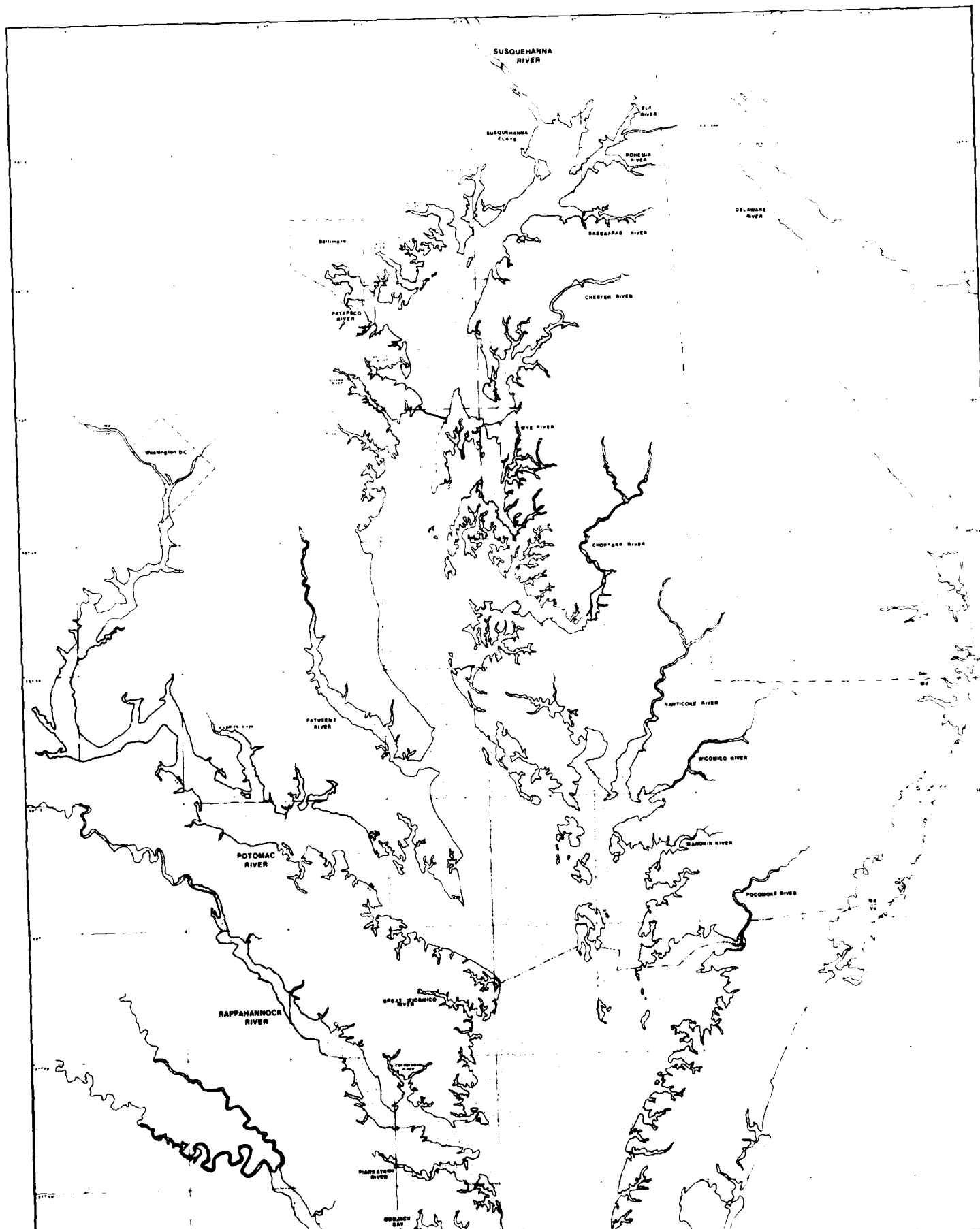


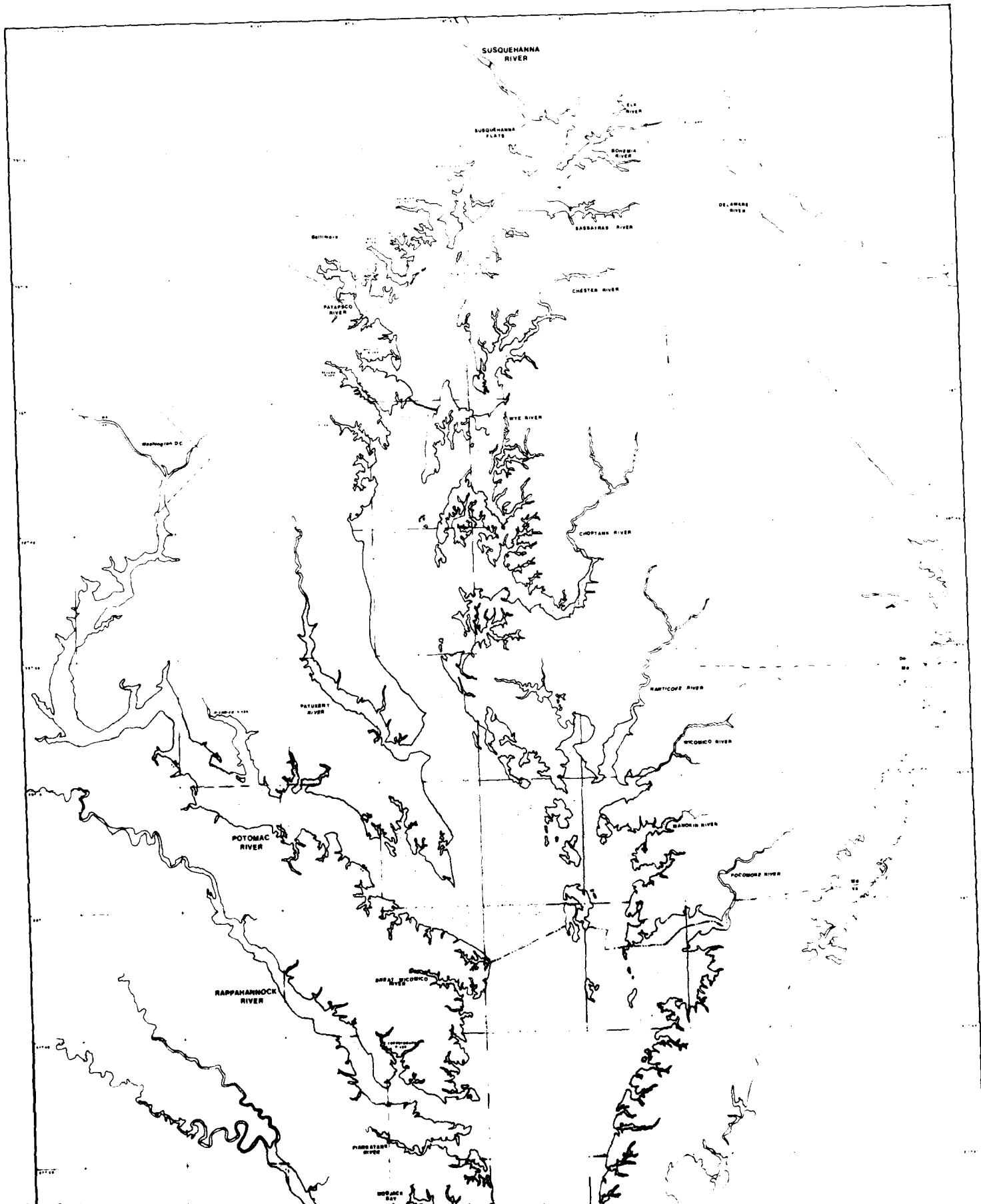


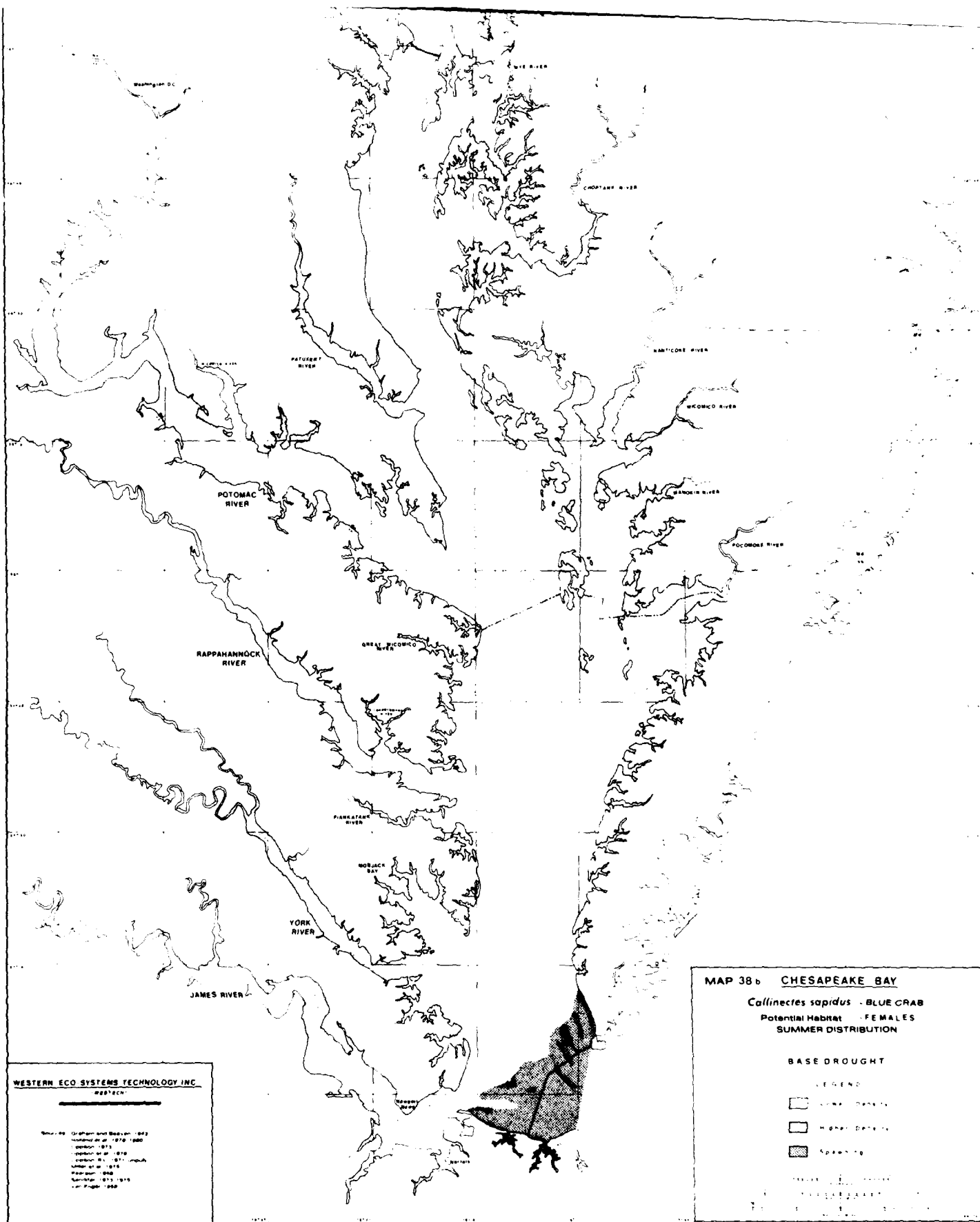


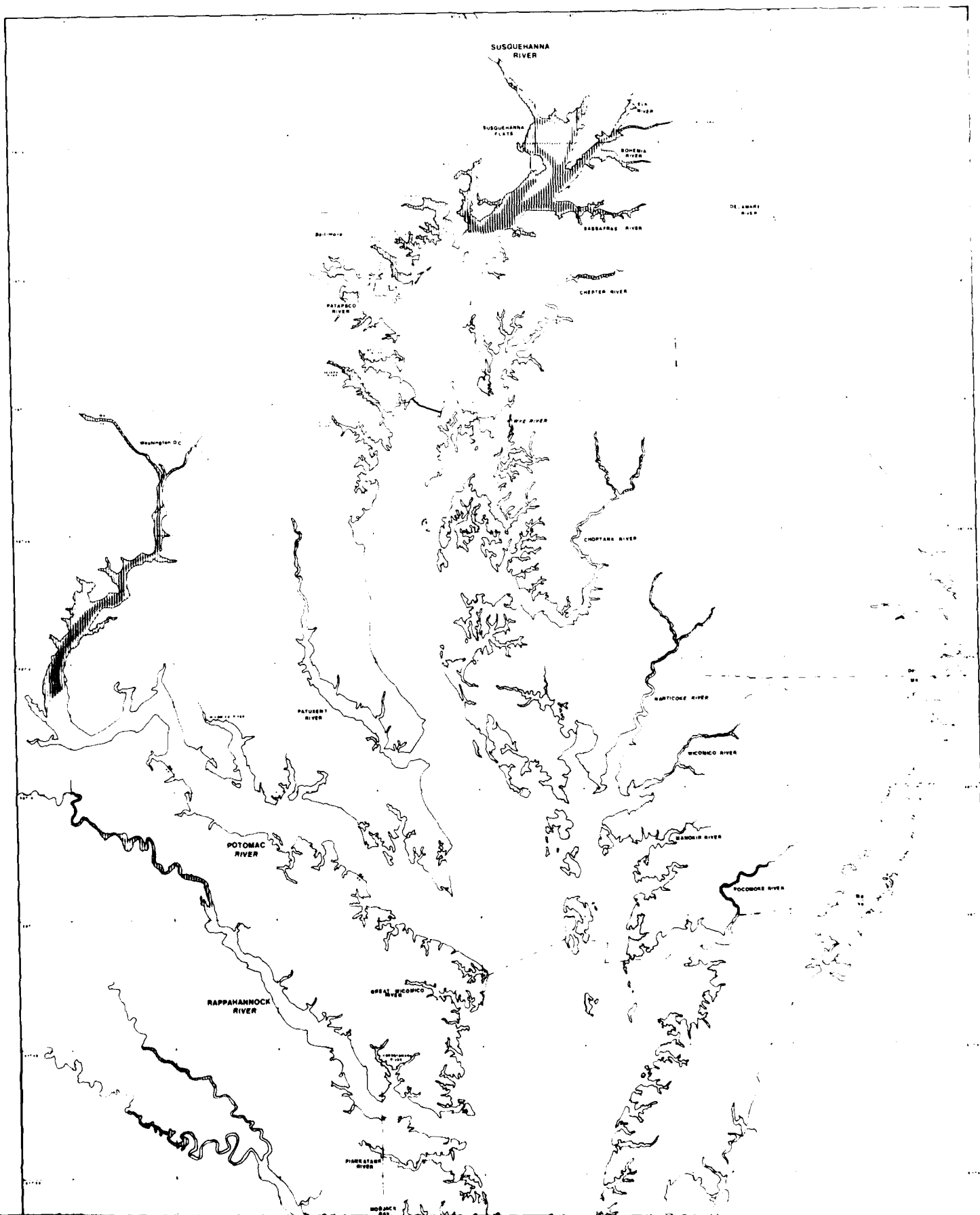


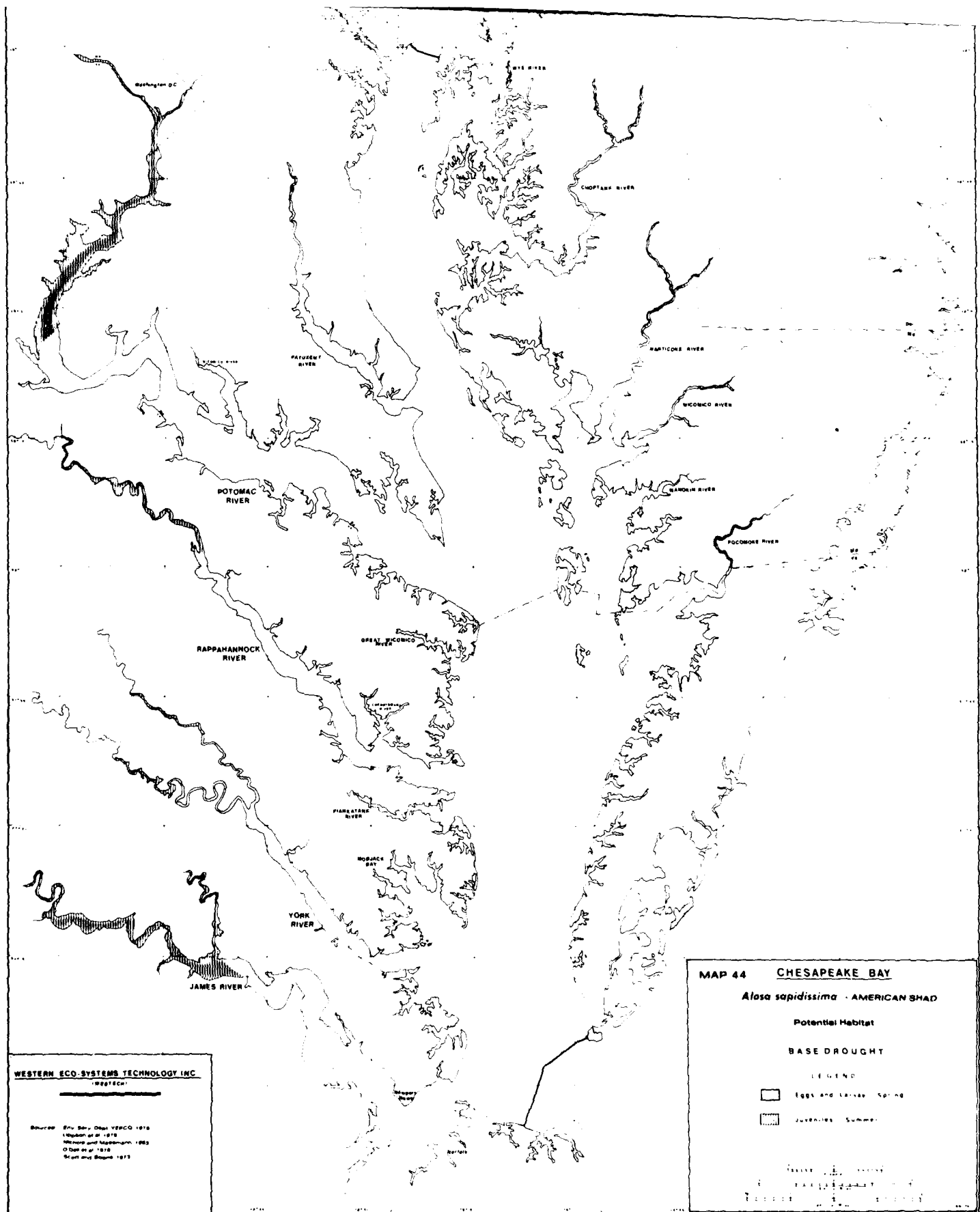


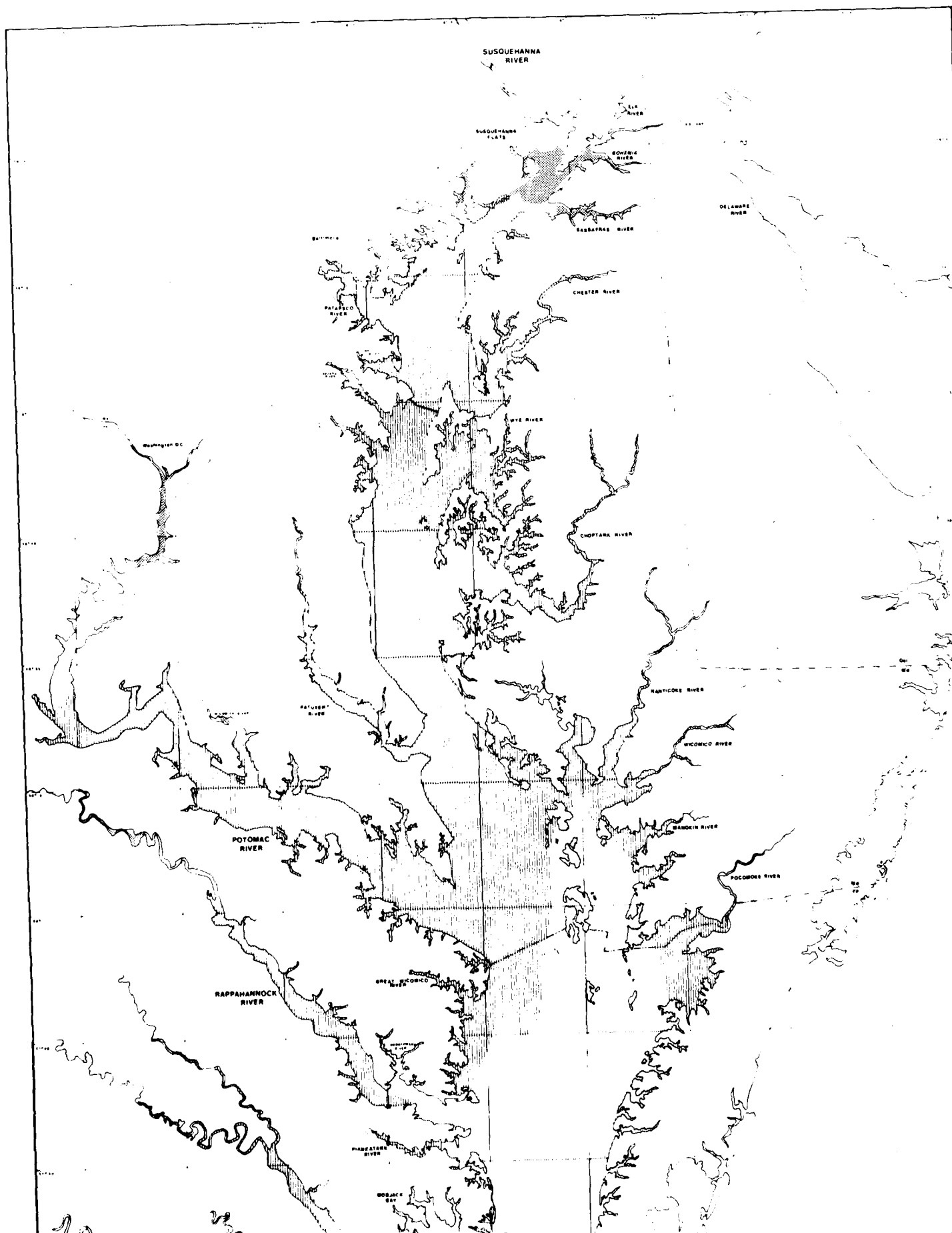


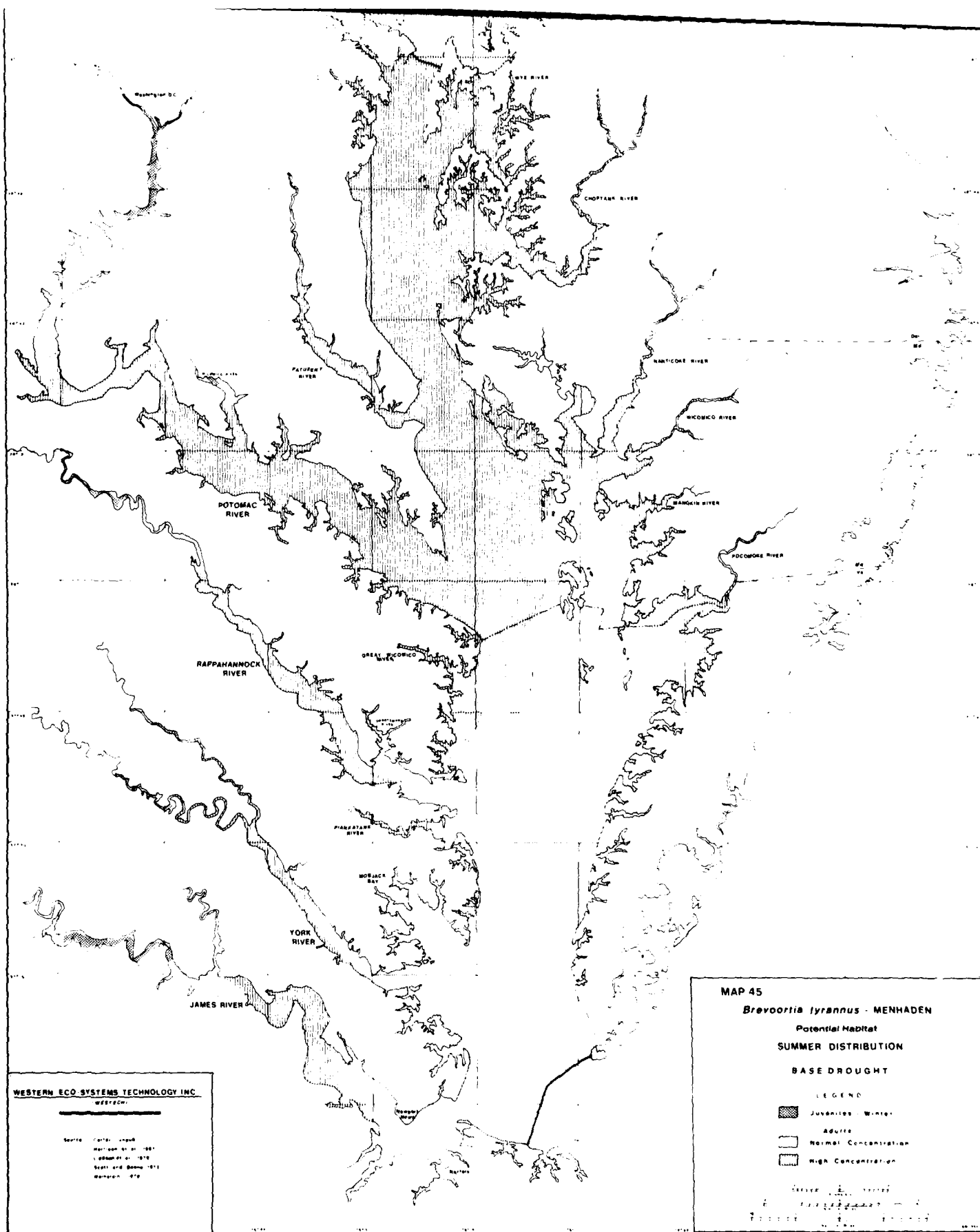


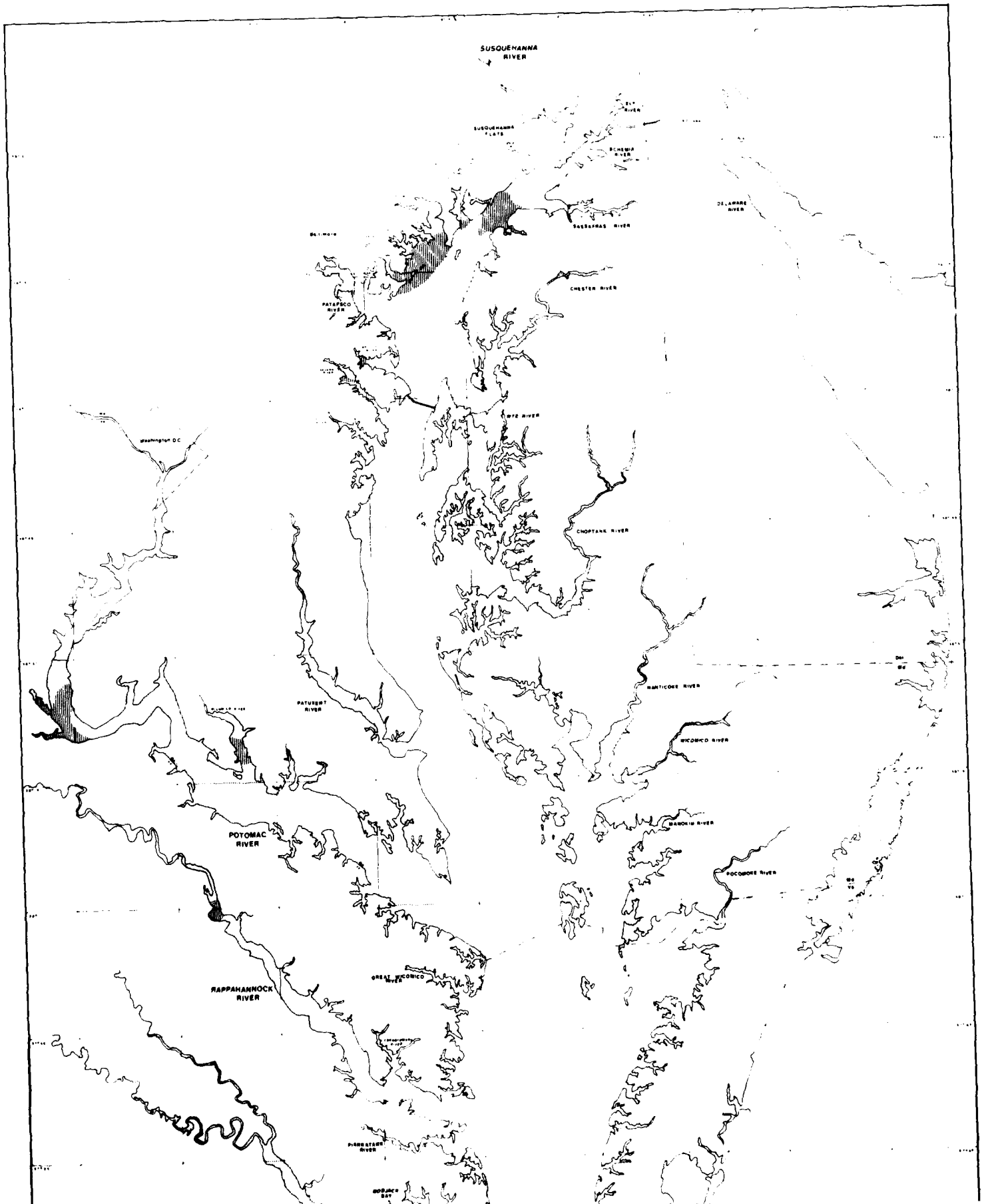


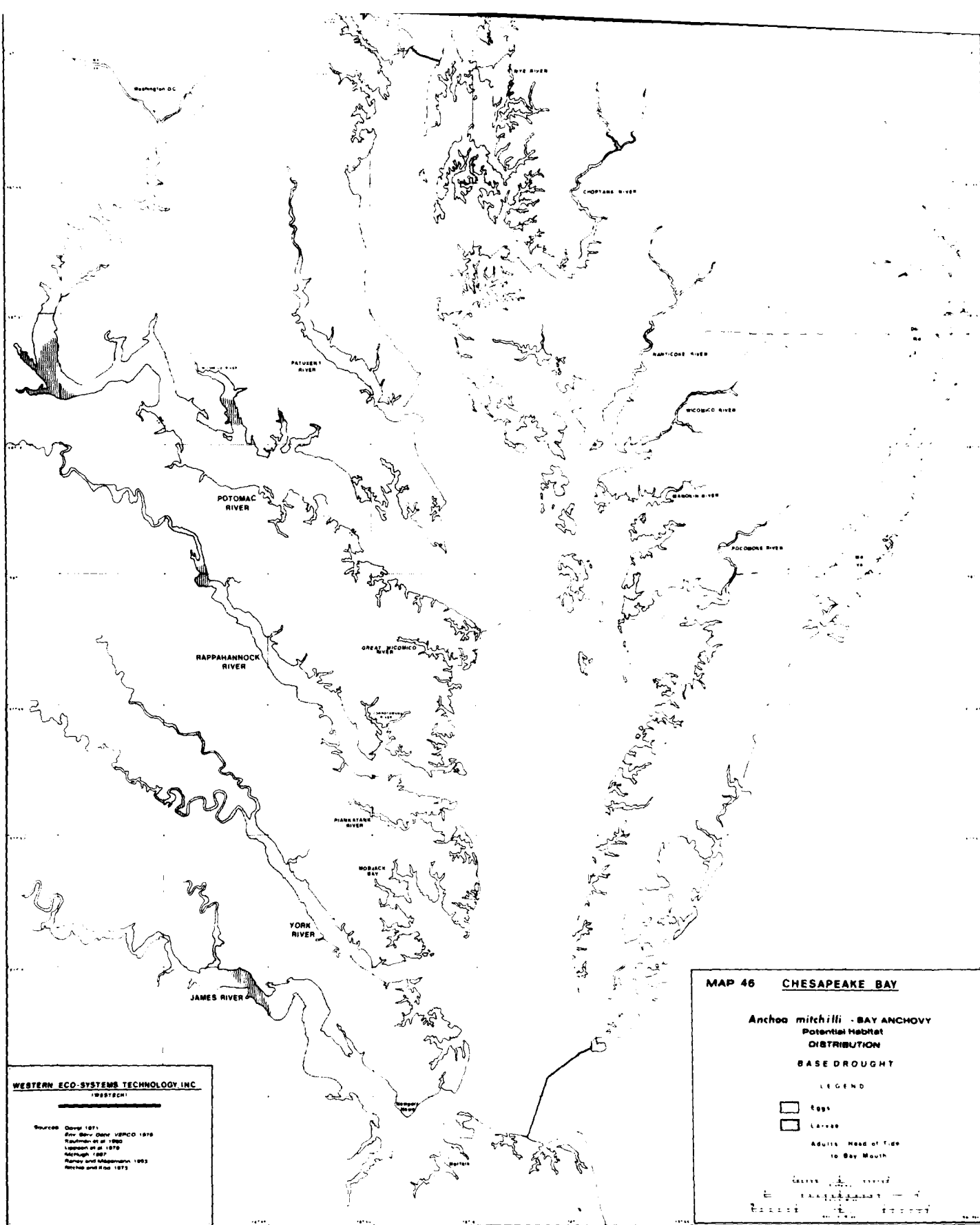


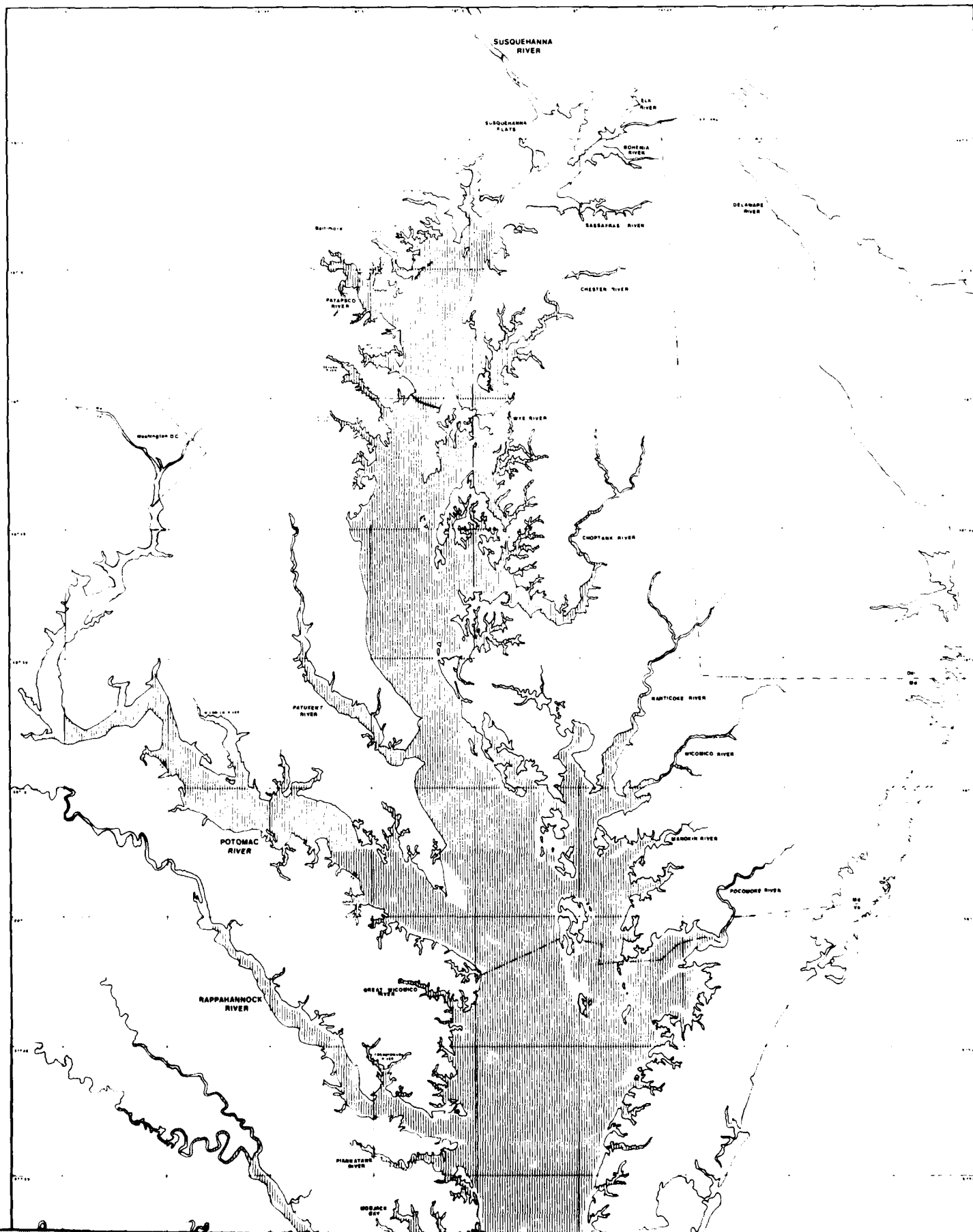


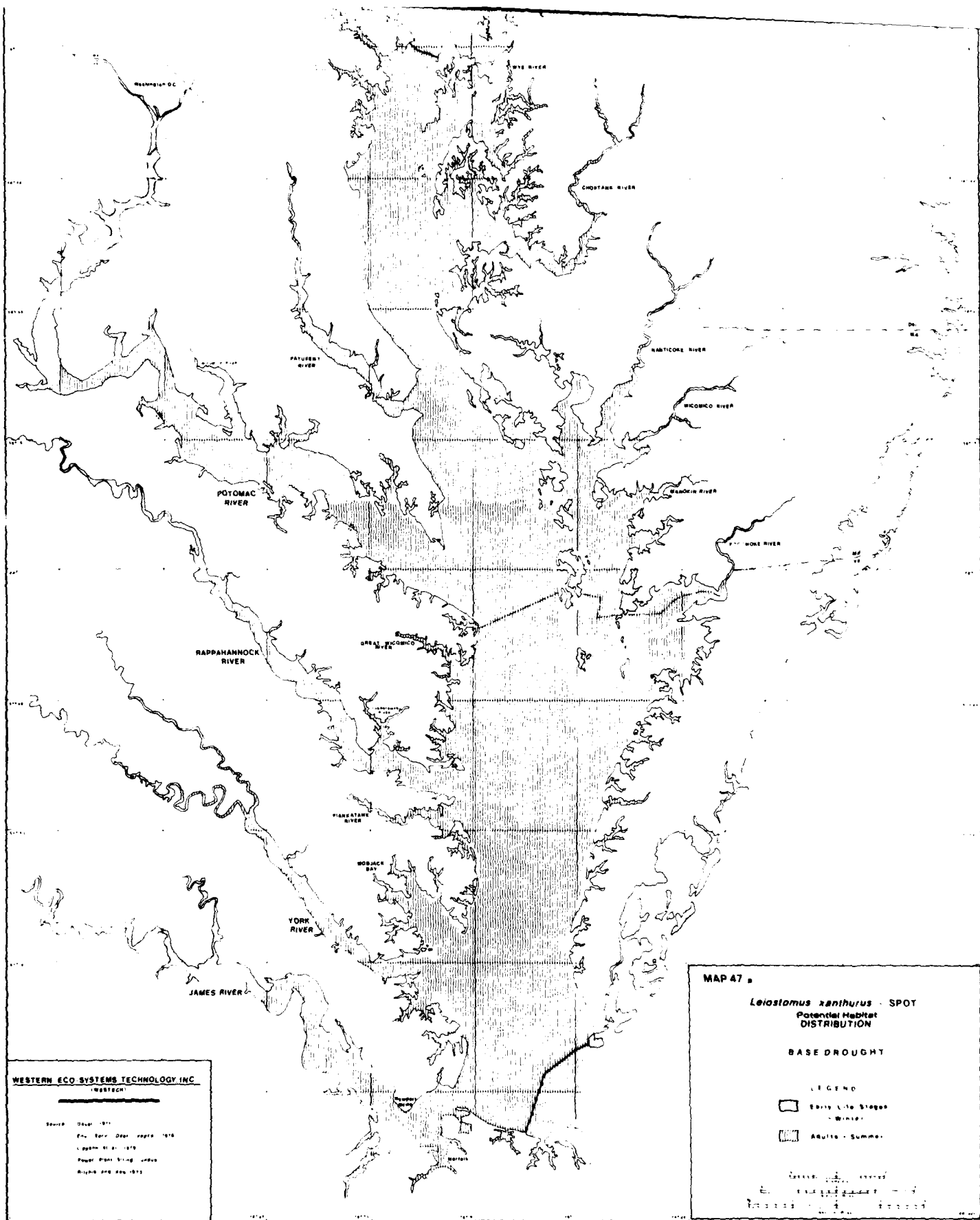


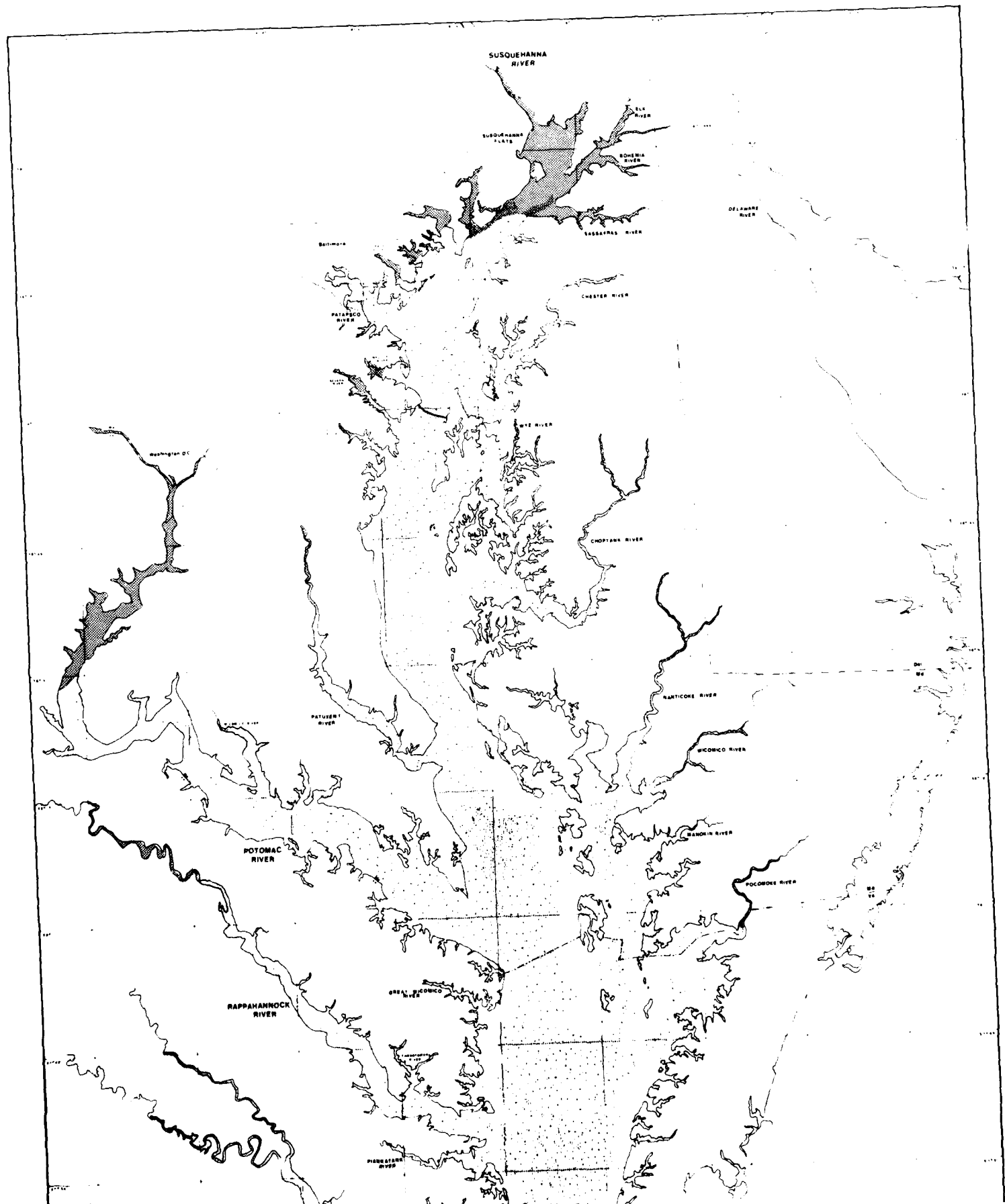


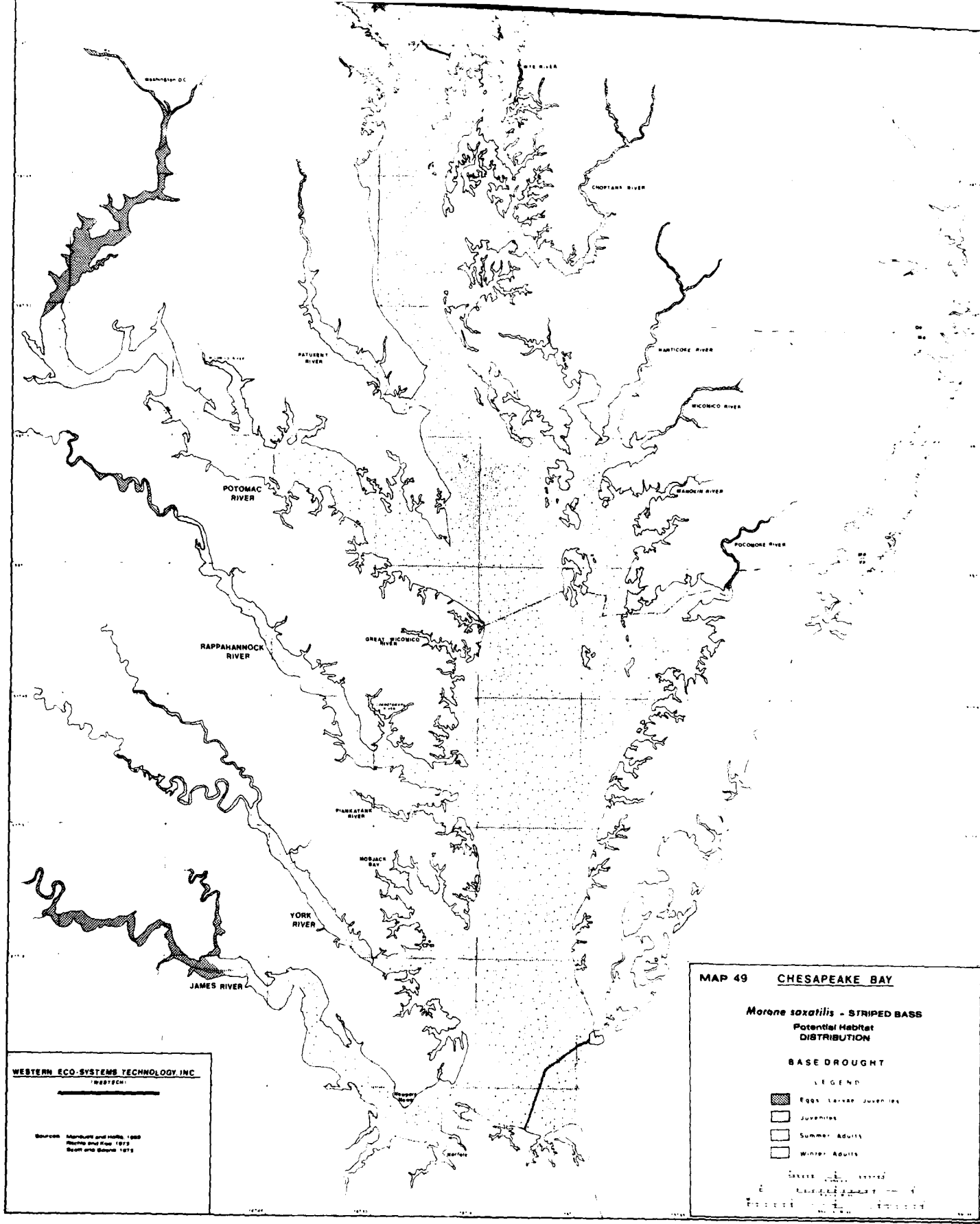


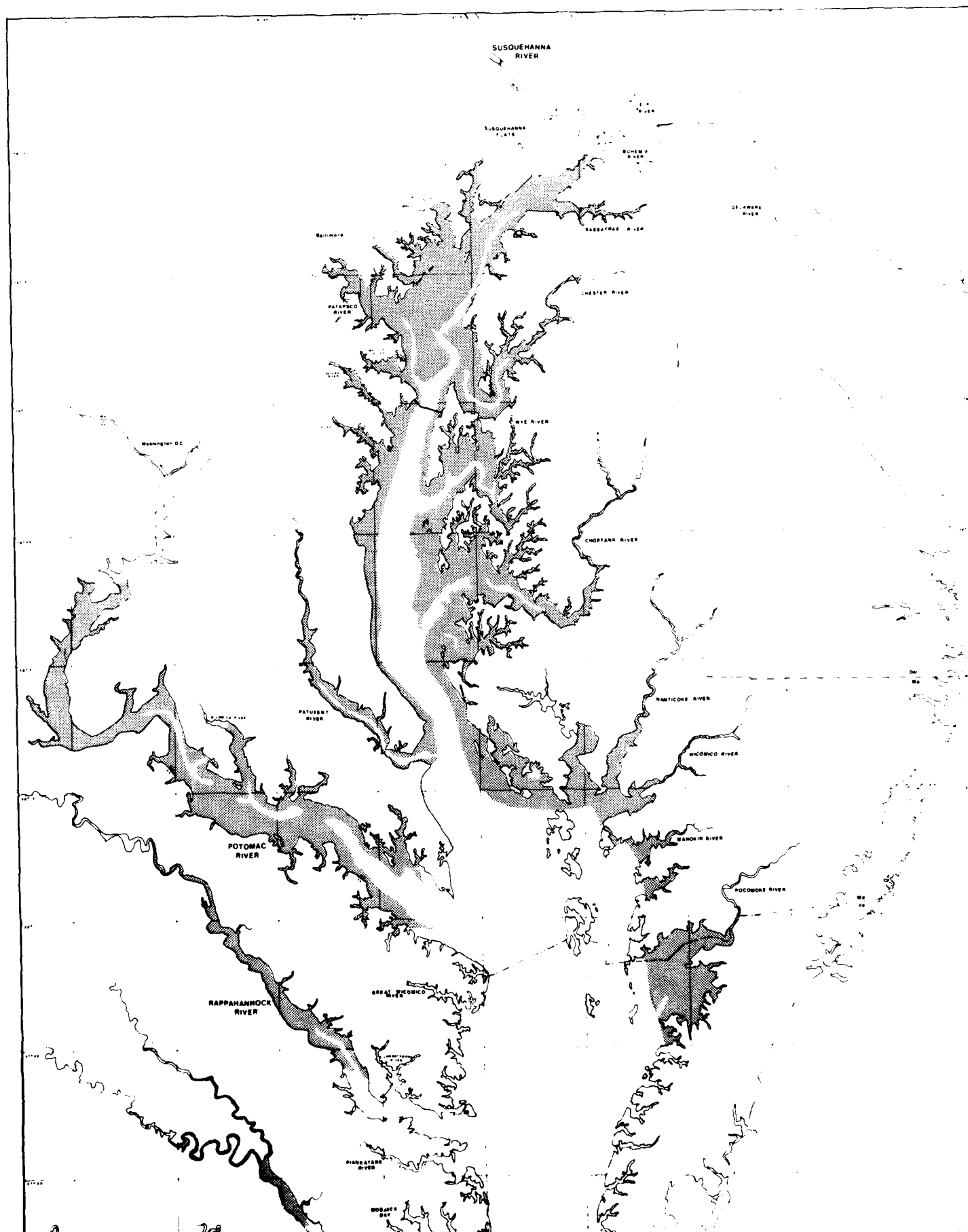


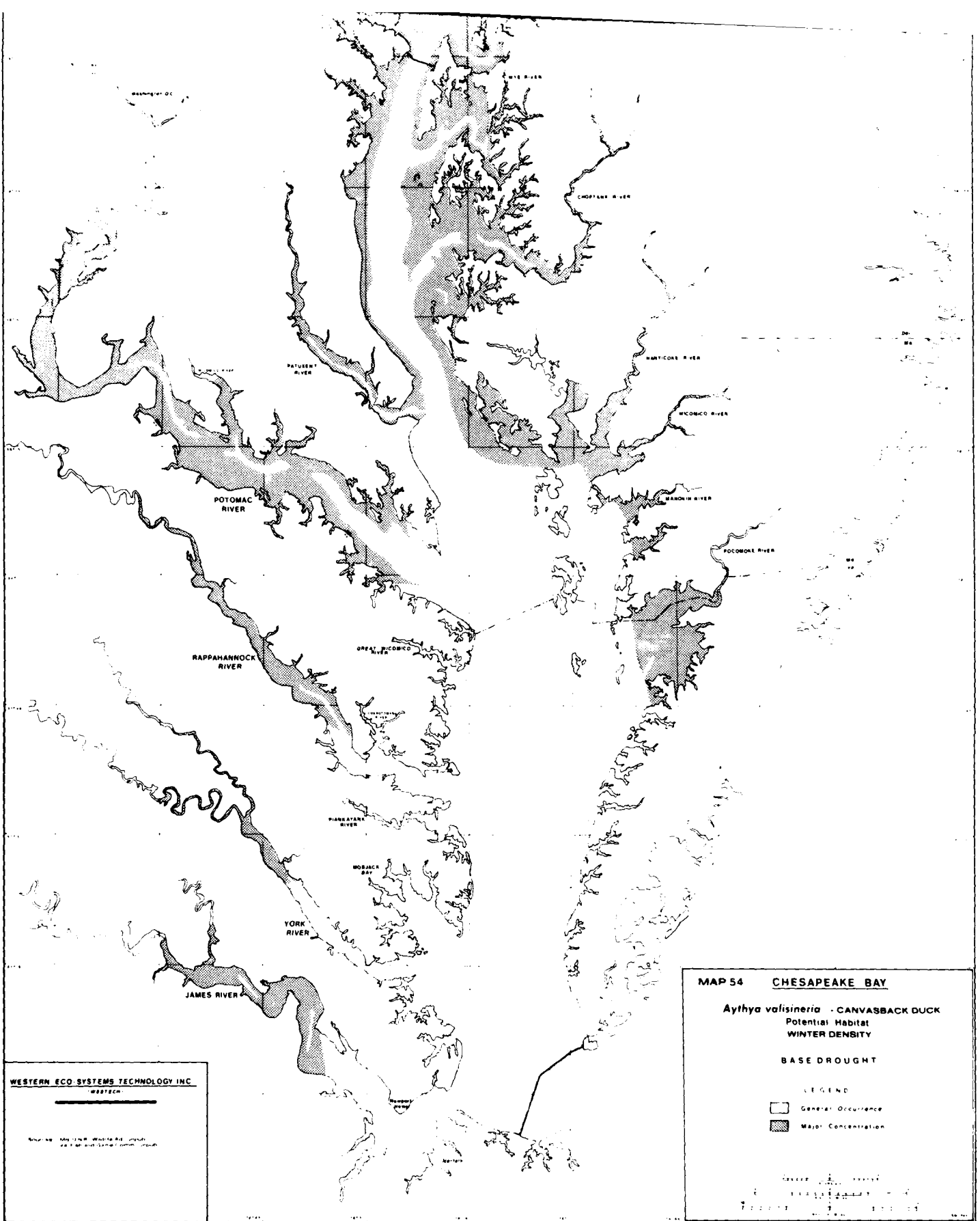


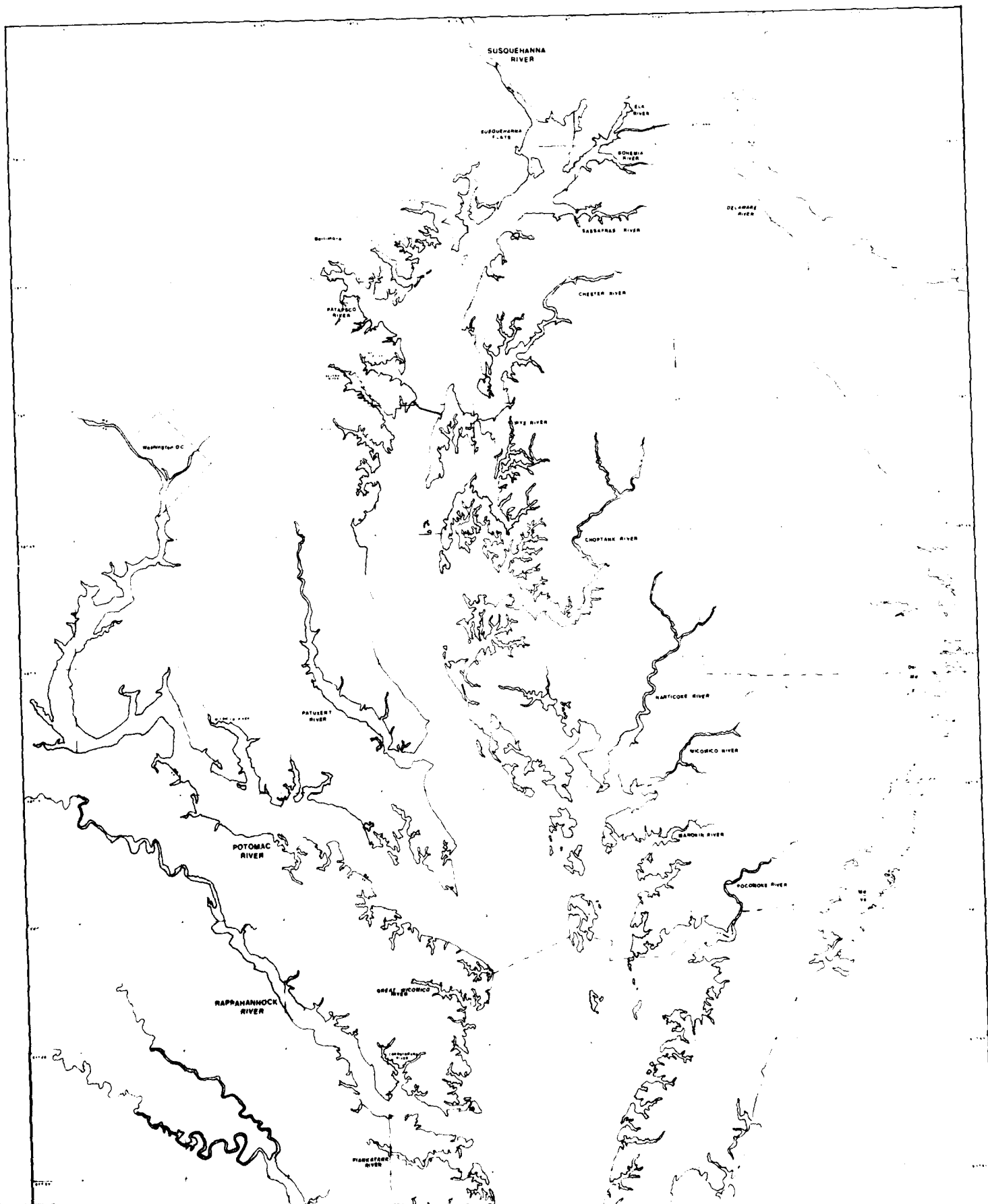


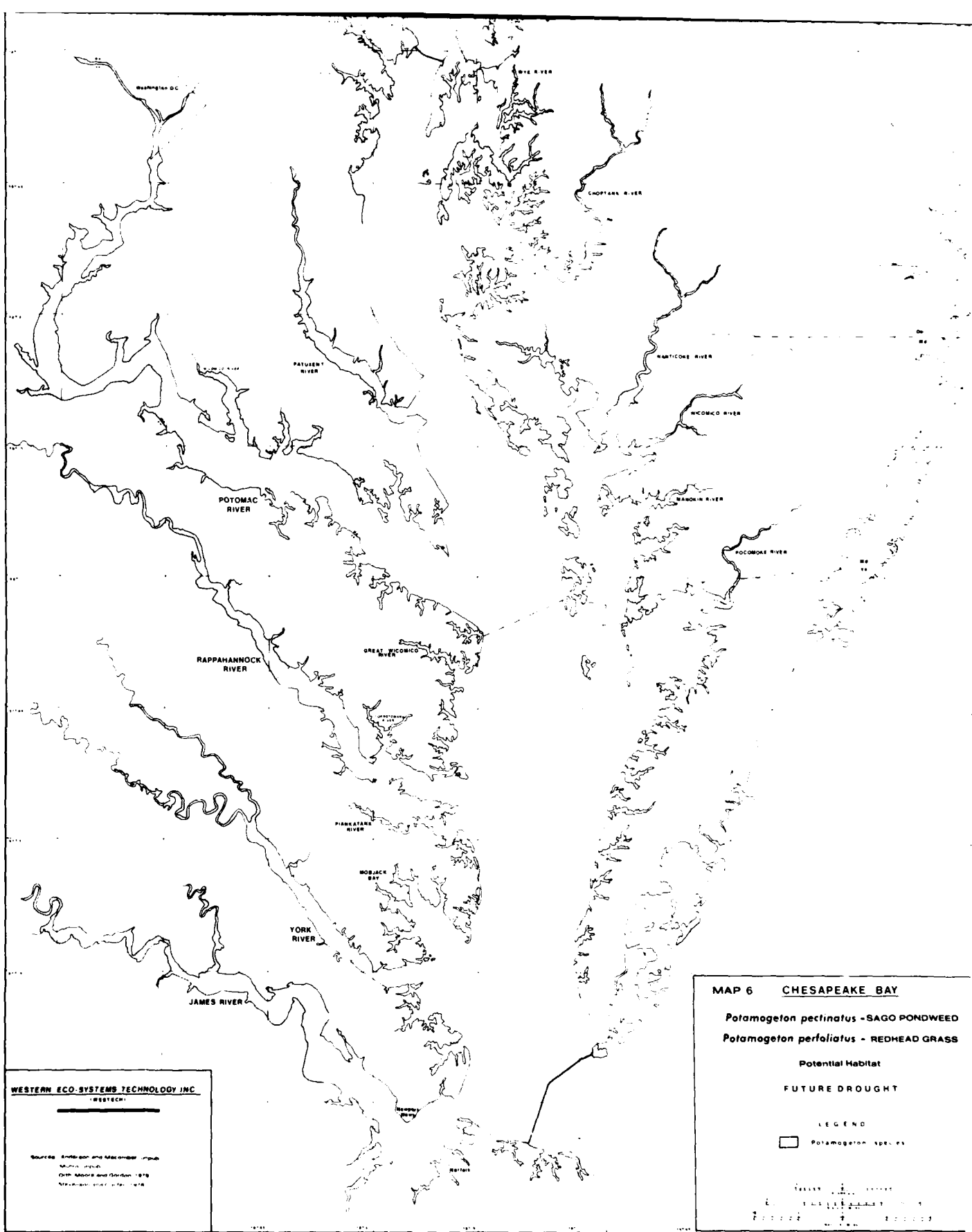


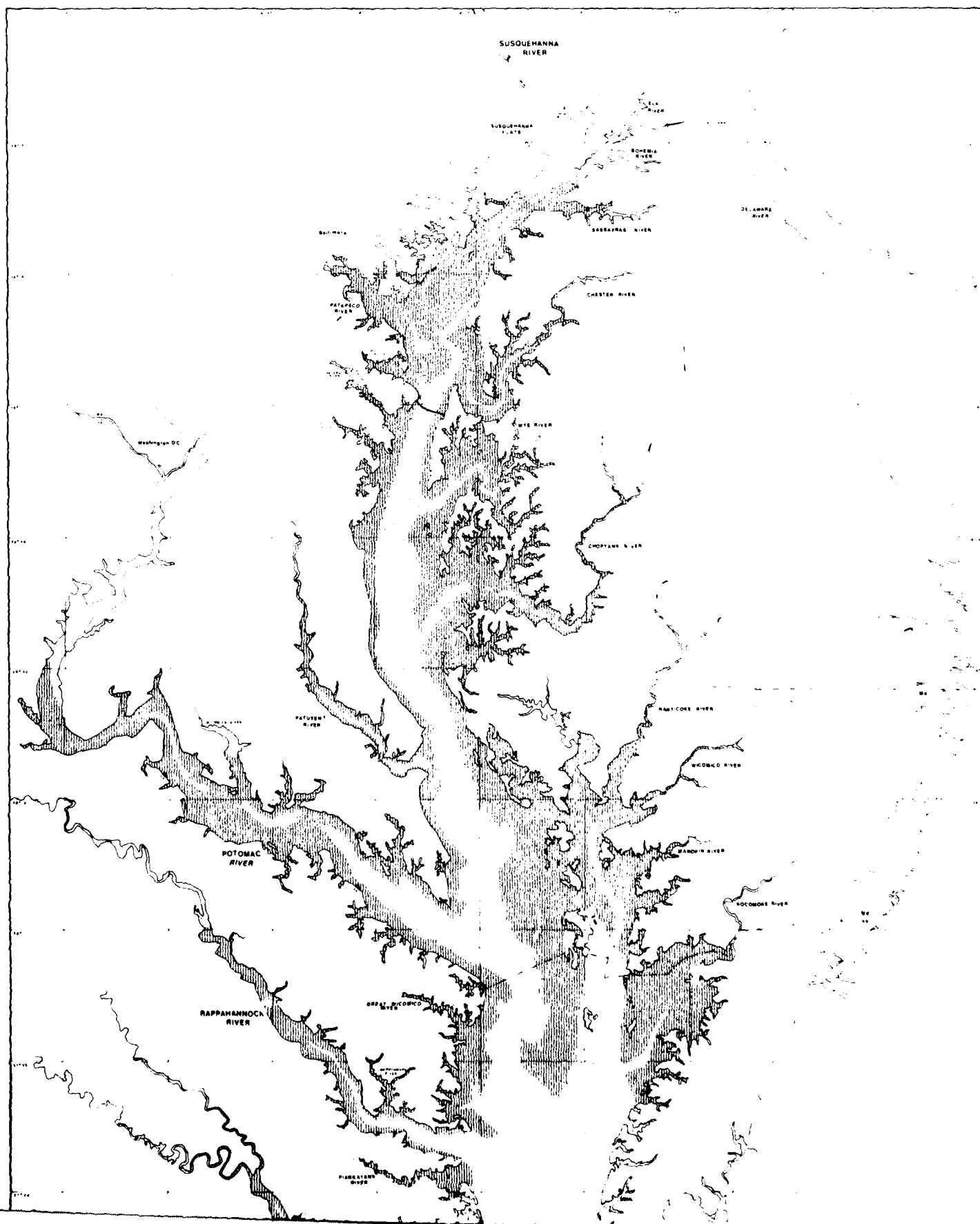












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CHESAPEAKE BAY LOW FRESHWATER INFLOW STUDY APPENDIX F
MAP FOLIO(U) CORPS OF ENGINEERS BALTIMORE MD BALTIMORE
DISTRICT SEP 84 CMB-84-L-APP-F

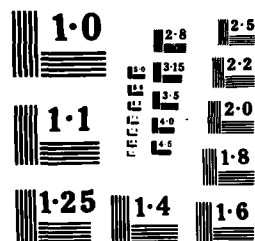
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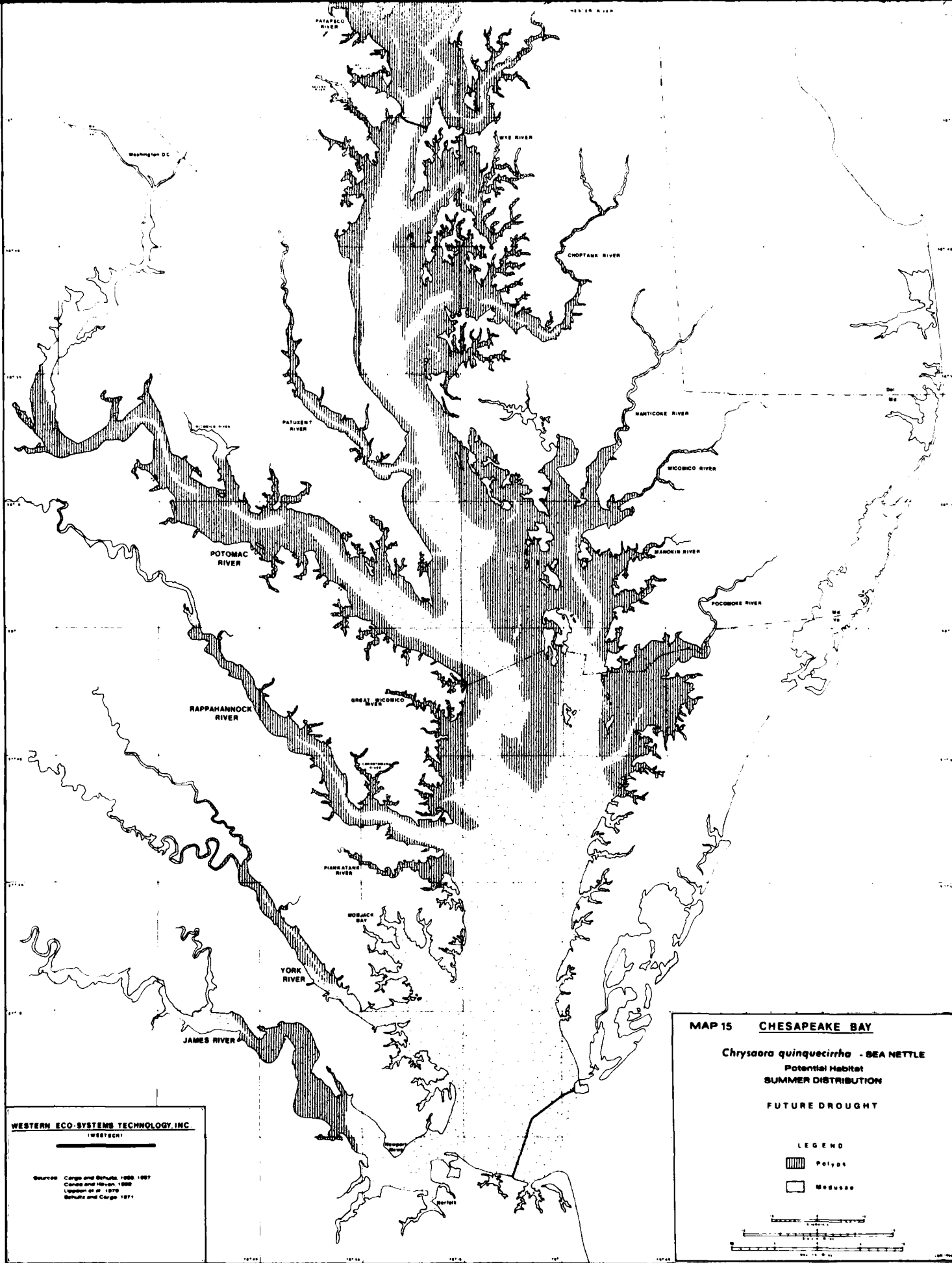
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11

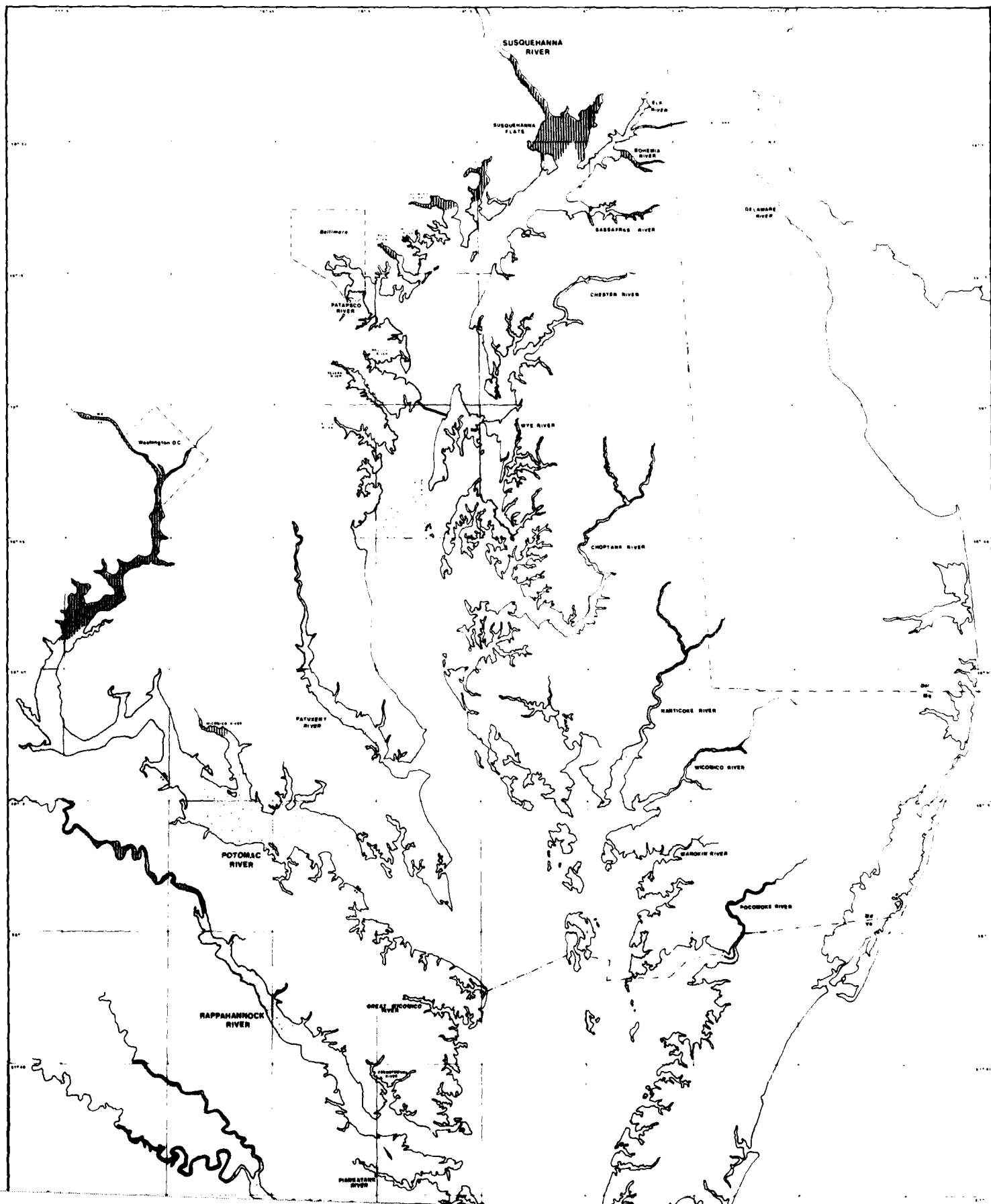
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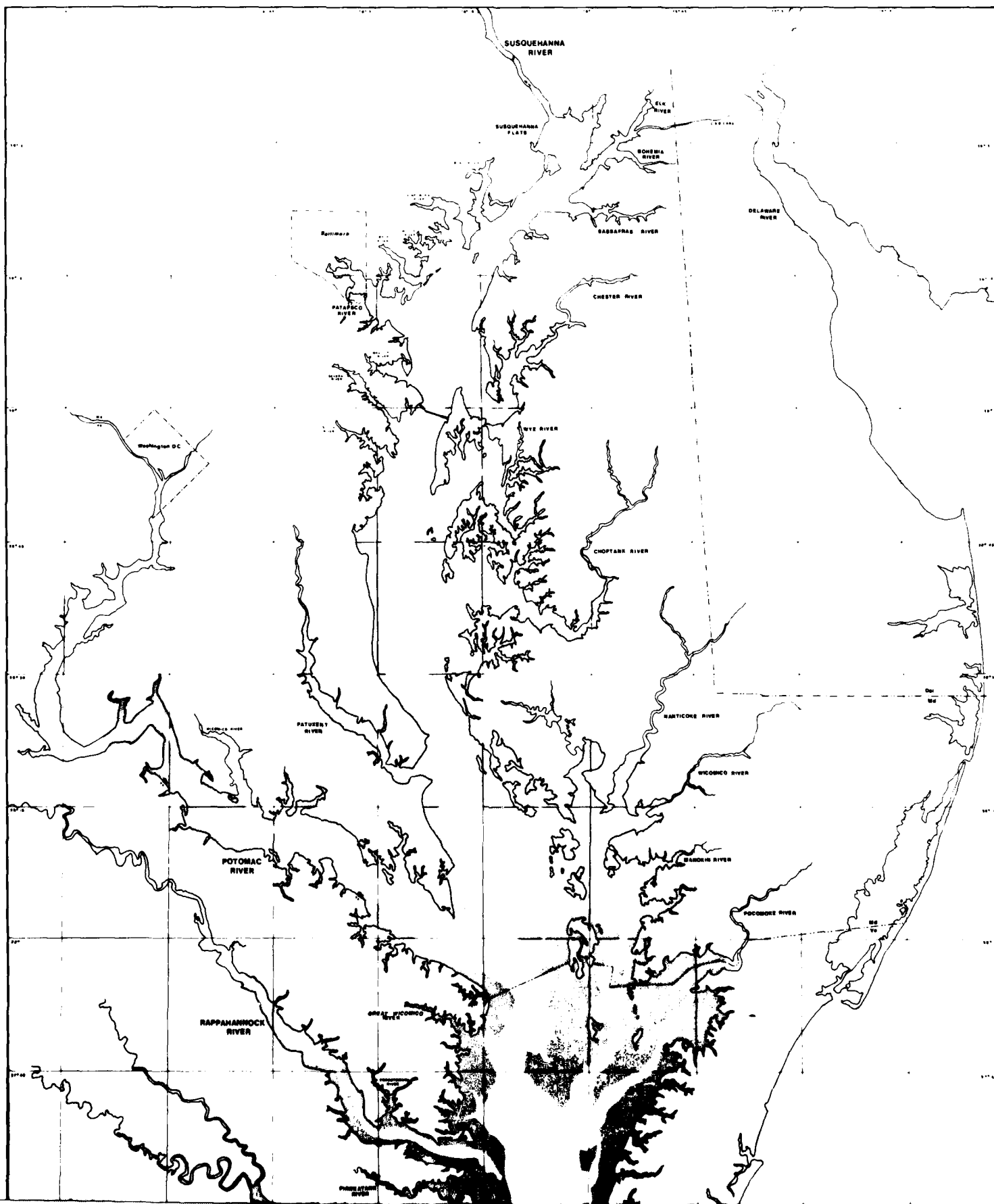


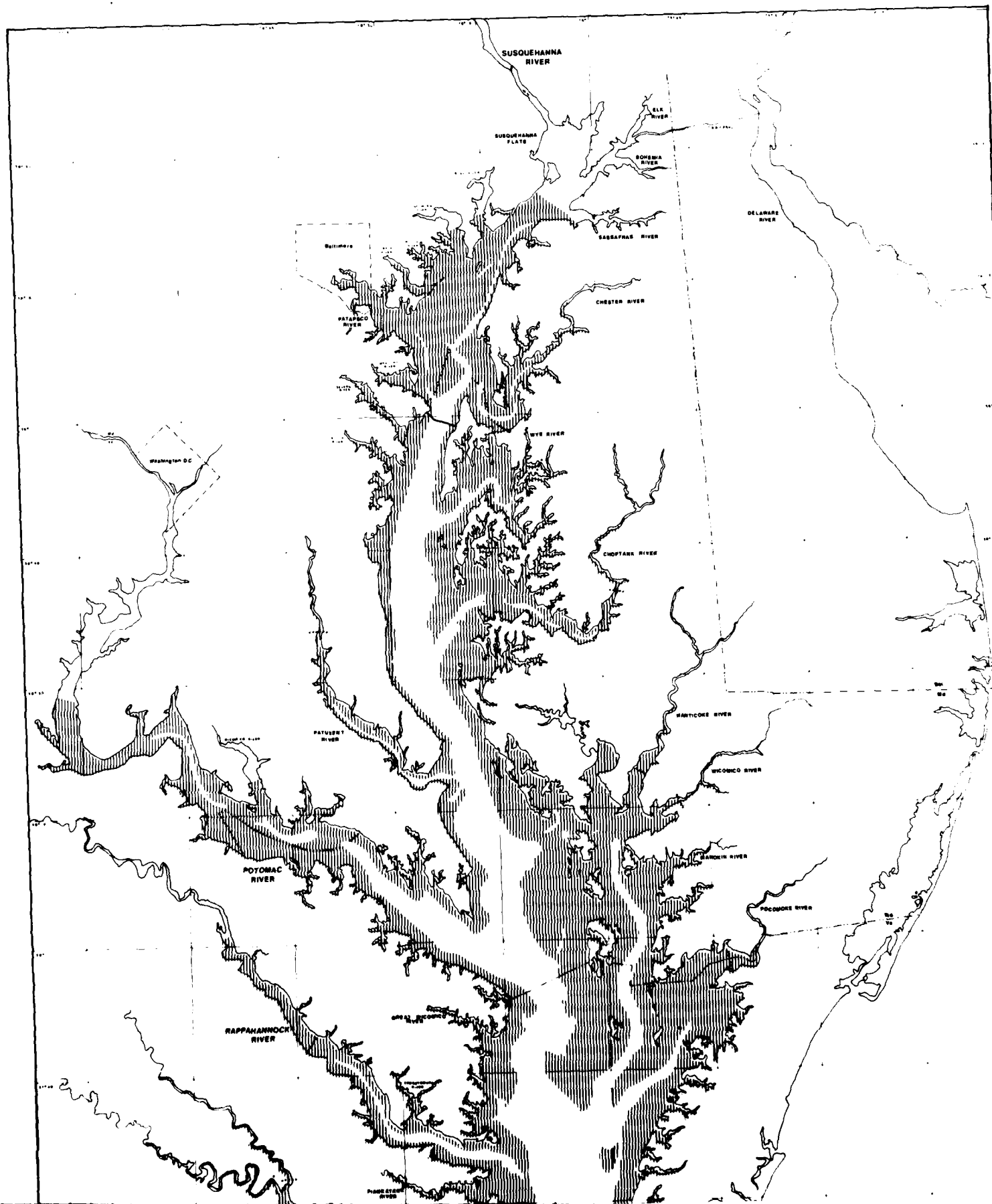


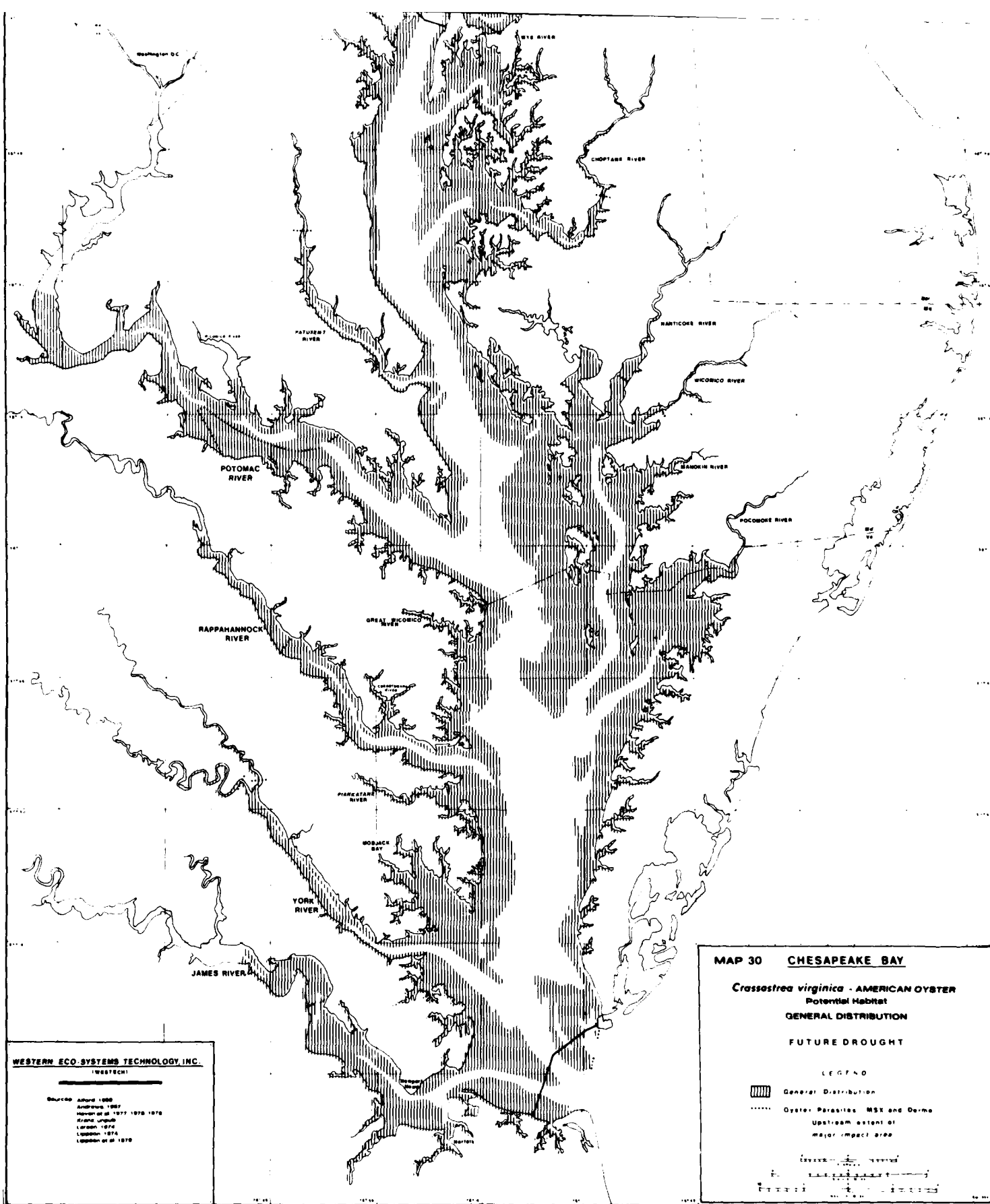
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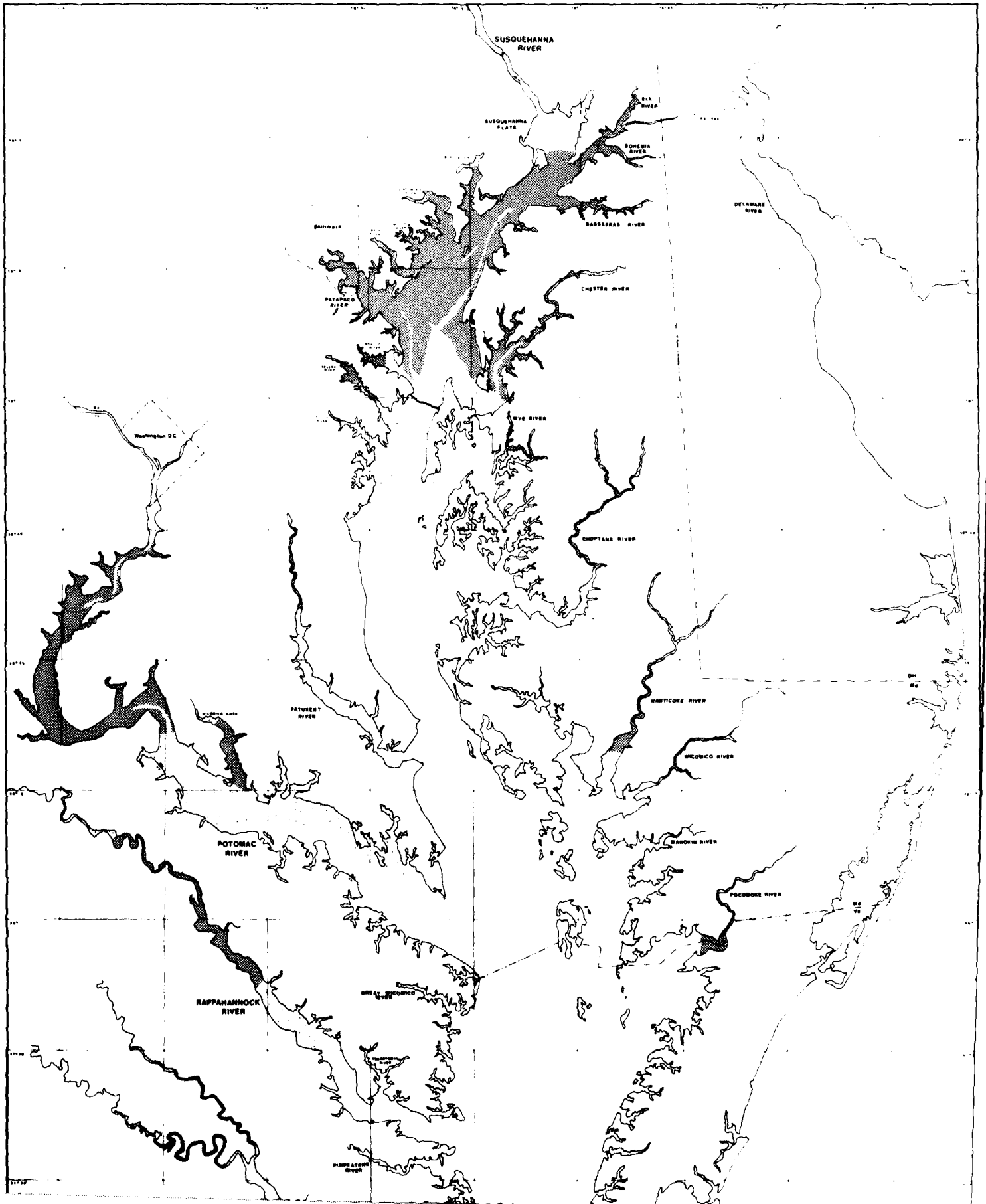
Source: Cargill and Schultz, 1988, 1987
Cargill and Haven, 1988
Lippert et al., 1979
Schultz and Cargill, 1971

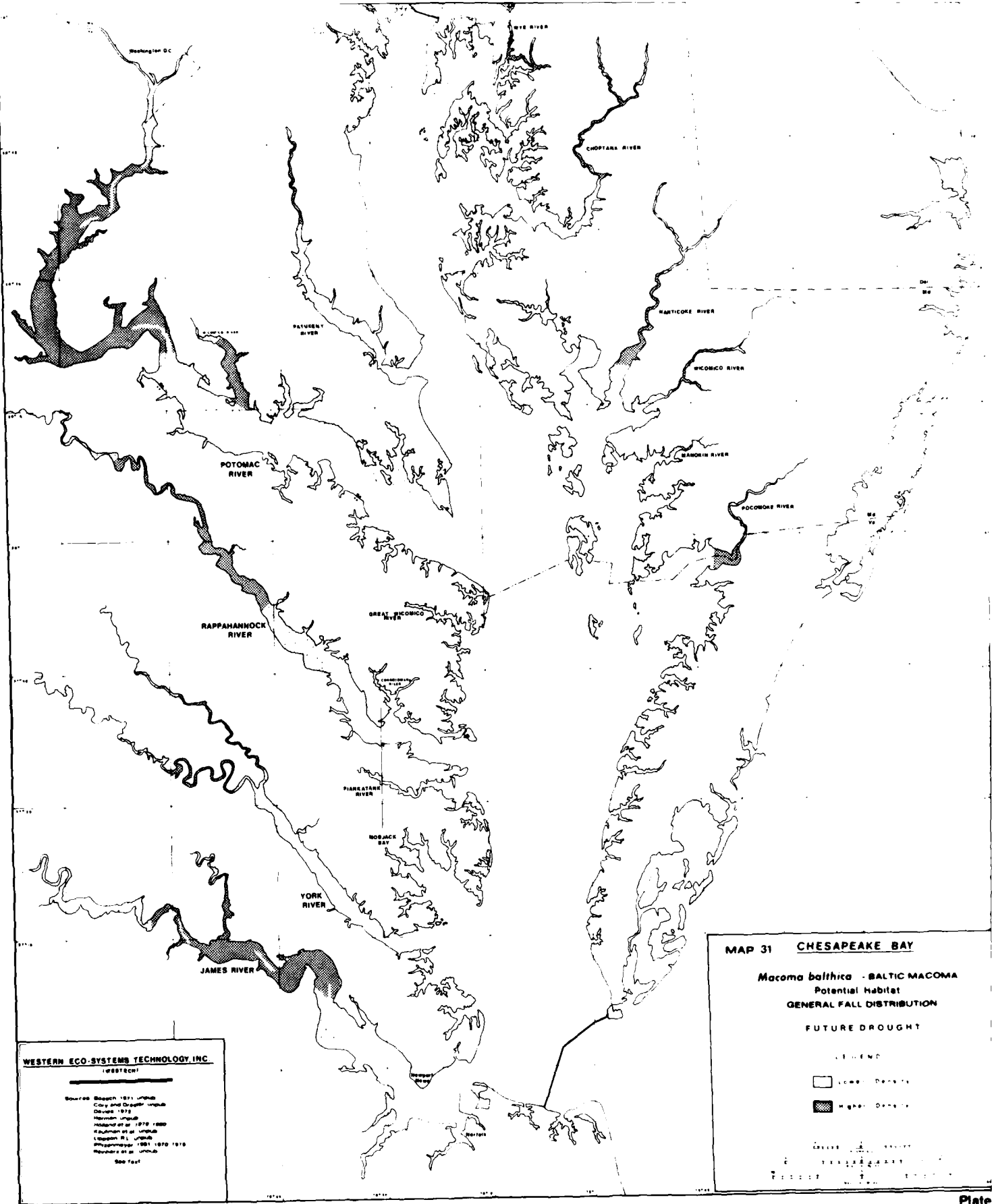












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Sources: Beach 1971, Unpub.
 Cary and Draper Unpub.
 Davies 1975
 Harman Unpub.
 Hoshizaki et al. 1979, 1980
 Kaufman et al. Unpub.
 Lippert H.L. Unpub.
 Mendenhall et al. 1981, 1979, 1978
 Mendenhall et al. Unpub.
 See Text

MAP 31 CHESAPEAKE BAY

Macoma balthica - BALTIC MACOMA
 Potential Habitat
 GENERAL FALL DISTRIBUTION
 FUTURE DROUGHT

LEGEND

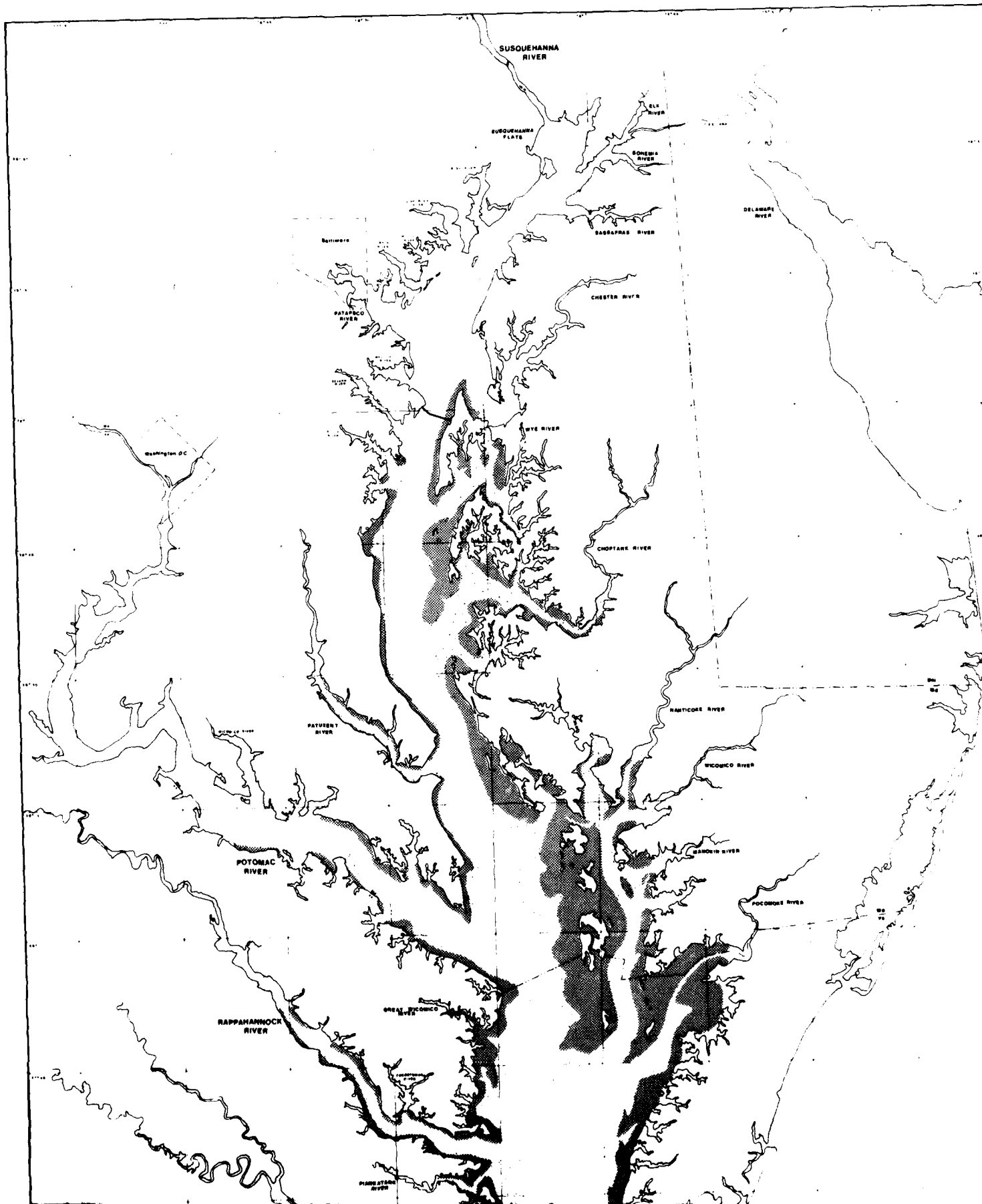
Low Density

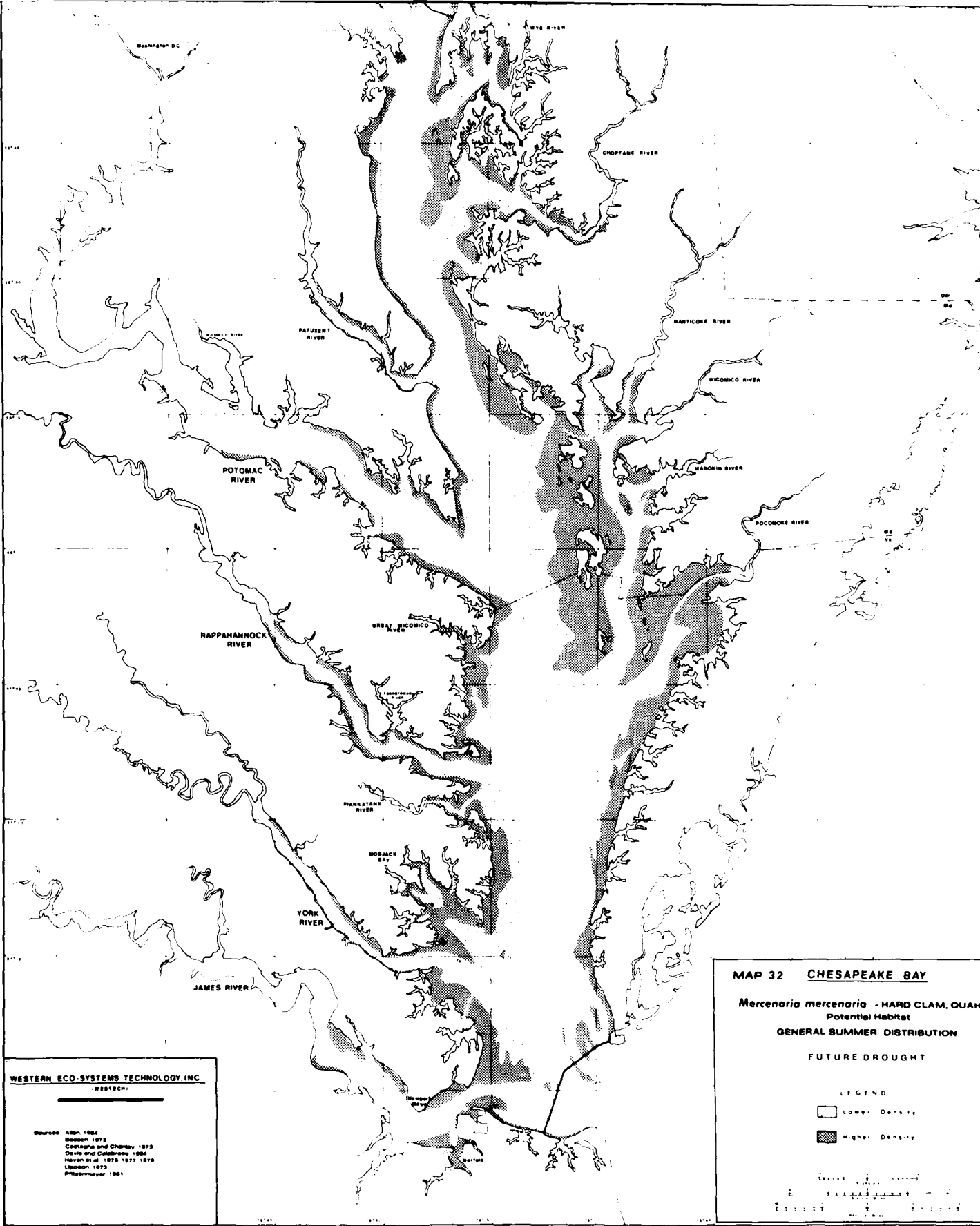
High Density

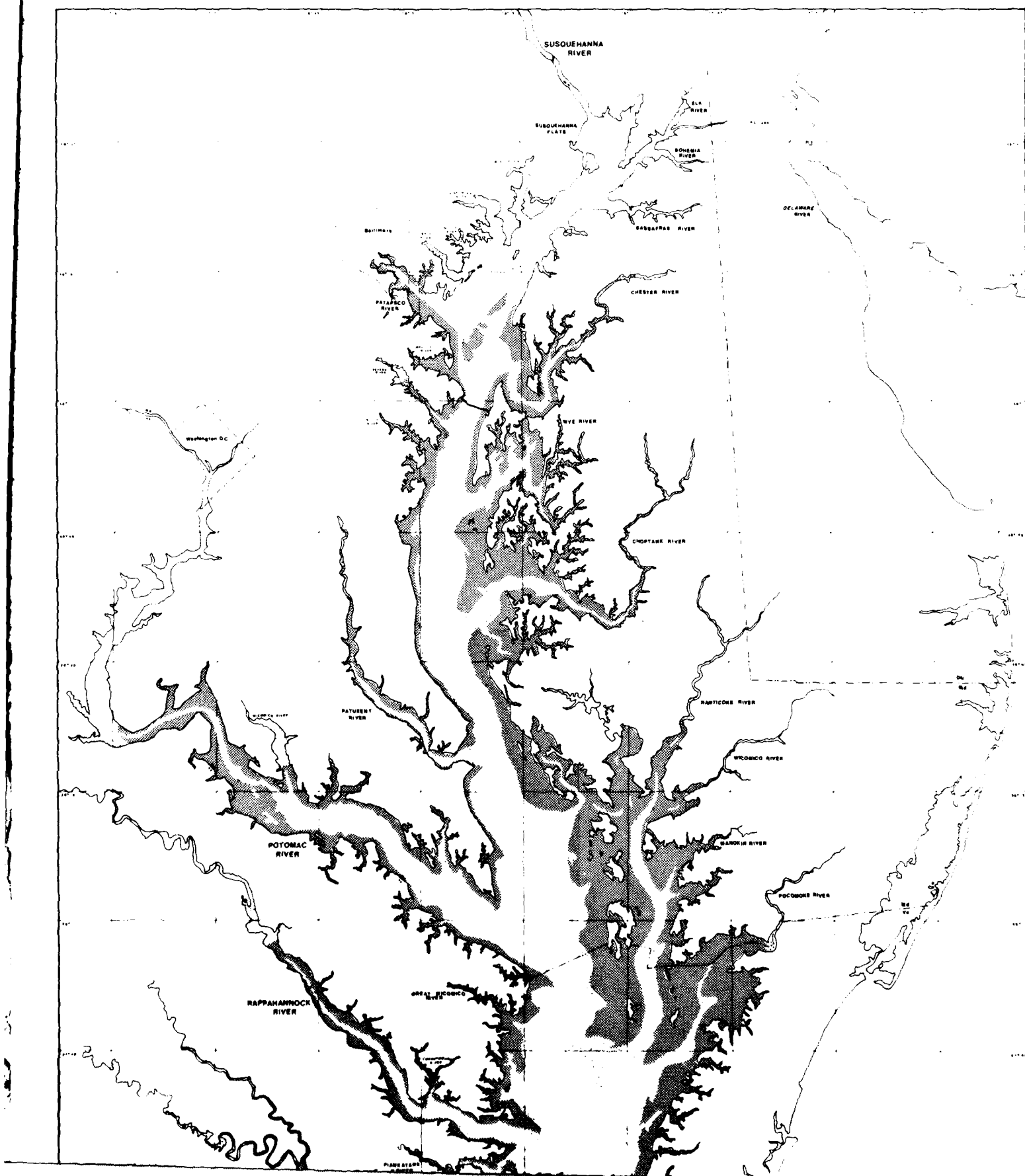
Scale 1:100,000

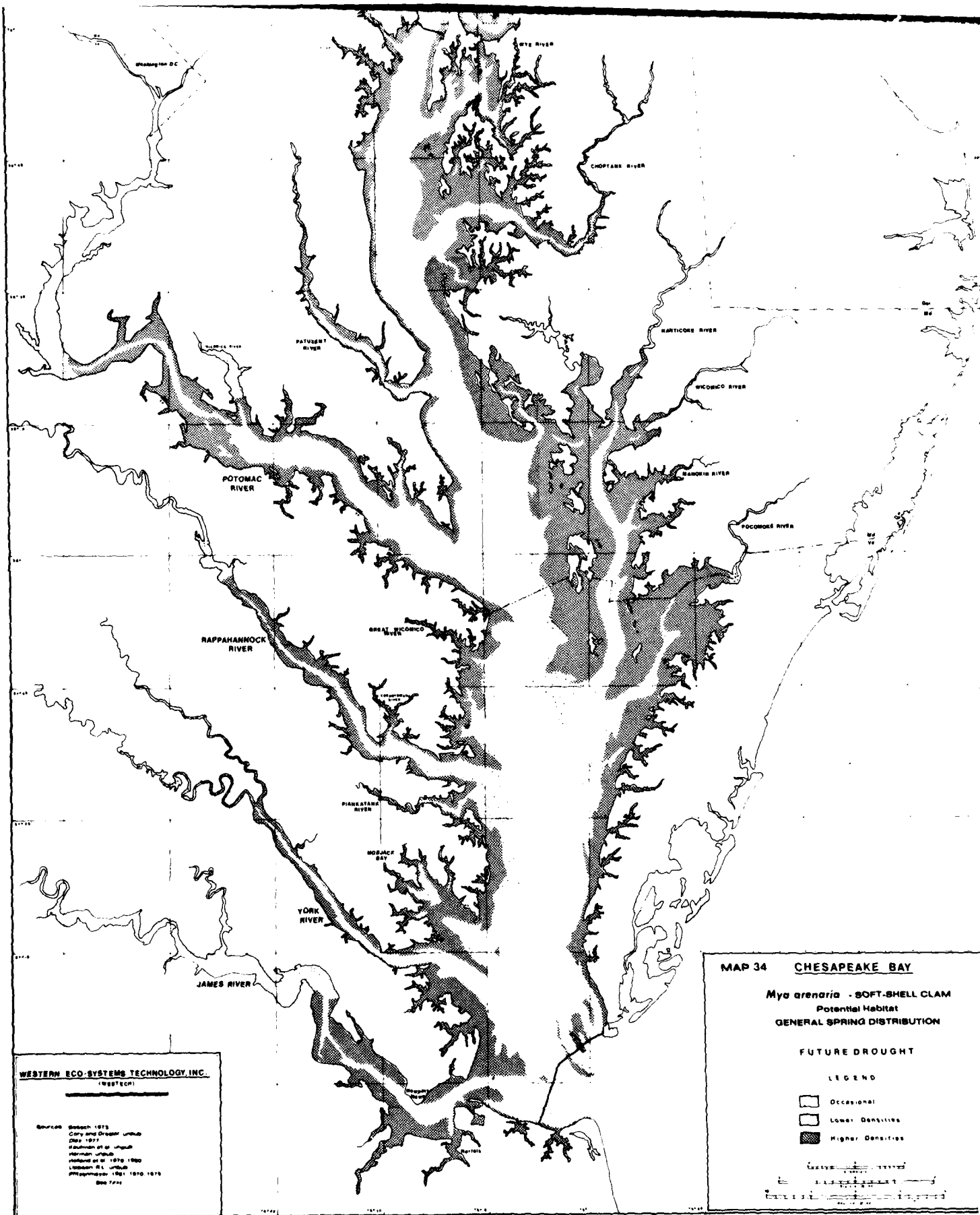
100 Miles

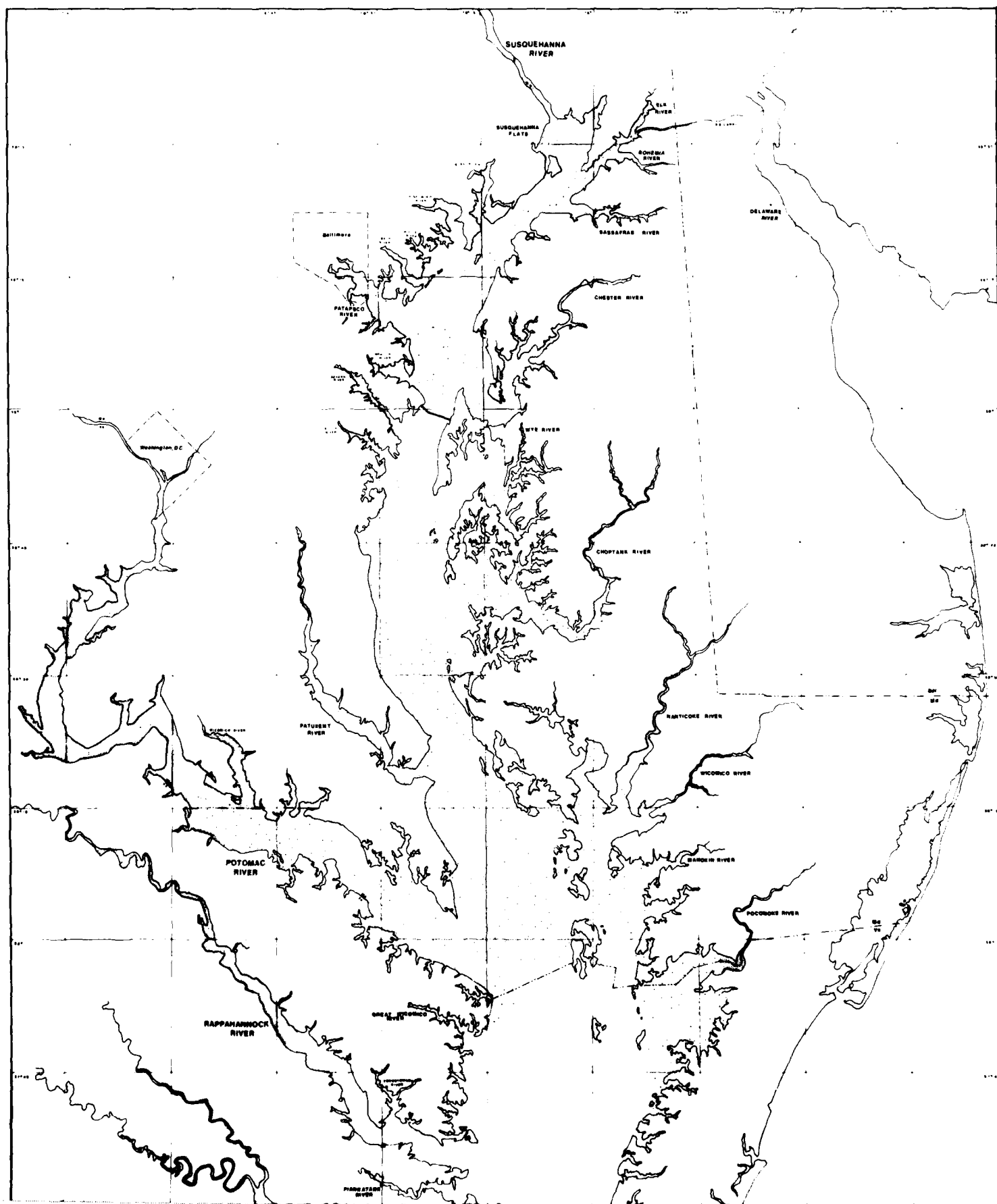
100 Kilometers

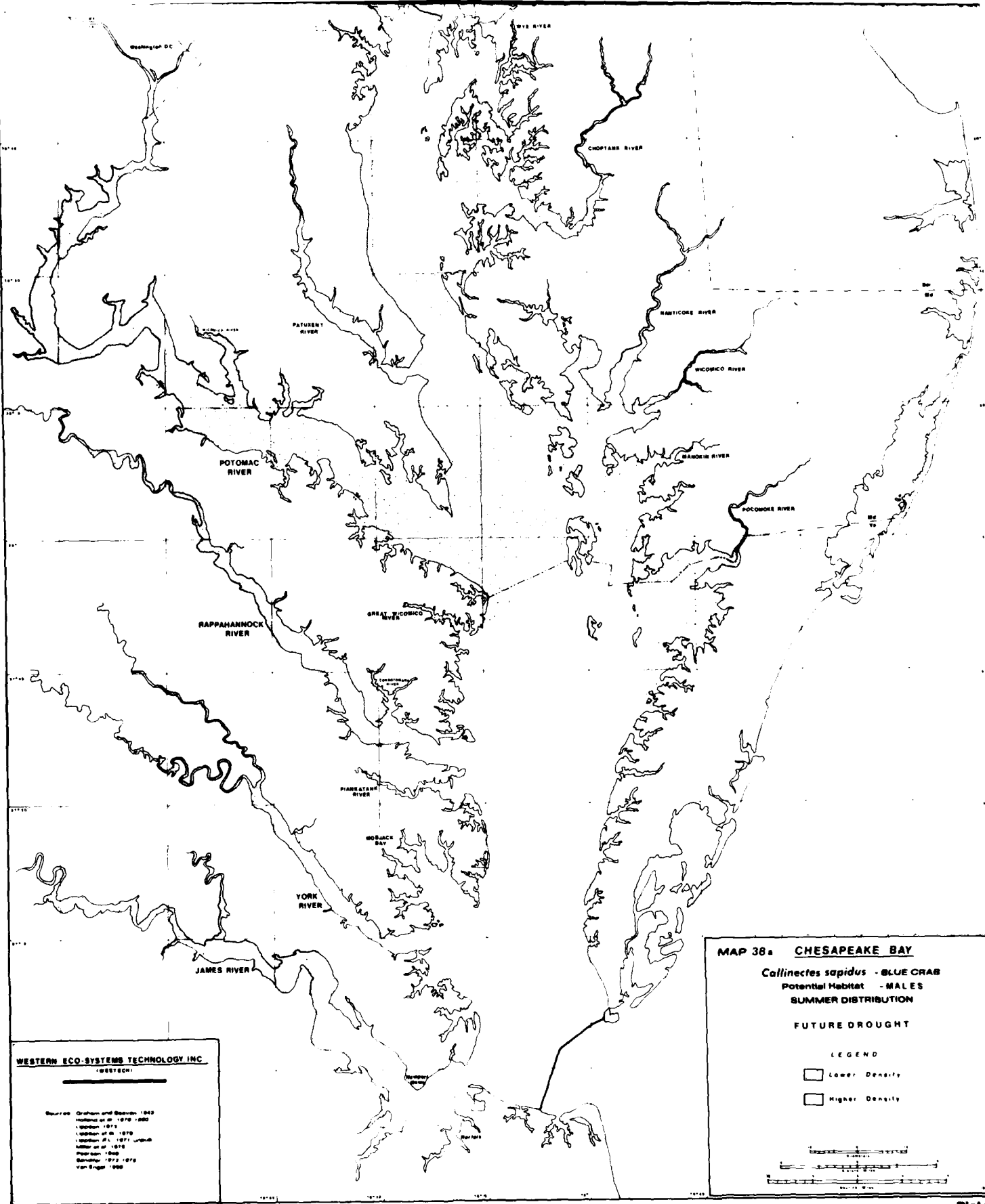


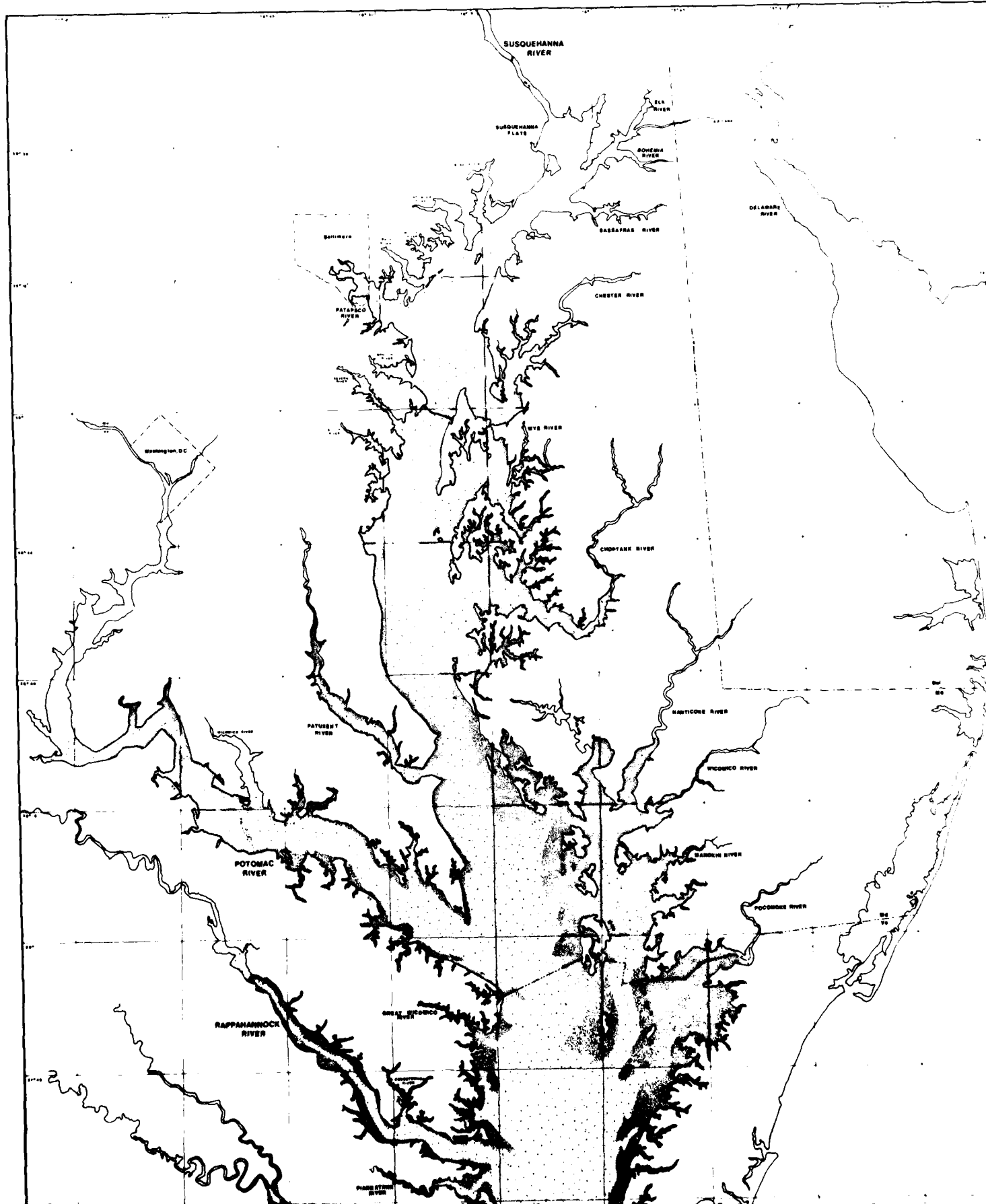


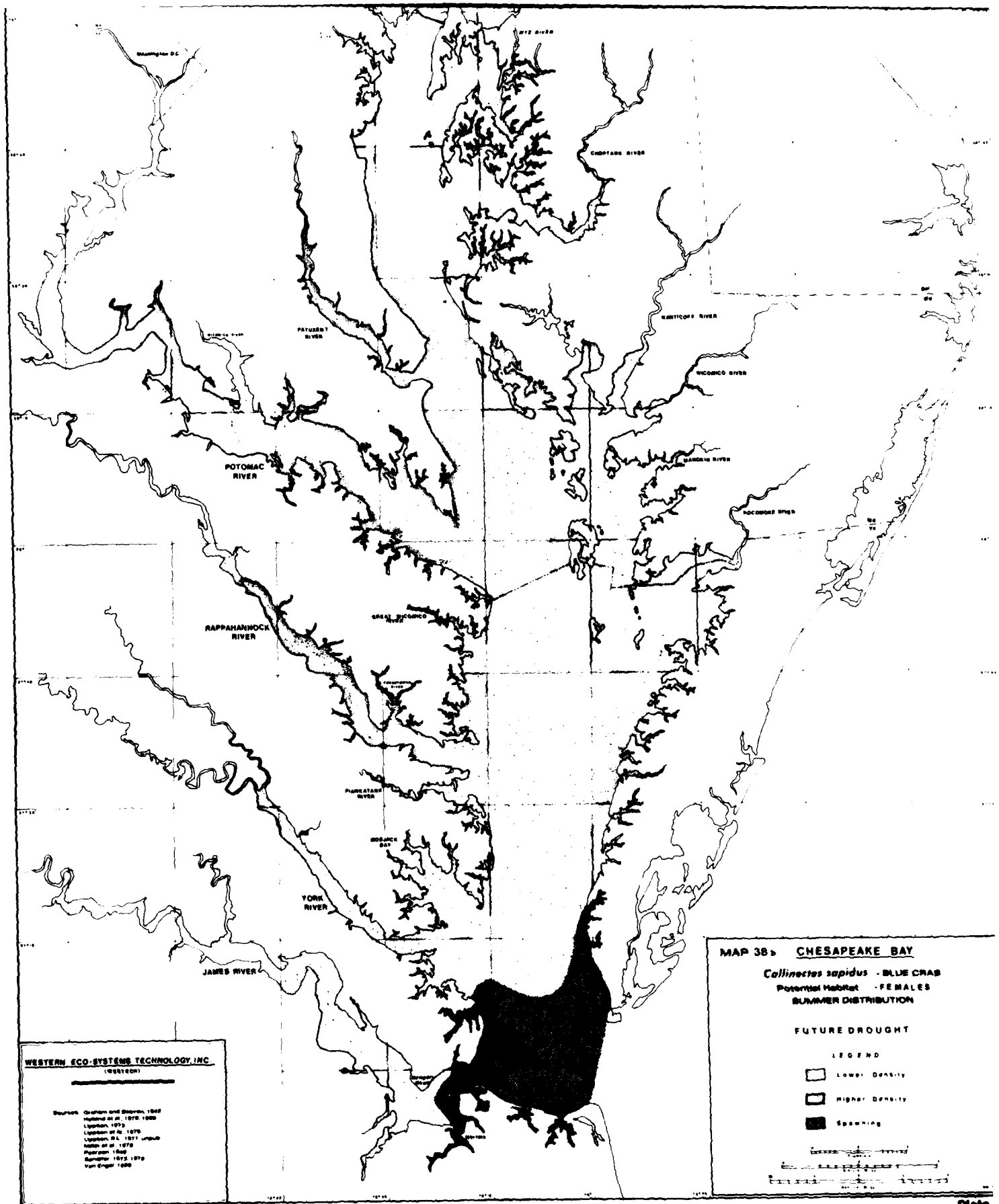


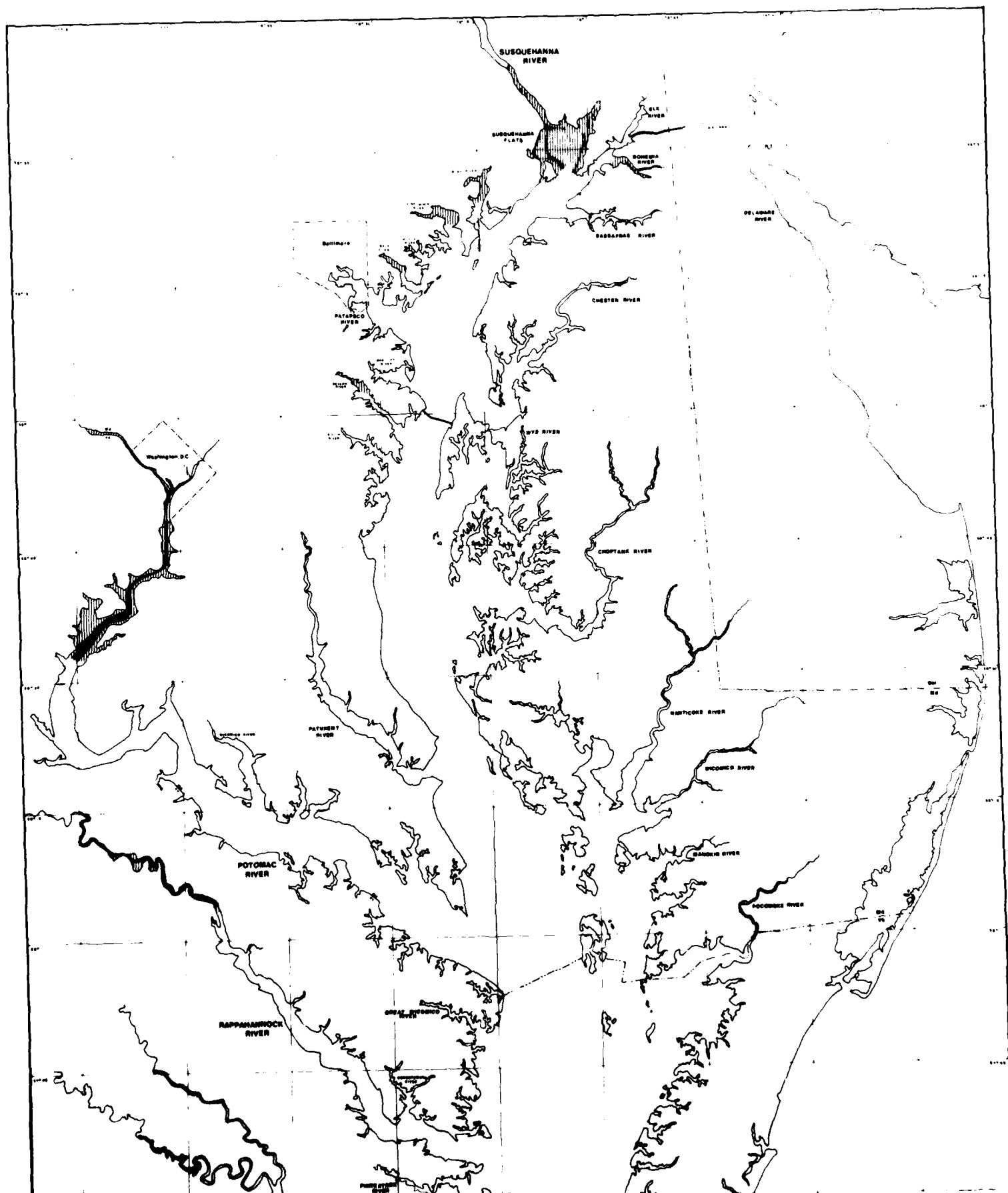


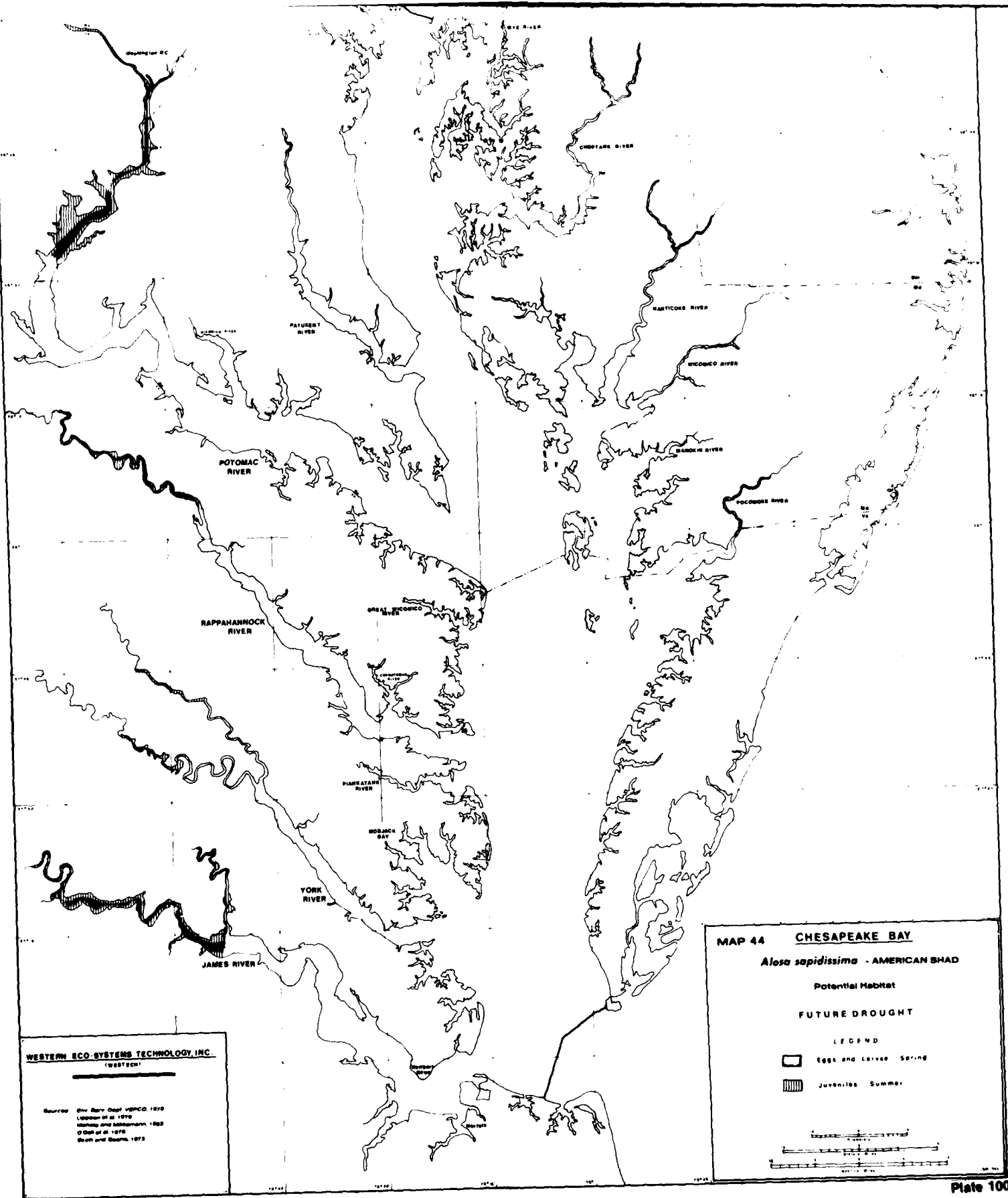


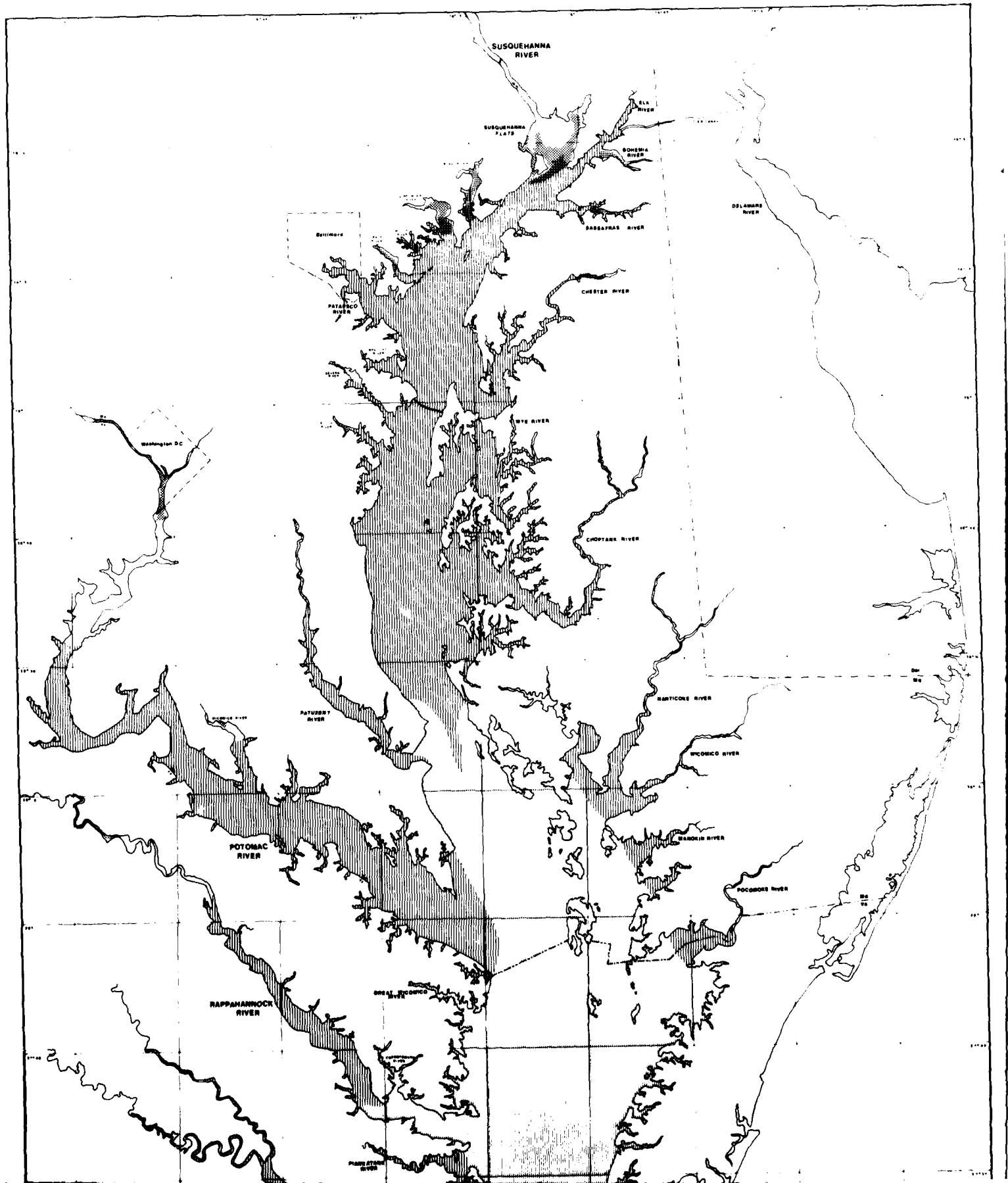


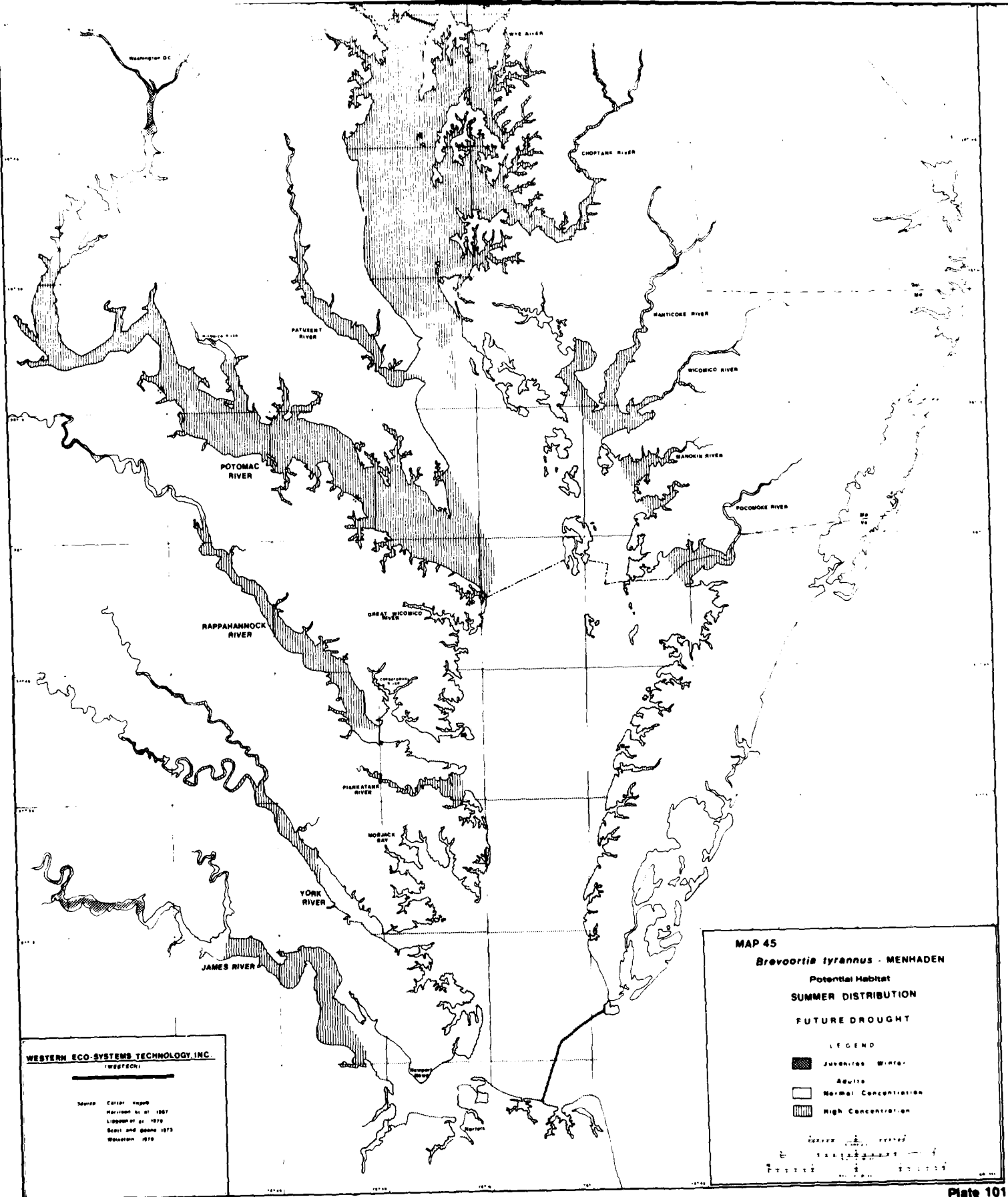


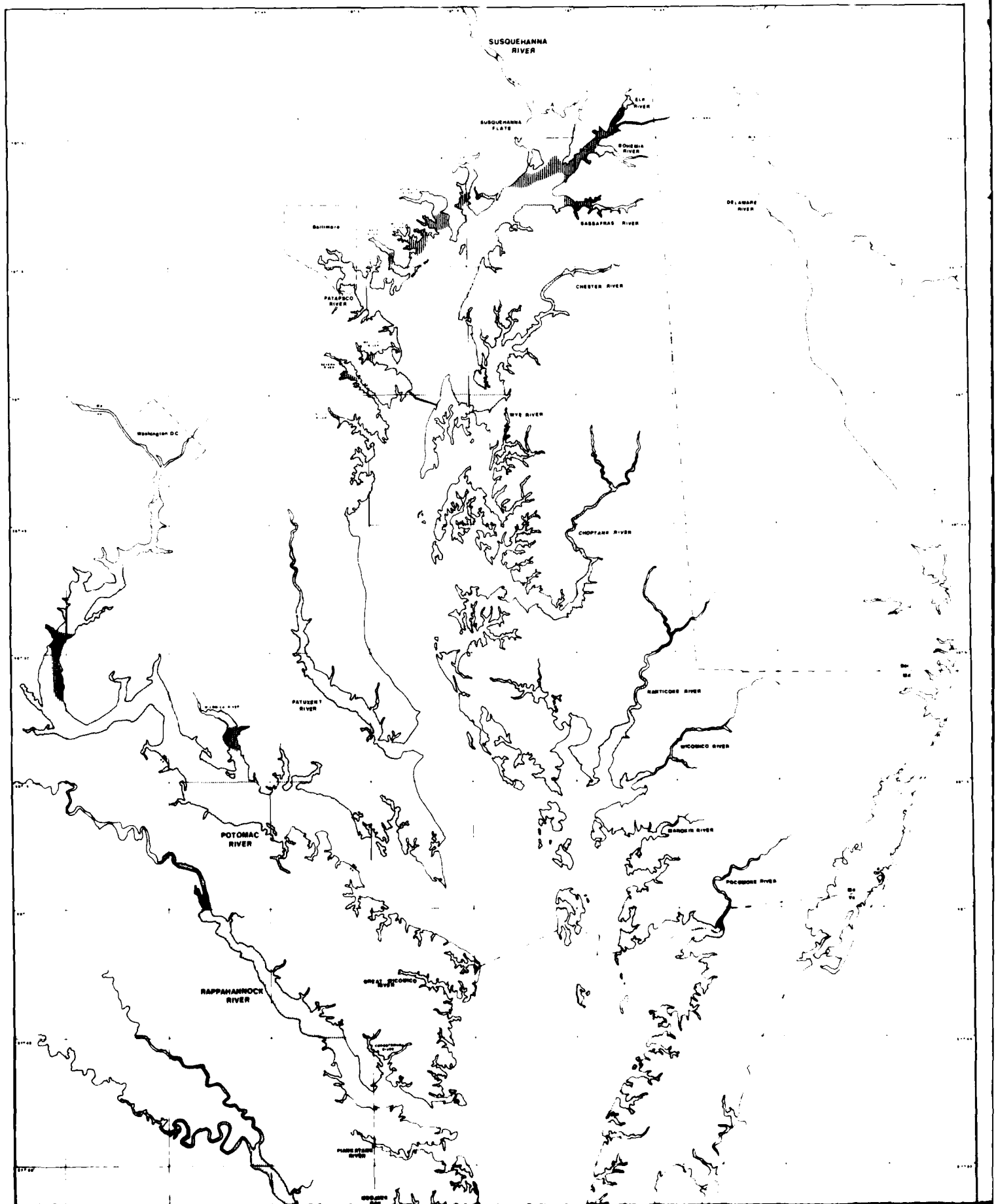


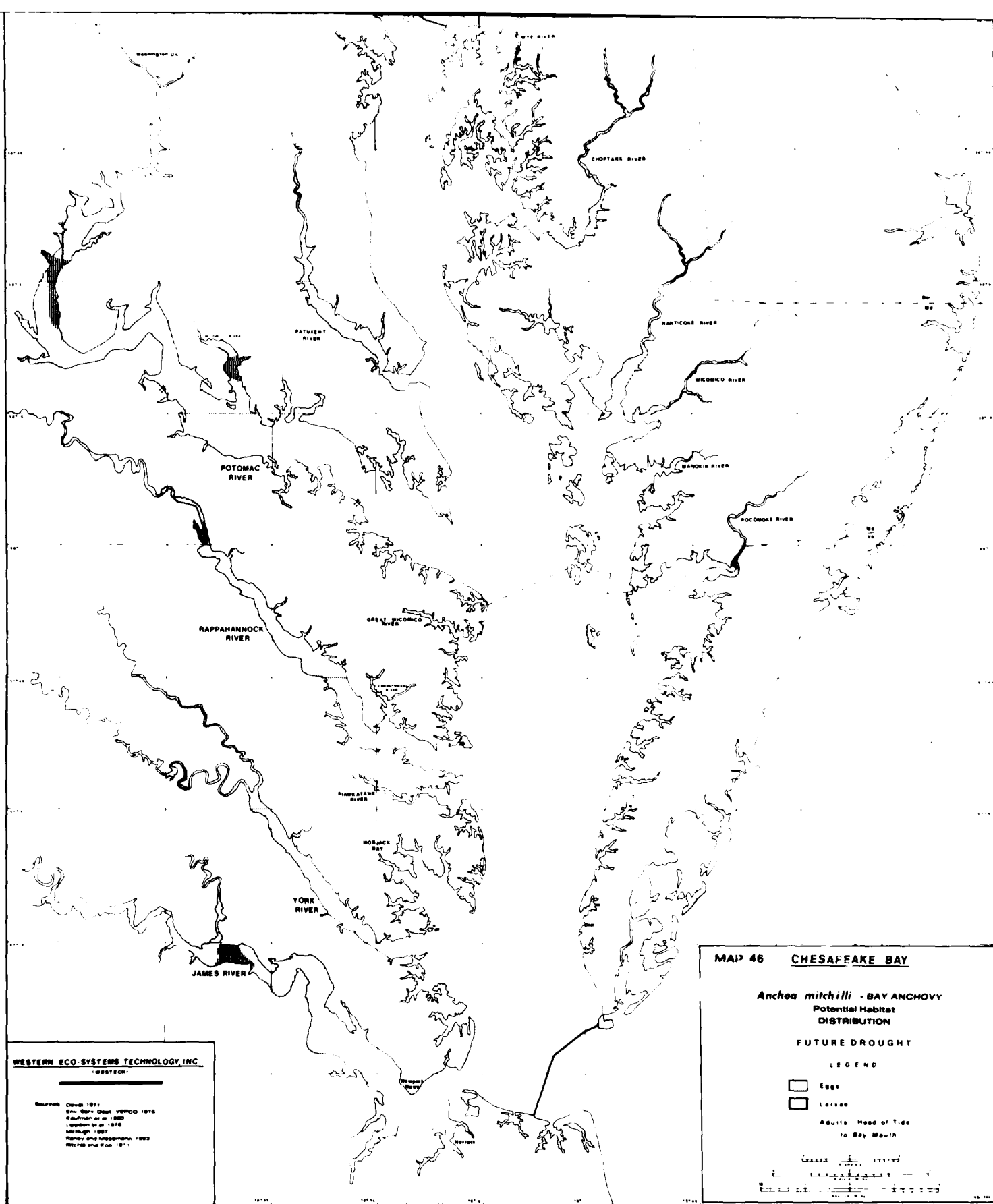


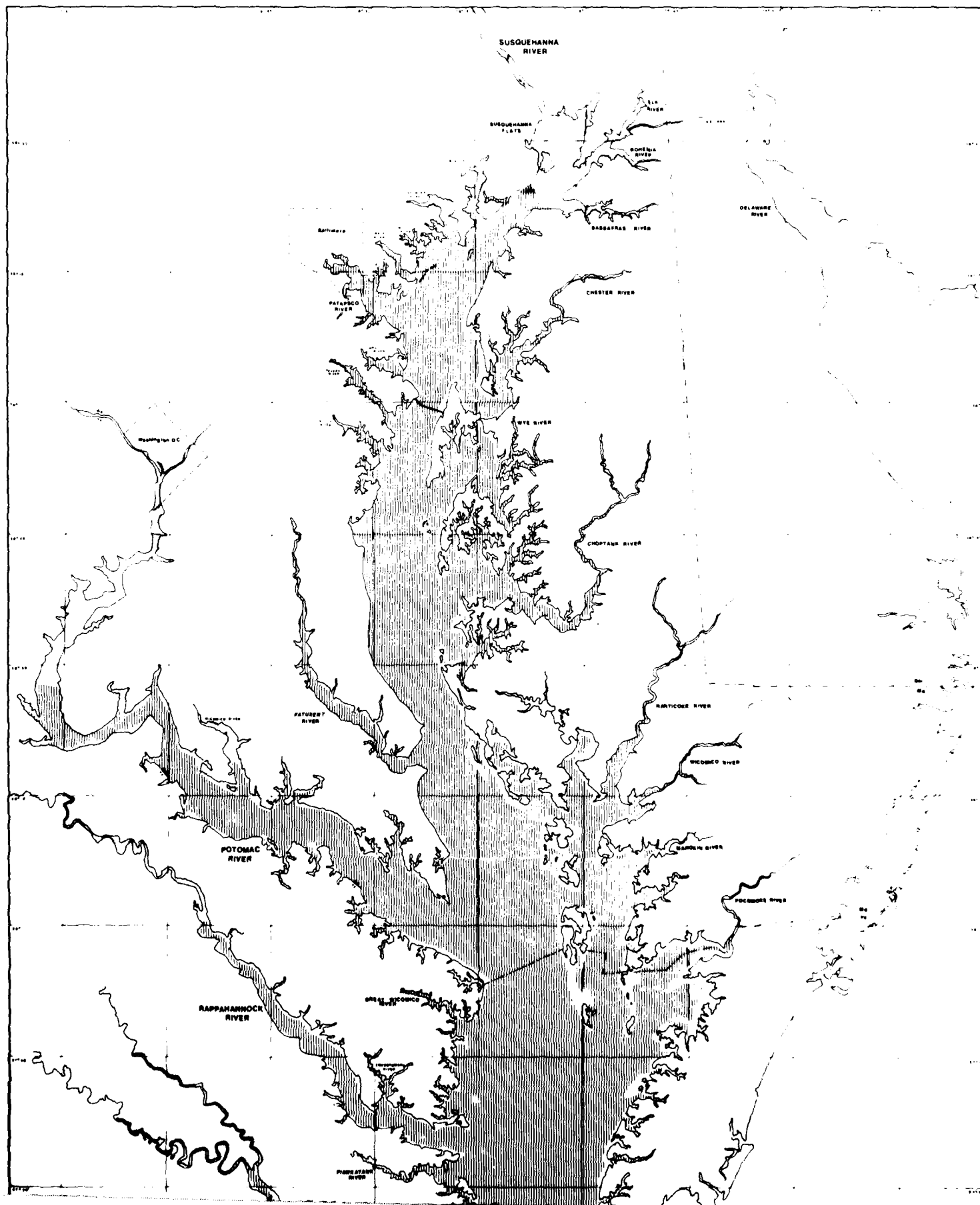


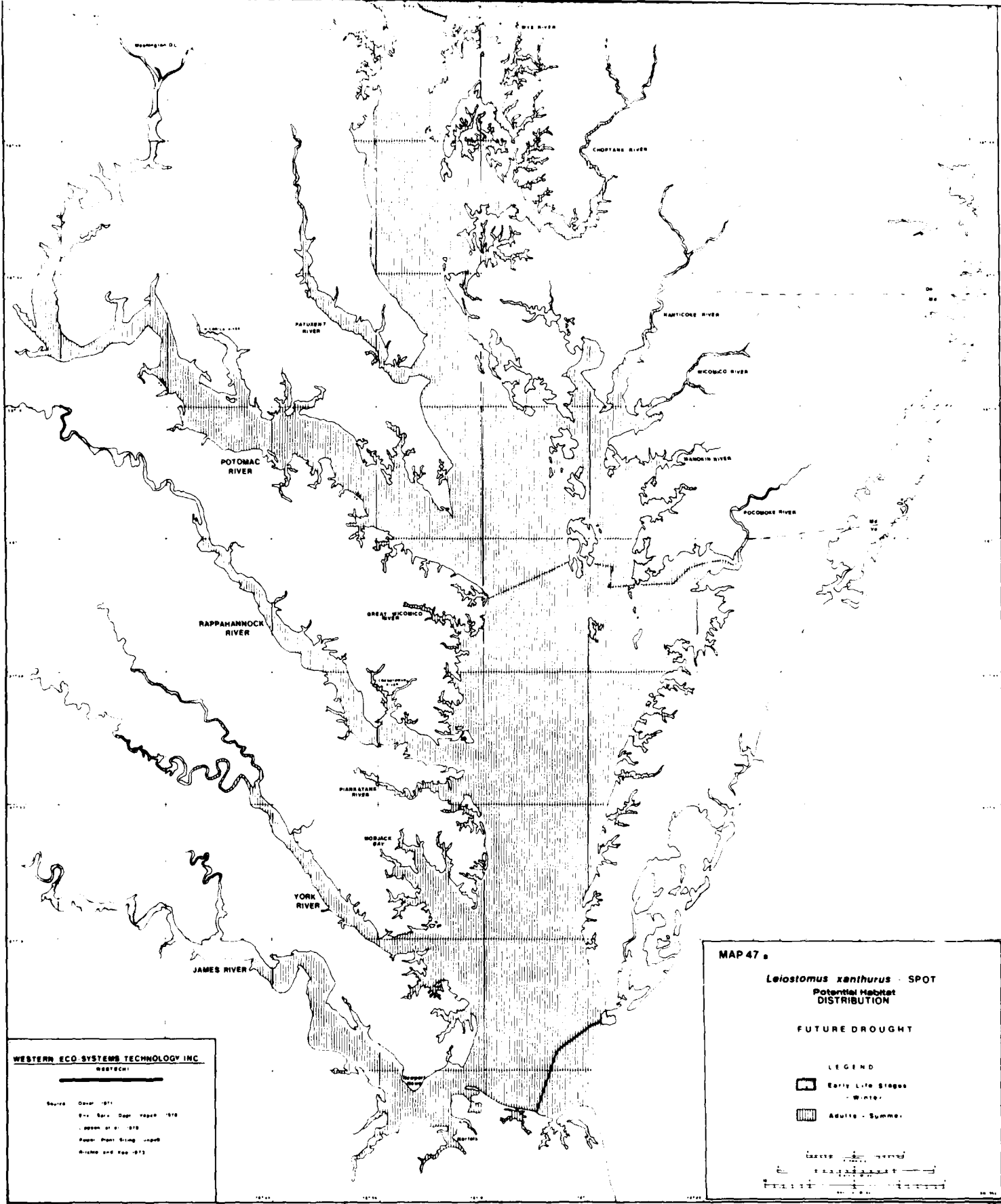












MAP 47

***Leiostomus xanthurus* - SPOT**
Potential Habitat
DISTRIBUTION

FUTURE DROUGHT

LEGEND

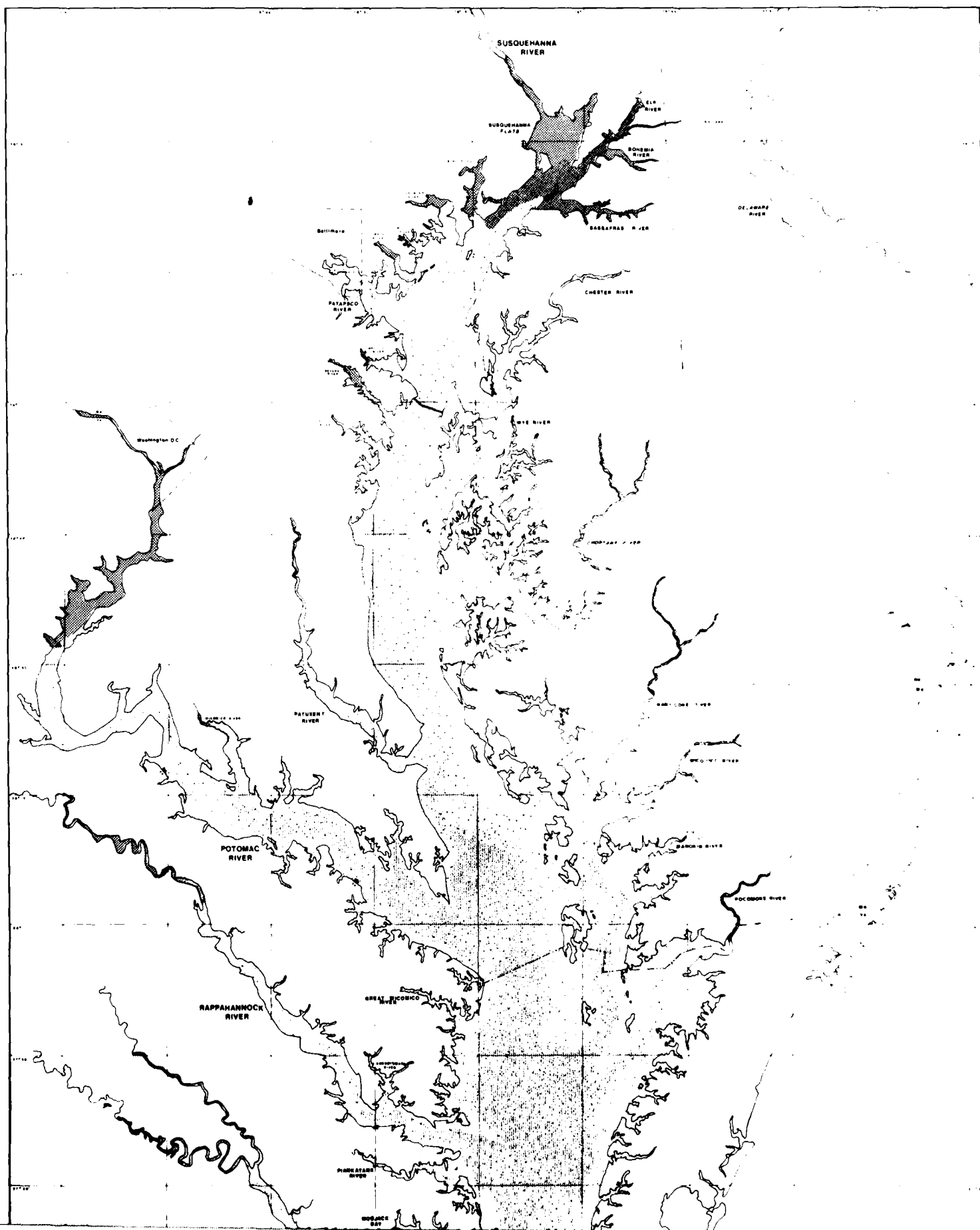
 Early Life Stages - Winter

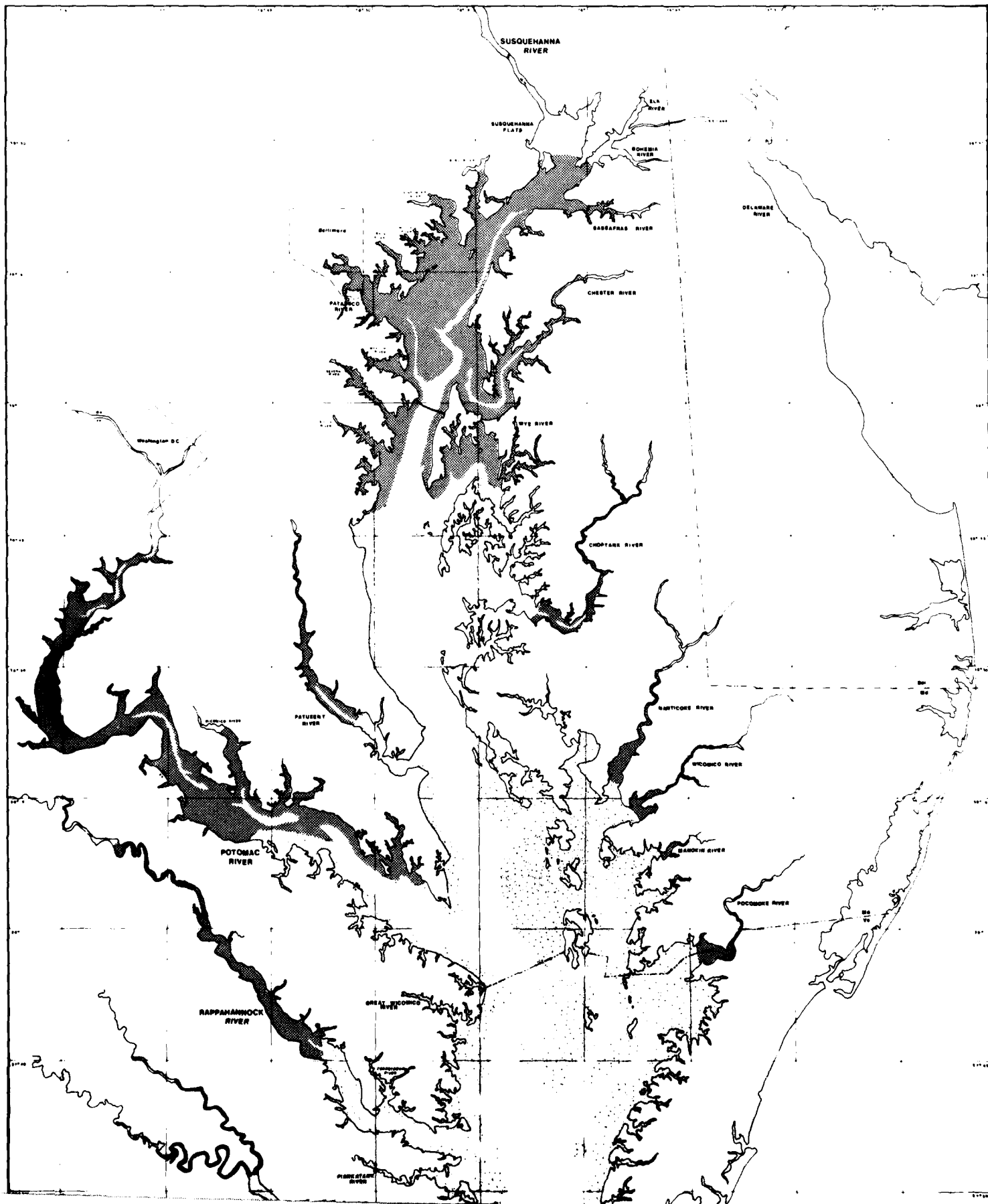
 Adults - Summer

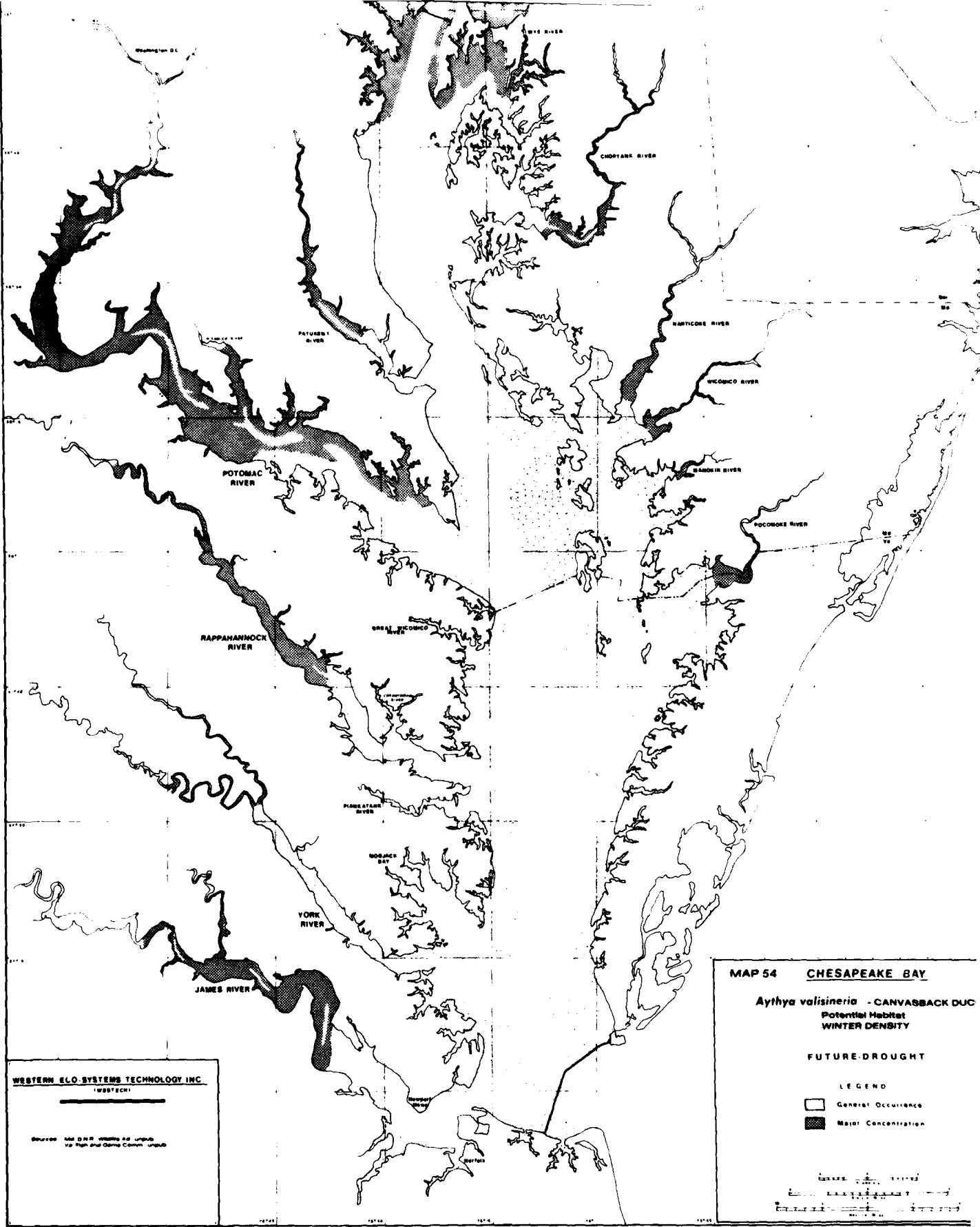
Scale: 1 inch = 10 miles

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 WESTECH

Source: Owen 1971
 E. & S. & D. & P. 1976
 L. & P. 1976
 P. & P. 1976
 A. & S. 1976







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