Maryland Dept of Natural Resources
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Critical Shore Erosion Reaches

Recommendations

of the

Coastal Resources Division

Tidewater Administration

Department of Natural Resources

of Areas for Designation as:

Areas of Critical State Concern

April, 1982

[redacted]

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Table of Contents

Part I.	Introduction	Page 1
Part II.	Criteria for Critical Areas Identification	Page 3
Part III.	Management Techniques for Critical Areas	Page 6

Appendix A: Description of Historic Shore Erosion Rate Maps and Shore Erosion Structure Maps Including Discussion of the Limitations of the Data.

Appendix B: Bibliography of Maryland Publications on Shore Erosion.

Attachment A: Tabular and Map Information on Location and Characteristics of Recommended Critical Shore Erosion Reaches.

Attachment B: Wetlands Division Policy Guidelines Concerning Permit Applications Involving Construction of Shore Erosion Control Measures.

Part I. Introduction

The State of Maryland contains 3,190 miles of tidal shoreline; most of which lies along the Chesapeake Bay and its inflowing rivers. The historic changes in shoreline have been documented for 1,593 miles;[1] 270 miles along the main Chesapeake Bay, 1,191 miles along its tributaries and 132 in the Atlantic Ocean/Bay system. All of this shoreline is dynamic and, thus, whenever development takes place immediately adjacent to the shoreline, a potentially hazardous situation arises.

The State of Maryland has taken an interest in the problem of shoreline erosion to the private property owner since 1910. Since 1968, the State has operated a program of technical and financial assistance to private shorefront property owners. Along the Atlantic Coast, the State has been active in building or funding shore protection structures since 1921. Concerns of the State which have resulted in its taking a financial interest in this problem can be summarized as follows:

1. Loss of valuable waterfront acreage with subsequent reduction in tax base;
2. Loss of land, particularly sandy beaches, available for public waterfront recreation;
3. Threat to man-made structures such as houses and roads,
4. Deposition of silt, sediment and debris into tidal waters, and
5. The potential for exacerbation of erosion problems at one location by erosion control structures on adjacent properties.

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[1]The upper reaches of tributaries were not surveyed historically and therefore erosion rates in those areas are not documented.

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In determining which areas should be considered Areas of Critical State Concern, one could argue that the entire tidal shoreline of the State qualifies. The Coastal Resources Division has for practical reasons, however, limited its recommendations to areas where erosion problems are more likely to become acute, based primarily on rate of shoreline retreat. In thus highlighting certain areas of the shoreline, the State and its local jurisdictions should not lose sight of the fact that shore erosion is a continual concern throughout the Tidewater region. Management goals for the State should include at least the following:

1) Public Education: Shorefront property owners should be educated about:

a.) the problems of shore erosion

b.) the costs of shoreline protection measures

c.) how to obtain adequate design and construction of protection measures

d.) the need for maintenance of shoreline protection measures.

2) Standards for Structural Protection: the State should develop advisory standards for design of protective structures adequate to withstand and protect against typical storms in this region.

3) Discouragement of Unwise Development

Through such mechanisms as State Clearinghouse Review, intervention and other means examined by the State Development Council, any significant construction within fifty feet of a tidal shoreline should be "red-flagged." In no case should such construction be sanctioned unless there is assurance that such development will be protected from shore erosion processes by structural or non-structural measures.

4) Local Action: The State should encourage local governments to use their authority to adopt some or all of the following measures to mitigate erosion hazards:

a) zoning controls which include the use of shoreline set backs and other mitigation techniques

b) design and building standards

c) creation of shore erosion control districts

d) subdivision controls

e) local bonding authority to obtain funding to install shore erosion measures.

f) inspection programs of the construction and maintenance of shore erosion measures.

Part II. Criteria for Critical Areas Identification

The recommended critical shoreline areas have been identified in terms of shoreline "reaches." A reach is defined as a stretch of shoreline which has a fairly uniform shoreline profile, a similar exposure to waves and is exposed to similar erosional forces. The actual rate of retreat may vary within a reach for reasons not yet clearly understood. Reaches along the Chesapeake Bay shoreline were characterized according to the predominate rate of erosion within the reach using information contained in a report entitled Assessment of Shore Erosion in Northern Chesapeake Bay and the Performance of Erosion Control Structures prepared for the Department of Natural Resources by Coastal and Offshore Engineering Research and Development Inc. as part of another Coastal Resources Division study effort. Additional reaches worthy of critical area designation located in the mouths of tributaries to the Chesapeake Bay were identified by Department of Natural Resources staff.[2] The two criteria used to identify areas

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[2]This approach is similar to that used by the Corps of Engineers in its Chesapeake Bay Study-Existing Conditions Report; the primary difference is the application of the criterion of "greater than four feet" per year (by CRD) rather than "greater than three feet per year" (by the Corps) in undeveloped areas. CRD used the "greater than four feet per year" criterion because the historic erosion rate maps categorize erosion in these intervals, i.e. (0>2 ft, 2-4 ft, 4-8 ft and > 8 ft).

(reaches) of critical state concern were:

(1) reaches in which water and or wastewater services are present or planned within a portion of the reach and where the historic erosion rate is two (2) feet or greater per year.

(2) reaches in which the historic erosion rate is four (4) feet or greater per year regardless of adjacent land use.

Approximately two hundred miles of shoreline meet these criteria. While this is a rather substantial area to include in a critical area nomination, we believe it is justified as an initial recommendation. Even at the lower end the scale of erosion included - i.e. two feet per year - a 1/2 acre shorefront lot could be cut in half in fifty years.

Table 1 lists the reaches on a county by county basis that are recommended for critical area designation. Attachment A of this report contains (1) maps showing the location of reaches recommended for critical area designation and (2) tabular information on the erosion rate occurring within the reach, the presence of shore erosion structures within the reaches, and the type of water and wastewater service existing or planned for the reaches on a county by county basis. Appendix A contains a description, including their limitations, of the historic shore erosion rate maps and the shore erosion structure maps used in the identification and characterization of the reaches. Appendix B contains a bibliography of pertinent Maryland publications on shore erosion.

It should be recognized that there are valid reasons why some of the recommended areas might be removed from the "critical" category prior to the designations being made. Areas might be removed from the "critical" category during their review by the Department of State Planning (DSP), the counties and other State agencies, based on the following factors:

1) Consideration of Future Development

CRD made no judgement concerning the likelihood that development shown in local water and sewer plans would occur. CRD is aware that in the areas scheduled for future development, especially in the 5-10 year period and beyond, a high level of uncertainty exists. We believe this is a matter for those familiar with the local situation to evaluate. Likewise, it may be appropriate to exclude some areas characterized by local undeveloped tracts, for which no subdivision or development is anticipated in the foreseeable future, despite the presence of severe erosion rates. If such undeveloped areas consist of prime agricultural lands, they still should be given serious consideration for designation.

2) Areas Already Given Protection

Some developed areas which historically have had a high rate of erosion may have been adequately stabilized in recent years. If an entire reach or community shoreline has been stabilized, and a means for adequate maintenance exists, an area may no longer be considered critical.

3) The Reach as a Practical Measure of Shoreline Erosion

It should be recognized that recommended designations were based on the concept of a "reach" of shoreline within which the erosional forces are similar. Nonetheless the actual rate of shoreline retreat will vary within this reach. From a local comprehensive land-use planning perspective, the reaches may be arbitrarily applied. There also may be factors which justify altering the geographic extent of the designated reach.

4) Existing or Planned Public Services on Only a Small Portion of the Reach

Where a portion of the area within a reach characterized by an erosion rate of two feet or greater had either existing or planned water and/or wastewater services, the entire reach was recommended for critical area

designation. In addition, some reaches may not be worthy of designation because only a small portion of them have existing or planned water and/or wastewater services or it may be the case that a more detailed analysis should be performed to determine if only a portion of the reach should be designated.

Additional areas not recommended in this report may be worthy of consideration for designation by DSP, other State agencies, or local governments. These could be:

1. Areas containing extensive shoreline development on individual water and septic systems and experiencing shore erosion rates of 2-4 ft/yr-because of the potential adverse impacts from shore erosion.

2. Areas adjacent to State parks, forests and wildlife management areas or similar lands owned by local governments on which development is planned-because of possible increased shore erosion on the adjacent publicly owned lands due to the development itself or associated shore erosion structures such as groins and jetties.

3. Shoreline publicly owned lands which experience shore erosion rates of 2-4 ft/yr but do not meet the criteria established above since they do not have existing or planned water and/or wastewater services-because of the significant adverse impacts on public property.

Part III. Management of Critical Shore Erosion Areas

In the designation process, two facts should be emphasized:

1. Designation as a critical area does not indicate that development should be discouraged. A recent study of success and failure of shoreline structures conducted for CRD indicates that erosion can be controlled along most Chesapeake Bay shorelines, even where the historic rate of retreat is greater than 10 feet/year. Designation should rather emphasize: (1) the need to provide for adequate shoreline setbacks and/or shore erosion

control measures; (2) the need to provide for the initial cost and the maintenance of controls; and (3) the potential to prevent future problems through sound planning.

2. Designation does not imply that areas necessarily qualify for receipt of State or federal shore erosion control funds. The Shore Erosion Loan Program can only protect about 1-1/2 miles of shoreline per year given current funding.

Management techniques should focus on two objectives:

1. To prevent development immediately adjacent to highly eroding shorelines, and/or

2. to provide for adequately designed, constructed and maintained shore erosion control measures.

CRD is currently assisting in a cooperative study of local management approaches to shore erosion in Queen Anne's and Talbot Counties. This study is expected to provide a more detailed analysis of the options available for erosion management. What follows is a preliminary listing of potential management techniques.

A. State Management Techniques

1. Wetlands License/Permit Program

Most shore erosion control measures will require a wetlands permit or license from the Wetlands Division, Water Resources Administration. While the adequacy of structures is not a criterion for obtaining a permit or license, this program does give the State the opportunity to funnel technical assistance to individuals seeking to build structures. The permit program can be used to prevent aggravation of erosion problems on areas adjacent to proposed projects. Attachment B contains the guidelines used by the Wetlands Division in making decisions on permit applications involving shore erosion structures.

2. Shore Erosion Control Program

The Maryland Department of Natural Resources administers a program to assist property owners through its Shore Erosion Control Division. Under Natural Resources Article 8-1001, individual landowners, municipalities, and counties may apply for 25 year interest-free loans for projects designed to control shore erosion.

Money for projects is awarded on the basis of available funds and priority ratings based on erosion rate, amount of silt coming from the property, public benefit, the type of water eroding the property, and the date of application.

Such State loans for erosion control projects cover 100% of the first $50,000, 50% of the next $20,000, 25% of the succeeding $20,000, and 10% of any remaining costs. Loans are repaid in 25 equal annual installments through a special charge levied by the Board of Public Works. This is recorded as a lien against the protected property. The Department of Natural Resources supervises the design and construction of the structures it funds, but expects the property owner to maintain the structure.

Individual property owners with shore erosion problems may contact the Shore Erosion Control Division by phone or in writing to request a field inspection. An inspector from the Shore Erosion Control Division will examine the property and inform the owner whether he is eligible for financial or technical assistance. If the erosion is serious, the inspector will give the owner a loan application and explain the entire process. Eighteen months is usually required between the initial request for financial assistance and the award of a construction contract. If the property's erosion is not deemed severe by the field inspector, he will assist property owners in determining the best method of controlling erosion.

Property owners in a single community who have a serious problem with erosion may petition their local government to create a Shore Erosion Control District. A feasibility study of the need for a District will be prepared by the Department of Natural Resources after the county has petitioned the Shore Erosion Control Division. If and when a District is established, the county may apply for financial assistance on behalf of the District and levy a special assessment against the affected property owners of any construction loans granted.

3. Coastal Zone Management Program

Through technical studies and informational documents, the CZMP helps the State improve its shore erosion program. Local coastal planners funded through CZMP can work on incorporating erosion mitigation measures into local plans and regulations. In addition, studies such as the above cited Queen Anne's/Talbot County effort are funded.

4. Structural Standards

The State can develop advisory guidelines or standards for construction of protective measures in Chesapeake Bay. Such guidelines could be mandatory when public funds are used.

5. Beach Erosion Control Districts

State Law Prohibits construction east of building limit line in Ocean City. The program is enforced by the City Zoning Administrator.

6. Interim and Long Term Beach Erosion Control Plans

Tidewater Administration has developed an Interim Beach Erosion Control plan for the Ocean City Beach, involving the construction of groins at set intervals along the Beach. Pending funding for this plan, Ocean City receives State funds for groin construction. The City is required to place new groins at locations consistent with the Interim Plan and use construction practices approved by the State such as the use of filter cloth.

7. Corps of Engineers Storm Protection and Shore Erosion Plan for Ocean City

A long term plan for Ocean City Beach restoration and management has been developed by the Corps of Engineers. Means of financing the non-federal share for this plan should be explored by the State in cooperation with Ocean City.

B. Local Management Techniques

1. Zoning Regulations: Special shoreline districts may be created involving setback or other shoreline standards. Alternately, setbacks can be included in all zoning district requirements, when the districts abut the shoreline.

2. Subdivision Regulations: Subdivision regulations may require shoreline setbacks. Alternately, clustering can be encouraged to avoid development along highly eroding portions of a reach or to lessen the burden of costs associated with shore protection. Developers might be given an option of providing a setback for shorefront lots or providing

shore erosion control as part of the community infrastructure. Design standards covering shore protection may also be integrated into subdivision standards similar to road construction or other improvement acceptance standards.

3. Building Codes could regulate construction of protective structures.

4. Protective Convenants/Home Owner Associations can be used to require maintenance of shoreline buffer areas.

5. Shore Erosion Control Districts may be formed to provide property tax revenue to repay local bonds issued for the purpose of constructing shore erosion control measures and to ensure that they are properly maintained.

6. Inspection programs could be developed to insure proper maintenance of existing structures.

7. Soil Conservation Districts should be consulted for assistance with bank stabilization. Bank grading and vegetative planting would be particularly appropriate in combination with setbacks or in agricultural areas.

C. Federal Management Techniques

1. U.S. Army Corps of Engineers

A. Section 10/Section 404 permits. Through its authority under Section 10 of the Rivers and Harbors Act of 1899 and Section 404 of the Federal Water Quality Act of 1976, the U.S. Army Corps of Engineers requires shorefront property owners to obtain a permit before undertaking any shore erosion control measures. Such permits require waterfront property owners to follow certain requirements in constructing shore erosion protective devices. In the case of small rip-rap projects and bulkhead and rip-rap maintenance projects which meet certain minimum

criteria an applicant does not have to undergo the full federal permit process but only provide the Corps with information on his proposed project 30 days prior to undertaking it. The applicant still must obtain any required State or local permits.

B. Section 103 of the Rivers and Harbors Act (Small Beach Erosion and Shore Protection Project Authority) authorizes the United States Army Corps of Engineers to conduct investigations and studies to identify effective means of preventing erosion of the shores of coastal and lake waters by waves and currents. Requests may be made by a prospective sponsoring agency who is empowered under State law to provide all local cooperation to the District Engineer of the Army Corps. The Federal cost of the studies and construction project together may not exceed 1 million dollars. The Federal government will bear 30-80% of the construction cost of an eligible project as a general rule.

C. Section 55 of Public Law 93-251 authorizes the Corps to provide technical and engineering assistance to non-Federal public interests in developing structural and non-structural methods of preventing damages attributable to shoreline erosion. It should be emphasized that construction funds are not provided under this program.

D. The Emergency Stream Bank and Shoreline Protection of Public Works and Non-profit Public Services (Section 14, Flood Control Act of 1946). This program would cover shore erosion that endangers: 1) highways and highway bridge approaches; 2) important and essential public facilities which serve the general public and are owned by the federal, State, or local governments; 3) non-public facilities that provide non-profit public services such as churches, hospitals, and schools.

E. Mitigation of Shore Damage Attributable to Federal Navigation Projects (Section 111, River and Harbor Act of 1968). This legislation authorizes the Secretary of the Army to investigate, study, and construct projects for the prevention or mitigation of shoreline damages caused by existing navigation works built by the Federal government. This law does not cover construction of works to prevent or mitigate shore damages due to river bank erosion or vessel generated wave wash damages. It would apply, for example, to shore erosion caused by blockage of the littoral drift process by a harbor breakwater constructed by the Federal government.

F. Public Works Projects. Another extremely lengthy Federal process which could potentially aid a group of shoreline owners would be a major civil works project. In this case the people would petition their congressional representative either directly, or through their local government representatives, to ask Congress to authorize the U.S. Army Corps of Engineers to study their problem. If Congress authorizes and funds the study, public hearings are held and the feasibility study is developed along with an Environmental Impact Statement. The feasibility study is then submitted to Congress for possible legislative action. If the project receives both Congressional authorization and funding, the project will be constructed if certain legal constraints are met by the State and local governments. This method of problem solving is extremely lengthy but may be the only way to raise the necessary funds when a large shore erosion project is considered necessary.

2. U.S. Department of Agriculture

The Soil Conservation Service of the United States Department of Agriculture is able to provide technical assistance to individuals, especially farmers, who need to protect their shoreline. They are

particularly qualified to help in problems where ground water seepage is causing damage to existing exposed bluff or an existing bulkhead.

Additionally, the local Soil Conservation District may make application for Resource Conservation and Development (RC&D) Program money which may be used to protect public shoreline. Funding through the RC&D program takes roughly a year to obtain. These funds are administered on a competitive basis. Local Soil Conservation District Office staff can usually provide more detailed information concerning requirements of the RC&D fund.

3. Farmers Home Administration

The Farmers Home Administration makes Soil and Water Conservation Loans available to owners of land who are actively involved in farming their property. These loans may be used to protect a shoreline with an erosion problem. Currently, there is a $200,000 limit on the loan and the interest rate is 13-1/4%. The term of these FHA loans is 40 years, and a mortgage is taken on the property to secure the loan.

4. Federal Emergency Management Agency

Section 1362 of Public Law 90-448 as amended, provides the Director of the Federal Emergency Management Agency with the authority to negotiate for the purchase and subsequent transfer to State or local government of flood damaged, improved real property under certain conditions. While this program does not help a community in need of shore erosion control structures, it would help to relocate all or part of such a community. There is a complex set of rules and regulations which must be met by a local government in order to qualify for assistance. These criteria can be found in the Federal Register, Volume 45, number 146, Monday, July 29, 1980.

Table I - Reaches Recommended for Critical Area Designation

County	Reach Number	Geographic Boundaries	Erosion Rate	Water/Wastewater Services Present or Planned
St. Mary's	8	St. George Island	M	NO
	10	Priests Point-Kitts Point	L	YES
	11	Kitts Point-Gray Point	M	NO
	14	Point Lookout-St. Jerome Creek	H	YES
	16	Point No Point-Pine Hill Run	M	YES
	18	Cedar Point-Hog Point	M	YES
	18A	Hog Point-Pearson Creek	M	YES
Calvert	20	Little Cove Point-Cove Point	L	YES
	21	Cove Point-Long Beach	L	YES
	23	Parker Creek-Plum Point	L	YES
	25	Chesapeake Beach-Holland Point	M	YES
Anne Arundel	26	Holland Point	H	YES
	28	Bockhold Creek-Broadwater Creek	M	YES
	29	Broadwater Creek-Curtis Point	M	YES
	30	Dutchman Point-Turkey Point	L	YES
	31	Thomas Point	H	NO
	32	Thomas Point-Tolly Point	L	YES
	34	Hackett Point-Sandy Point	L	YES
	36	Mountain Pt.-Gibson Island Beach	L	YES
	38	Bodkin Point-Rock Point	L	YES
Baltimore	40	Bayshore Park-Bay Island Beach	L	YES
	41A	Island and View Beach-Browns Crk.	M	YES
	43A	Brier Point	M	NO
	43B	Lower Island Point	H	NO
	43C	Carroll Point	M	NO
	43D	Bengies Point	M	NO
Harford	47	Taylor Island Pt.-Strong Point	M	NO
Cecil	53A	Seneca Point Charlestown Basin	L	YES
	53B	Charlestown Basin N.-Amtrack Bank	L	YES
Kent	70	Swan Point-Windmill Point	L	YES
	73A	Hail Point	M	NO
	73B	Gum Point-Baybush Point	M	NO

Table I (Continued)

County	Reach Number	Geographic Boundaries	Erosion Rate	Water/Wastewater Services Present or Planned
Queen Anne's	74	Chesterhaven-Love Point	L	YES
	75	Love Point-Matapeake (Kent Is.)	M	YES
	77	Craney Crk.-Kent Pt. (Kent Is.)	M	YES
	79	Long Point-Philpots Island	L	YES
	80	Philpots Island-Cox Creek	M	YES
	82	Brain Point-Bennett Point	L	YES
	81A	Turkey Point-Johnson Island	L	YES
	81B	Little Creek-Alley Neck	L	YES
	81C	Alleyneck-Normans Point	M	YES
	81D	Parson Island	M	NO
	74A	Chesterhaven Beach-Piney Creek	M	YES
	74B	Piney Creek-Kent Narrows	M	YES
	74C	Long Point-Jackson Creek	L	YES
Talbot	83	Tilghman Point-Wades Point	L	YES
	83A	Porter Creek-Hambleton Point	L	YES
	85	Lowes Point-Knapps Narrows	M	NO
	86	Knapps Narrows-Blackwalnut	M	YES
	87	Poplar Island (Bayside)	H	NO
	90	Change Point Nelson Point	M	NO
	93	Lucy Point-Benoni Point	M	NO
Dorchester	97	Todds Point	H	NO
	99	Mills Point-Hills Point	H	NO
	100	Hills Point-Ragged Point	M	NO
	101	James Island	H	NO
	102	Hooper Point-Oyster Cove	H	NO
	103	Oyster Cove-Punch Island Creek	H	NO
	104	Punch Isl. Crk.-Barren Isl. Gap	H	NO
	105	Barren Island	H	NO
	106	Hooper Island	M	YES
	107A	Lakes Cove-Cedar Point	M	NO
	112A	New Foundland Point	M	NO
Wicomico	113	Roaring Point-Nanticoke Point	M	NO
	113A	Bay Point-Holland Point	M	NO
Somerset	114	Long Point-Haines Point	L	YES
	115	Haines Point-Twiggs Point	L	YES
	116	Twiggs Point-Webster Point	L	YES
	117	Webster Point-Claw Point	M	NO
	122	Janes Island	M	NO
	123	Cedar Island	M	NO
	128	Big Thorofare-Hog Neck	H	NO

Table I (Continued)

County	Reach Number	Geographic Boundaries	Erosion Rate	Water/Wastewater Services Present or Planned
Worcester	125A	Clam Harbor Tumps	M	NO
	125B	Mills Island South End	M	NO
	125C	Striking Marsh (West)	M	NO
	125D	Big Bay Point	M	NO
	125E	Snow Hill Landing (South)	M	NO
	125F	Robins Marsh	M	NO
	125G	Ricks Point-Cotter Cove	M	NO
	125H	Assateague Island State Park --Ocean City Inlet	H	NO
	125I	Ocean City Inlet-Ocean Bay City	M	NO
	125J	Ocean Bay City-Fenwick Island Lighthouse	L	NO

NOTE: A reach may consist of a single point of reference due to particular characteristics of geographical location.

APPENDIX A

Description of Historical Shore Erosion Rate Maps and Shore Erosion Structure Maps (Including Their Limitations)

I. Historical Shorelines and Erosion Rates Map Portfolios

In 1975, as part of the state's Coastal Zone Management Program development efforts, the Maryland Geological Survey produced four portfolios of historical shoreline and shore erosion rate maps, one for each of the following groupings of Maryland's coastal counties: Upper Western Shore, Lower Western Shore, Upper Eastern Shore, and Lower Easter Shore. United States Geological Survey 7½ minute quandrangle maps were used as base maps. Two series of maps were produced, one showing historical shorelines, the other historical shore erosion rates. Information on the historical shoreline were compiled by T. H. Slaughter from United States Coast and Geodetic Survey charts, and are presented in tabular form in Shore Erosion in Tidewater Maryland (1949). The U.S. Coast and Geodetic survey charts date as far back as 1841 and are of scales 1:10,000 and 1:20,000. To compile historical shorelines on the base maps at a scale of 1:24,000 a Kargl Reflection Projector was used which reduced the Coast and Geodetic Charts to the 1:24,000 scale. The historical shorelines superimposed on the base map were hand traced on a mylar overlay. Generally, two shorelines are depicted in the map series but if the base map had been revised a third, intermediate shoreline was presented.

Using the historical shoreline maps, erosion rates in feet per year were calculated by dividing the linear recession by the number of years. Erosion rate categories were selected to be: 0<2 ft/yr (slight), 2-4 ft/yr (low), 4-8 ft/yr (moderate) and >8 ft/yr (high) for time periods greater than 75 years and 0<4 ft/yr (low), 4-8 ft/yr (moderate) and >8 ft/yr (high) for time periods less than 75 years. The shoreline areas falling into each category were then mapped the USGS maps. Areas in which accretion had occurred were also noted. Selection of the categories and time periods was based on accuracy of drafting technique and field observations to depict the severity of erosion for any particular area. It should also be noted that where artificial fill or erosion control structures exist in local areas, the erosion rate categories noted on the maps may not be valid. The user is cautioned to determine if artificial fill or erosion control structures are present in the area of interest before using the map. Areas left blank are a result of a lack of or invalid historical data and do not necessarily represent a zero erosion rate.

II. Shore Erosion Control Structures in Maryland: Their Location and Extention Map Portfolios

In 1976, as another Coastal Zone Management Program development effort, the Maryland Department of Natural Resources undertook an effort to map and compile statistical information on shore erosion control structures on tidal shoreline coastal zone. It was not intended for use in determining precise positions, lengths, value, or effectiveness of individual control structures.

The base maps utilized in this inventory were the 7.5 minute topographic quadrangles of the U.S. Geological Survey. The primary data source used was color aerial photography (1971, 1:12,000) made available through the Wetlands Permit Section of the Water Resources Administration. Deficiencies in coverage and interpretation of the photography were rectified by field checking of selected areas by boat and plane during 1975 and 1976. A secondary data source, the case files of the Wetlands Permit Section, was used to map structures which have received a State Wetlands License from 1971 through July 1976. Structures in this class have been divided into new and replacement categories. In Anne Arundel County, the above data sources were supplemented by an intensive field survey of the entire shoreline conducted by the Maryland Geological Survey in the summer of 1974.

Potential sources of error exist in the compilation and mapping process. The most significant potential error is the omission of existing structures due to misinterpretation of the photography. Another error of omission is implicit in the use of the case files, since a State Wetlands License is required only for structures at or below mean high water (mhw). Therefore, the inventory may be considered conservative with respect to the total length and number of structures represented.

Structures included in the inventory are defined as follows:

Bulkheads - All protection structures with a vertical face placed parallel to the shoreline at or near mhw. (Other structures, such as revetments and gabions, may have been placed in this category in cases in which they could not be differentiated from bulkheads in interpretation of the source data.)

Riprap - sloping structure of loose stone construction placed parallel to the shoreline at or near mhw.

Concrete Revetment - smooth sloping structure of interlocking block or concrete construction placed parallel to the shoreline at or near mhw.

Groin System - one or more structures placed perpendicular to the shore along a reach of shoreline to promote beach accretion.

Jetty - a structure placed perpendicular to shore along the edge of a tidal or river inlet to prevent shoaling of the channel by material transported by littoral currents.

Breakwater - a structure placed offshore, sometimes connected to the shore at one end, designed to protect the shoreline or harbor areas from wave action.

Appendix B
Bibliography of Maryland Publications on Shore Erosion.

The following publications on shore erosion have been developed as part of the development and implementation of Maryland's Coastal Zone Management Program and provided an information base for development of this report.

1. Comprehensive Shore Erosion Planning in Queen Anne's and Talbot Counties, 1982 (expected publication date).

2. Effects of Erosion Control Structures along a Portion of the Northern Chesapeake Bay, 1980.

3. Factors Influencing the Success and Failure of Shore Erosion Structures in the Northern Chesapeake Bay, 1982.

4. Historical Shoreline and Erosion Rates Map Portfolios, 1975.

5. An Illustrated Study of Chesapeake Bay Beaches in Four Maryland State Parks, 1982 (expected publication date).

6. The Role of Boat Wakes in Shore Erosion in Anne Arundel County, 1980.

7. Shore Erosion Control: A guide for Waterfront Property Owners in the Chesapeake Bay Area, 1976.

8. Shoreline Structures in Maryland: Their Location and Extent Map Portfolios, 1976.

Attachment B

Wetlands Division Policy Guidelines Concerning Permit Applications Involving Construction of Shore Erosion Control Measures.

The owner of land bounding on navigable or tidal waters is entitled to protect his shore against erosion as described in Title 9 of the Natural Resources Article. To ensure this right, the Water Resources Administration uses the following criteria to review proposed projects in carrying out the state policy to preserve the wetlands while allowing the exercise of the right of a riparian owner to protect his shore against erosion.

(6) The construction of bulkheads or other shore protection measures shall include only such filling as necessary for effective use of such measures and shall generally be located at the mean high water line or no further channelward than needed for proper tie-back emplacement, or in cases of a steep bank or cliff, no further channelward than needed to obtain a stable slope.

(7) Where shore protection is needed and a marsh exists in front of an applicant's land, the shore protection structure shall be placed behind the marsh or low profile protection (preferably riprap) placed channelward of the marsh so that normal tidal flow into the marsh will be maintained.

(8) Bulkheads shall be constructed with adequate returns to fastland or connected to adjacent shore erosion control structures, as may be applicable.

(9) Because of their possible detrimental effect, shoreline protective structures may not be approved or recommended for approval in the following cases, except where there is no alternative means to achieve a necessary public benefit whose need significantly outweighs the harm done by the proposed work:

a. Marshland will be filled or otherwise destroyed.
b. Surface drainage channels will be filled or occluded.
c. Navigation will be adversely affected.
d. Unique or rare and endangered flora or fauna will be affected.
e. Important historical or archeological sites will be adversely affected.
f. Private oyster leases or natural oyster bars in adjacent open waters will be affected.

b. Junk metal, tires, tree stumps and logs or other material that does not contain, and will not create pollutants, not placed as an interlocking structure shall not be used as part of any shore protection measures.

c. If jetties or groins are used, they must be designed at a minimum length and height to serve the purpose intended and only placed in a location not harmful to navigation or to the land of nearby land owners and the general public. The Water Resources Administration requests a determination from the Maryland Geological Survey on such works. Such work shall be approved only if it does not interfere with public access, create adverse sand transportation patterns or adversely disturb the aquatic ecosystem.

d. The approval by the Water Resources Administration of any shore protection measures does not constitute state certification of the adequacy of the fixed structures for the particular circum-

(10) The provision of shoreline protection is encouraged in locations subject to severe erosion where conditions described in (9) above do not apply. In the review of such projects in locations determined by Maryland Geological Survey (where applicable) to have documented erosion, the Water Resources Administration recommends such protective works to be constructed in such way to have the minimum adverse effect upon the ecological, economic, hydrological, aesthetic, historical, and recreational values in the area.

(11) Permits or licenses may not be granted for shore protective structures or filling unless adequate provision is made for drainage from inland areas. The construction of bulkheads and other protective structures across wetland areas shall provide only such filling as is necessary for the effective operation of the shore protection work and shall not be used for the creation of fast land from wetlands except in those cases where the proposed activity is water dependent and the filling complies with other pertinent policy in these guidelines.

(12) Dredging for fill to be used for the efficient operation of shore erosion control work is allowed only where access to deposit land source material is not feasible or costs are excessive and it is determined not to have an extended or permanent adverse environmental impact. Dredging seaward of an existing bulkhead will alter the graduated bottom depth that helps dissipate wave energy. If dredging is used for fill, adequate compensation may be required by the state for this material. An example of cases where dredging to obtain backfill material may be permitted is where:

a. A steep bank or cliff exists and the nearshore water depths are shallow which makes trucking-in or barging-in fill material infeasible.

b. Large trees or buildings prevent trucking-in fill material.

In both a and b above, however, if grading is to be done, trucking-in fill material usually becomes feasible. The fact that dredged material may be less expensive than trucked-in fill is not a major factor.

(13) The shore protection measures used must satisfy the following criteria regarding quality and performance:

a. When site conditions permit the use of a sloping bank stabilized with vegetation, with or without riprap, this method should be encouraged as an economical solution while preserving the natural conditions.

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