REPORT ON

THE NATIONAL SHORELINE STUDY

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
WASHINGTON, D.C.

The National Shoreline Study

How will the shore be used ?

SEE

SHORE MANAGEMENT GUIDELINES

What is its condition ?

SEE

REGIONAL INVENTORY REPORTS

What can be done ?

to preserve or enhance the shore,
by using—

- Engineering techniques

SEE

SHORE PROTECTION GUIDELINES
REGIONAL INVENTORY REPORTS

- Management techniques

SEE

SHORE MANAGEMENT GUIDELINES

REPORT ON THE NATIONAL SHORELINE STUDY

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August 1971

ABSTRACT

In the River and Harbor Act of 1968 (PL 90-483), the Congress gave to the Chief of Engineers special responsibilities for appraising, investigating, and studying the condition of the Nation's shorelines and for developing suitable means for protecting, restoring, and managing them so as to minimize erosion induced damages. This is the report on the study. Other reports — 11 in number — primarily addressed to local and State authorities, complete the National Shoreline Study and provide the base from which this report is drawn. The reports provide guidelines and broad conceptual plans but are not intended to produce project authorizations.

The National Shoreline Study finds 20,500 miles of the ocean and Great Lakes shores of the United States, Puerto Rico, and the Virgin Islands undergoing significant erosion. The study further finds that action to halt significant erosion appears justified along 2,700 miles of shore. The cost of constructing suitable protective works for these shores is estimated to be $1.8 billion. The study suggests that priority attention should be given to 190 miles of shores where continued erosion is most likely to endanger life and public safety within the next 5 years. The cost of constructing protective works along these shores is estimated to be $240 million. About two-thirds of the areas where erosion is a serious problem are privately owned and not eligible for Federal assistance under present law. The study also finds that management to minimize adverse effects of erosion appears appropriate for 17,800 miles of shores undergoing significant erosion where action to halt the erosion may not be justified.

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PREFACE

This report represents the first overall National appraisal of shore erosion problems. In the congressional hearings preceding authorization of this National Shoreline Study, it was recognized that determination of the scope and magnitude of the problem is an essential prelude to any effort to control erosion induced damage; that all parties – Federal, State, local, and private – concerned with shore erosion need better estimates as a basis for long range comprehensive planning.

The shoreline is a vital part of the coastal zone; it is where the land and the people meet the sea. It is where tides, winds, and waves attack the land, and it is where the land responds through the give and take of shifting beaches, rocky headlands, and offshore sandbars, coral reefs, and chains of barrier islands. The shore is complex and changing. Above all it is of critical importance and value to man.

Shores and beaches serve a great variety of uses, respond to widely differing interests and needs, and concern all people.

–Recreation – shores and beaches are the largest and most attractive recreational facilities readily available to the 30 densely populated coastal States. Residents of interior sections of the country travel great distances to public and commercial beach areas.

–Natural resources – With the associated marshes, embayments, and estuaries, the shoreline provides the most productive areas for marine life and varieties of fish and wildlife which derive their existence from the rich resources of the region. Conservation of the natural environment is of general concern.

Near a metropolitan area there is seldom an excess of beach. The tiny dots are people, like ants on an anthill; but each enjoying the ocean shore. The beach has been restored and widened using sand fill and stone groins.

—Seaports and commerce — With associated harbors, channels, and protected waterways, the shorelines are the gateways for world commerce, inland trade, and coastwise commerce. Port facilities, commerce, industry, oil wells, and power plants constitute an intensive and high dollar value use of the shoreline.

—Residential — Shores and beaches are a uniquely attractive kind of real estate in a Nation faced with the ever increasing crowding of an expanding population.

—Commercial — Restaurants and private recreational facilities, including marinas, launching ramps, small-boat harbors for recreational, commercial, and sport fishing craft, boat sales and service, on or near the shore are supplemental to other shore activities.

—Aesthetics and amenities — Shores and beaches offer the outdoors — water, sand, sun, wind, and view — to people subject to the tensions and crowding of urbanized living.

Shores and beaches are probably the most critical and valuable parts of the coastal zone. Shoreline land forms — rocky headlands, stable beaches, unspoiled salt marshes, bold shorelines — must strongly influence long range planning for land use in the coastal zone.

The coastal zone is a uniquely valuable national asset.

—It is a magnet to living things. Nearly half of our population lives in counties that touch the sea or Great Lakes. The heaviest population of fish in the sea, and essentially all marine vegetation, are concentrated in the coastal zone.

—The coastal zone is growing more rapidly in population and wealth than other parts of the Nation. In the past 10 years, 90 percent of the National population growth was in coastal States. The 30 coastal States have 75 percent of the Nation's population and 12 of the 13 largest cities.

Shoreline management problems tend to be interwoven with coastal zone problems, such as:

—Land use, ownership, public access, and transportation.

—River basin and watershed floods, sedementation, regulation, and diversions.

—Water quality and pollution.

—Water access to navigable channels and harbors for large ships and small boats.

—Coastal flooding and related protection.

This report is primarily an inventory of shoreline conditions and is concerned mainly with erosion and preservation of the shoreline. In each region there are special cases, which are part of larger problem areas, beyond the present state-of-the-art of erosion control. A few examples are:

—Shores subject to sudden flooding from hurricanes and other great storms, tsunamis, and seiches.

—Marshes, onshore and offshore, that dominate the coastal zone ecology, and bear the first onslaught of waves and storm surges.

—Low barrier islands that, like the marshes, are essential features of shoreline protection and the coastal environment.

—Shoreline vegetation and sand dunes that aid in providing storm protection and the long range stability of beaches.

REPORT ON THE NATIONAL SHORELINE STUDY

Today's Federal involvement in shore protection reflects congressional and public recognition of beach and shore erosion as a national – as well as a local – problem. In 1968, the 90th Congress authorized the National Shoreline Study by including the following section in the River and Harbor Act approved August 13.

"SEC. 106. (a) The Chief of Engineers, Department of the Army, under the direction of the Secretary of the Army, shall make an appraisal, investigation and study, including a review of any previous relevant studies and reports, of the Atlantic, Gulf, and Pacific coasts of the United States, the coasts of Puerto Rico and the Virgin Islands, and the shorelines of the Great Lakes, including estuaries and bays thereof, for the purpose of (1) determining areas along such coasts and shorelines where significant erosion occurs; (2) identifying those areas where erosion presents a serious problem because the rate of erosion, considered in conjunction with economic, industrial, recreational, agricultural, navigational, demographic, ecological, and other relevant factors, indicates that action to halt such erosion may be justified; (3) describing generally the most suitable type of remedial action for those areas that have a serious erosion problem; (4) providing preliminary cost estimates for such remedial action; (5) recommending priorities among the serious problem areas for action to stop erosion; (6) providing State and local authorities with information and recommendations to assist the creation and implementation of State and local coast and shoreline erosion programs; (7) developing recommended guidelines for land use regulation in coastal areas taking into consideration all relevant factors; and (8) identifying coastal areas where title uncertainty exists. The Secretary of the Army shall submit to the Congress as soon as practicable, but not later than three years after the date of enactment of this Act, the results of such appraisal, investigation and study, together with his recommendations. The views of concerned local, State, and Federal authorities and interests will be taken into account in making such appraisal, investigation and study."

To satisfy the purpose of the authorizing legislation, a family of 12 related reports is being published and distributed to concerned individuals and organizations – in and out of

Even the smallest of beaches, when strategically located, perform a valuable function if access is provided.

government. These reports are also being released to the National Technical Information Service, Department of Commerce, for general distribution.

A Regional Inventory for each of the 9 major drainage areas identified on the map, Figure 1, focuses on erosion problems, but also examines shore uses, shore ownership, beach distribution, and other shore characteristics. Shore Protection Guidelines describes causes of erosion and methods of protection. Shore Management Guidelines address primarily the problems of local and State decision makers. And finally, this Report on the National Shoreline Study – addressed to the Congress – summarizes the findings.

The inventory of shore conditions and characteristics is the foundation for the entire study and accounts for the major part of the effort expended. In accordance with the legislative guidance, attention first focused on determining areas where significant erosion occurs. For such areas, the rate of erosion was considered in conjunction with economic, industrial, recreational, agricultural, navigational, demographic, ecological, and other relevant factors to identify those areas where action to halt such erosion may be justified. Areas so identified were classified critical. Other areas undergoing significant erosion were classified non-critical. Particular attention is invited to the fact that non-critical does not equate with non-serious in this instance. It simply identifies areas where action to halt erosion does not seem suited to the particular problem. Remedial actions suited to the specific case were selected for each critical area and the costs of the actions were estimated. The inventory also took note of shore use and shore ownership.

In addition to generally defining shoreline problems, the specific purposes of the National Shoreline Study are in three closely related areas. These areas and the purposes encompassed within them are:

a. **Shore erosion.**

(1) Determining areas along coasts and shorelines where significant erosion occurs.

(2) Identifying those areas where erosion presents a serious problem because the rate of erosion, considered in conjunction with economic, industrial, recreational, agricultural, navigational, demographic, ecological, and other relevant factors, indicates that action to halt such erosion may be justified.

b. **Shore protection.**

(1) Describing generally the most suitable type of remedial action for those areas that have a serious erosion problem.

(2) Providing preliminary cost estimates for such remedial action.

(3) Recommending priorities among the serious problem areas for action to stop erosion.

c. **Shore management.**

(1) Providing State and local authorities with information and recommendations to assist in the creation and implementation of State and local coast and shoreline erosion programs.

(2) Developing recommended guidelines for land use regulation in coastal areas taking into consideration all relevant factors.

(3) Identifying areas where title uncertainty exists.

In this summary report, the responses to these purposes are similarly grouped.

Rock revetment and groins protect a bold headland.

SHORELINE PROBLEMS

The processes which shape the shoreline are extremely complex and diverse. Waves are the main factor in the alteration of the shore, including the creation and degradation of beaches. When waves reach the shallow water near the shore, the waves deform and are subsequently destroyed. Most of their energy is expended in direct assault on the land. A lesser part is expended in littoral currents which move along and parallel to the shore. The shores of the United States include practically all known landforms, formed of many materials and at various stages of geologic evolution. These landforms and materials have different vulnerabilities to wave action, and their responses to the powerful forces which they oppose form a very broad spectrum. Each interaction, each combination of landform, material, and force must be carefully and individually examined. There are no all-encompassing simple solutions to shore erosion problems. Broad appraisals — and the National Shoreline Study is such — cannot define final, action-ready solutions.

Beach Erosion.

Beaches in general, and sand beaches in particular, erode readily under both wave and littoral current attack. Actually, the sand in the surf zone on an exposed beach is seldom still; it is usually moving along, outward from, or in toward the shore in response to waves and littoral currents. These beaches naturally tend to reach an equilibrium state in which they advance and retreat in some sort of rhythm. Over several cyclic periods little or no net movement of sand occurs on a stable beach unless this natural rhythm is upset. Beach erosion — or more properly, beach regression — is the result of a net sand movement away from a shore area and is usually caused by an upset of the natural balance. Some sustained unbalances result from actions essential to social well being which interrupt the movement of sand from the land to the sea. Examples of such actions include the stabilization of banks, bluffs, and cliffs to protect life and property from landslides; the construction of dams and levees to control floods and provide water for people, industry, agriculture, and transportation; the construction of highways and railroads to move people and goods; the construction of cities to house and serve people; and the control of soil erosion to conserve the land. Other unbalances result from ill-advised attempts to stabilize particular reaches of shore which in reality do so at the expense of other reaches by interrupting the littoral movement of sand. Unbalances caused by acts of nature are apt to be more short lived, but may be catastrophic. Some examples are droughts which reduce the transport of sediments from the land to the sea, hurricanes and other great storms, and abrupt rises in the water surface which expose hitherto unexposed areas to wave attack.

Other Shore Erosion.

Steep shores — hills, bluffs, cliffs — are not particularly vulnerable to littoral current attack, but are erodible under wave attack. Generally speaking, erodibility decreases as steepness of slope increases. Wave attack at the base of the slope causes undercutting and subsequent collapse of the overhanging bank. Soft strata in rock faces may erode under moderate wave attack causing pockets in the rock. Subsequent large waves may then concen-

Surfers offshore, swimmers on the beach, and hotels on shore.

trate energy in the pockets and thereby splinter or crack the adjacent hard rock; rock slides follow. Eroding steep shores do not tend toward dynamic equilibrium as sand beaches do, but the sand fractions eroded from them are distributed along the shore by the littoral currents. They are therefore sources of sand for beach areas.

Nature of Shore Damages.

Damages from shore erosion include the loss of beaches used for public and private recreation, the continuing loss of waterfront land, and substantial damages to highways, residences, commercial development, and other waterfront structures. Occasionally major storms erode deeply into beaches and bluffs, and destroy seashore homes. Each year citizens invest millions of dollars in an effort to protect their property from erosion. Much of this investment is an economic loss because the measures are often ineffective.

Records of economic losses and property damages attributable to shore erosion are not

Residents of this California beach suffered property damage and spent hundreds of thousands of dollars in temporary or ineffective measures for shore protection. The beach has now been restored by completion of comprehensive project sand fill and groins.

generally available. Some estimates made for damages from erosion and flooding caused by several great storms, hurricanes, and tsunamis and by the unusually high water levels in the Great Lakes in 1952 are reported in the various regional inventories.

The magnitude of shore damages is illustrated by the south shore of Long Island, New York. Located near major population centers, many areas of this shoreline are representative of advanced shore development and intensive use. Historical records of shoreline regression show a loss of unprotected beach averaging from one-half acre to one acre per mile of shoreline. With land values running from about $50,000 down to $14,000 per acre, average annual land losses range from about $50,000 to $7,000 per mile. The total land losses for the 120-mile shoreline exceed $1,000,000 annually. Estimates of damage and increased maintenance to highways, buildings, and utilities resulting from ordinary storms are combined with the damages resulting from major coastal storms and hurricanes. The total average annual damage to shore property and development is estimated at about $9,000,000 annually for the south shore of Long Island.

Shore Use and Related Factors.

Probably most significant and important with respect to erosion is the loss of beach recreation area, a valuable natural resource. Counts of users of good beaches less than one-half mile long show hundreds of thousands of visitors each year. Considering all the beaches of the United States, there are many hundred million beach visits each year. For example, annual attendance at the major public beaches on Long Island totals more than 70,000,000. The most intensive use area is at Jones Beach State Park, which has an annual attendance of about 13,000,000, equivalent to 6,000,000 per mile for the developed area. On the outer part of the island, at Robert Moses Park, the annual attendance of 2,000,000 would indicate an intensity of one-half million per mile. Obviously, beach losses affect a considerable percentage of our population. The population expansion and increased leisure time cause rapidly increasing demands for beach areas. Because the quantity of beaches is limited, continued loss of beach areas will increase in importance and economic value. This is of particular significance near large population centers.

Residential use of the shore is attracting increasing portions of our population. With limited zoning and regulation in eroding areas and in areas subject to flood and wave damage, such privately owned property is particularly vulnerable. At many locations it is impractical for an individual owner to protect his property from flanking by waves or development.

Recreation use of a restored beach.

Increasing pressures of population and development are evident in the competition for the shoreline and coastal zone for use, development, and preservation including such items as: public access and use of the shore; development of private residences and high-rise apartments; construction of commercial, industrial, transportation facilities, and seaports; the use of harbors for fishing and recreational boating; and the preservation of aesthetic and natural values of shore and marsh areas.

The preservation of natural and scenic values is an equally important use of the shoreline. Beaches, marshes, and their adjacent nearshore areas provide some of the Nation's most productive areas for marine and other life forms. In many instances, the Nation's beaches and shores are directly related to the values of the adjacent estuaries or bays. These values are discussed extensively in the National Estuary Study, Department of the Interior, January 1970.

Table 8 summarizes for each region the miles of shoreline used for public recreation, private recreation, non-recreational development, and undeveloped. Similar information is given in detail in the tabulations and plates of the Regional Inventories.

Special Shoreline Problems.

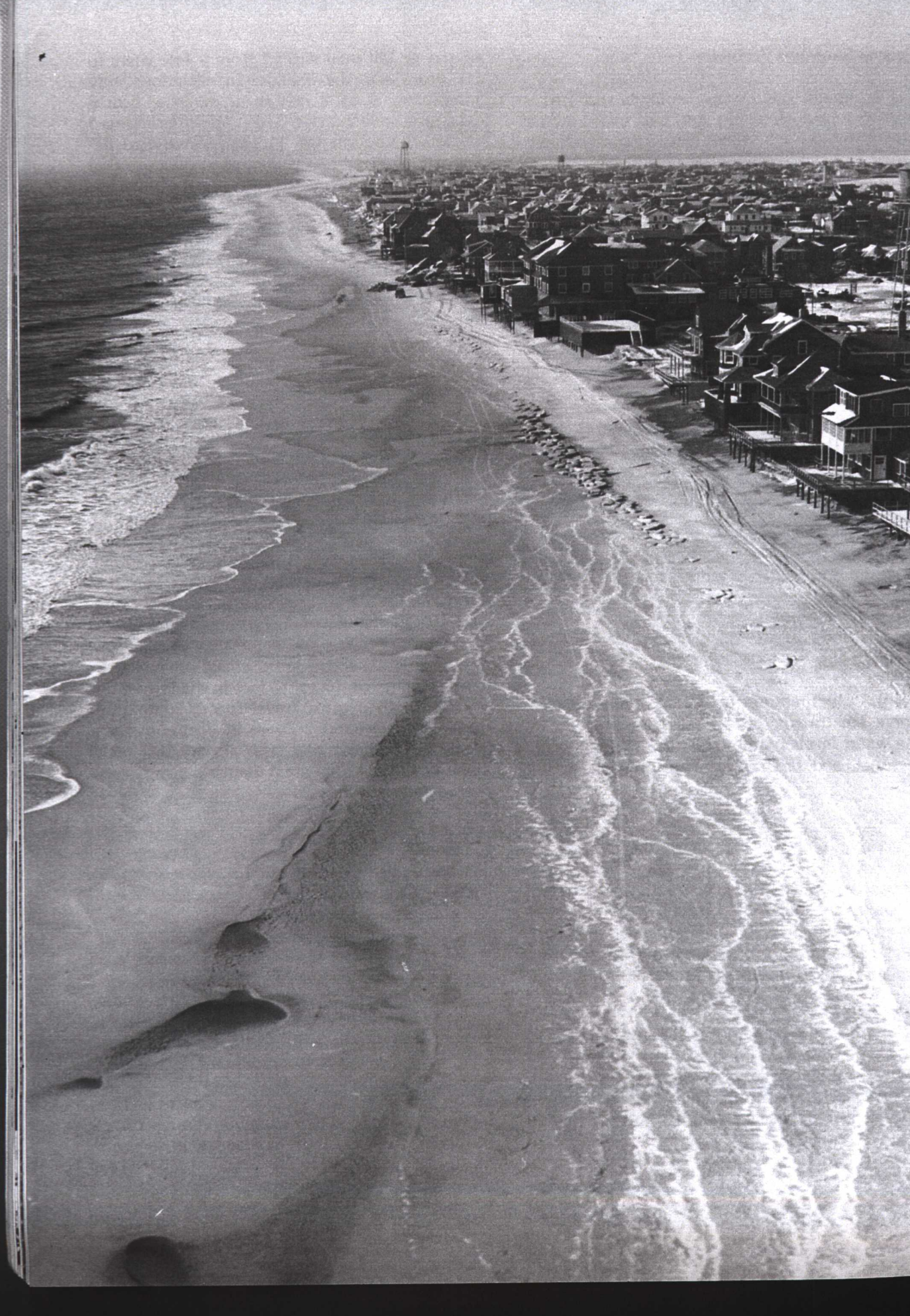
(1) Inlets. Sand transported along-shore by littoral currents drops out at openings or breaks in the shoreline. Thus inlets adversely affect beaches by removing sand from littoral transport and thereby depriving downdrift beaches. When inlets are protected by jetties, the jetties impound some of the littoral transport and divert some of it into deeper water off the ends of the jetties. Both actions deprive downdrift beaches.

(2) Barrier Beaches. The many barrier beaches along the Atlantic and Gulf coasts perform various functions including protecting mainland shores from direct onslaught of the ocean, providing growth areas for crustaceans, and spawning areas for many types of sea life. Paucity of littoral drift and actions of man are destroying vegetation and dunes and reducing widths of the barrier beaches.

(3) Hurricanes and Other Great Storms. In some cases storms accelerate erosion of beach areas because a storm surge raises the elevation of the water surface. Therefore design of structures to protect shorelines must include consideration of the onslaught of these severe storms.

(4) Fluctuations in Great Lake Levels. There are three types of recurring changes in the water levels of the Great Lakes: long-term, seasonal, and temporary. The long-term trend of rise or fall may extend from a few years to 25 years and the changes in elevations may range from 1 or 2 feet to as much as 5 or 6 feet. Seasonal changes, which are superimposed on the long-term level, can be predicted because they are directly related to precipitation and lag it in time. These two types of changes mainly affect Lakes Huron, Michigan, and Erie because Lakes Superior and Ontario are controlled to within one foot of their monthly mean levels. All five lakes are susceptible to temporary changes in elevation caused by winds, rapid changes in barometric pressure, and ice damming. The higher lake elevations allow waves to attack shores and bluffs at high elevations, thereby accelerating erosion and increasing damage.

(5) Tsunamis. Tsunamis are long-period waves generated by catastrophic geological disturbances such as submarine earth movement or volcanic eruptions. Tsunamis travel at speeds of 400 to 500 miles an hour across the ocean basin, and are relatively unnoticed until they near shore. Waves generated near Alaska have caused great damage thousands of miles away in Crescent City, California, and Hilo, Hawaii. The height of the waves in deep water is small, but they peak in the shallow water as they approach the shore. Large tsunamis may reach heights of 10 to 12 feet in shallow water and, with their great travel speed, commonly rush up to elevations 20 to 30 feet above sea level, but occasionally rush up to 100 feet. Such tsunamis inflict great damage.



SHORE EROSION

Significant Erosion Areas.

The condition of 84,000 miles of United States Ocean and Great Lakes shorelines was surveyed to determine where significant erosion occurs.[1] Data were based mainly on available information, knowledge, and judgment; some categories of information could not be obtained for the more remote parts of Alaska. Investigators consulted local authorities and agencies, reviewed aerial photographs, maps, and surveys, made reconnaissance surveys, and reviewed previous studies to determine where significant erosion occurs. This information is presented in the Regional Inventory Reports and summarized in Table 1. Significant erosion occurs on 20,500 miles of the ocean and Great Lakes shorelines — 24 percent of the total. Excluding Alaska, about 15,400 miles — 42 percent — of the shoreline is undergoing significant erosion.

Critical Erosion Areas.

Areas undergoing significant erosion were further examined to identify "those areas where erosion presents a serious problem because the rate of erosion considered in conjunction with economic, industrial, recreational, agricultural, navigational, demographic, ecological, and other relevant factors, indicates that action to halt such erosion may be justified."[2]

To identify critical areas — places where actions to halt erosion may be justified — these factors were supplemented by population and land use demands projected to 2020, the effects of past and continued erosion on environmental values, ownership, and the constraints imposed by present and anticipated land use regulations. Areas were designated "critical" if experienced judgment indicated that prospective damage prevented and benefits from tangible and intangible values may justify action to halt erosion. Where judgment did not so indicate, areas were designated "non-critical" although erosion was significant. Critical erosion totals about 2,700 miles of shore for the Nation. The major regions in which critical erosion is occurring are the North Atlantic region with 1,090 miles and the South Atlantic-Gulf region with 980 miles. The large amounts of critical shoreline in these regions are directly related to extensive development along the shores of these areas. Coastal storms in areas undergoing erosion may damage coastal developments which, when constructed, were a safe distance landward from the zones of severe wave attack, but are now near the shoreline because of erosion. The Regional Inventory Reports show that critical erosion most frequently results where manmade improvements have been constructed relatively close to the shore. Thus, in sections of the coast where tradition has allowed development of the shoreline for industrial and recreational construction, such as in the North Atlantic and South Atlantic-Gulf regions, long reaches of shore are found in the critical category.

[1] *Item (1) of Authorizing Act.*
[2] *Item (2) of Authorizing Act.*

Eroded shore along south shore of Long Island, New York.

TABLE 1

National Assessment of Shore Erosion

Region	Total Shoreline (miles)	Significant Erosion (miles)	Critical Erosion (miles)	Non-Critical Erosion (miles)	Non-Eroding (miles)
North Atlantic	8,620	7,460	1,090	6,370	1,160
South Atlantic-Gulf	14,620	2,820	980	1,840	11,800
Lower Mississippi	1,940	1,580	30	1,550	360
Texas Gulf	2,500	360	100	260	2,140
Great Lakes	3,680	1,260	220	1,040	2,420
California	1,810	1,550	80	1,470	260
North Pacific	2,840	260	70	190	2,580
Alaska	47,300	5,100	100	5,000	42,200
Hawaii	930	110	30	80	820
Total For Nation	84,240	20,500	2,700	17,800	63,740

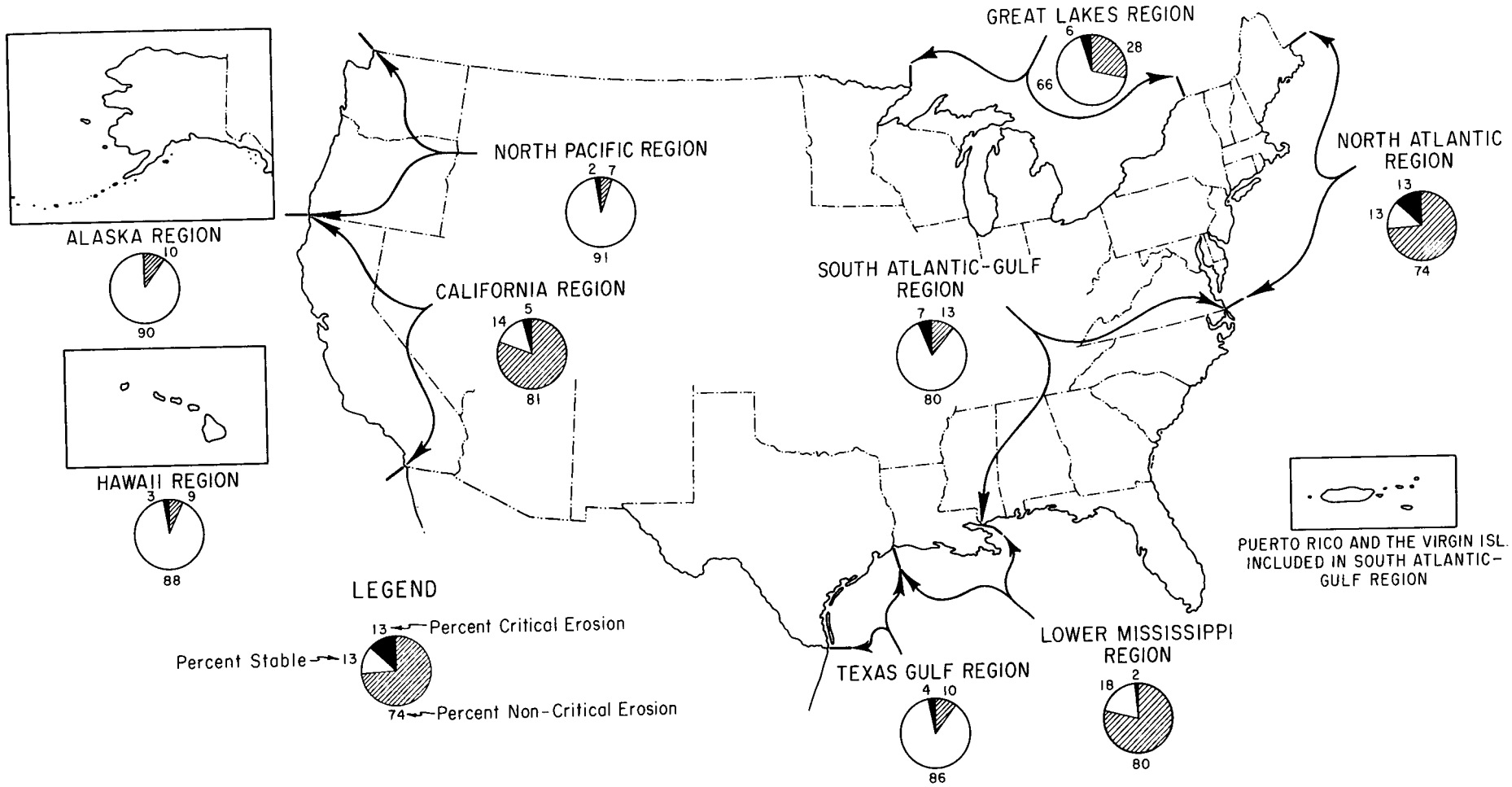


FIGURE I. SHORE EROSION BY REGIONS

Non-critical Erosion Areas.

Non-critical does not connote non-serious; most of these areas have problems which appear amenable to land-use controls and other management techniques rather than measures to halt erosion. Many non-critical eroding shores in all probability would have been classified critical if development had occurred close to the shore. Non-critical areas are thus areas where if development takes place without appropriate controls, future problems will be generated.

The total of this classification is 17,800 miles. Large reaches of non-critical erosion are the North Atlantic region with 6,370 miles, South Atlantic-Gulf region with 1,840 miles, the California region with 1,470 miles, the Lower Mississippi region with 1,550 miles, and the Great Lakes region with 1,040 miles. Alaska is estimated to have about 5,000 miles of non-critical shores. However, this value is approximate due to the lack of basic data for this state.

Above–Seriously eroding high bluffs endanger houses constructed too close to the shore. Below–Non-critical erosion appears amenable to management techniques.

SHORE PROTECTION

Studies were made for the 2,700 miles of shoreline undergoing critical erosion to determine: (1) how the erosion should be halted[1]; and (2) how much it will cost[2]. The Regional Inventory Reports provide detailed information; it is summarized in this section. Shore Protection Guidelines furnish descriptions of the various types of remedial measures to help officials and property owners understand the alternative methods that are applicable to different situations. These methods are also summarized in this section.

General priorities[3] for the 2,700 miles of shoreline undergoing critical erosion are given in this section. They were developed from the studies and basic data contained in the Regional Inventory Reports.

Types of Protection.

Generally, there are several methods that may be used in a situation but they vary in degree of effectiveness, ecological effects and erosion effects on adjacent shores. When conditions permit, artificial fill with periodic nourishment to restore and preserve a beach is the preferred method; it is the natural method, is aesthetically pleasing, and permits a variety of recreational uses. In many areas vegetation may be used to reduce losses of sand from dunes or zoning and land-use controls may be imposed to reduce or control damage attributable to erosion.

Shore protection is most effective and economical when complete physiographic reaches are considered and proper attention is given to the effects of the protection on adjacent shores and on natural environment. Detailed studies of each site with careful consideration of alternative methods are essential preludes to efficacious results, least cost, and least modification of existing environment. A brief discussion of generally used methods of protection follows.

[1] *Item (3) of the Authorizing Act.*
[2] *Item (4) of the Authorizing Act.*
[3] *Item (5) of the Authorizing Act.*

Critical erosion before restoration; 200 feet wide beach after completion of sand fill.

Rock revetment protects slope behind the beach

(1) Artificial Fill and Nourishment. It is often economical to allow erosion to persist and to restore and subsequently nourish a beach with sand from other sources. This method is especially desirable when sand of suitable characteristics may be obtained from nearby bays, inlets, or inland borrow areas without damage to the ecology of the area. The development of economical methods of dredging sand from deep water offshore and placing it on the beaches may result in reduced costs; research is needed.

(2) Groins. Groins are structures constructed generally perpendicular to the shoreline, across the beach, and into the water. Used individually or in a series, they interrupt the sand moving into the area and widen the beach at the location. Only when large amounts of sand are in transit is this method effective. The accelerated erosion downdrift which usually results from groins is minimized when sand is artificially added to the system.

(3) Seawalls. Seawalls are massive rigid structures constructed parallel to the beach line to withstand and reflect wave energy. Seawalls, by preventing erosion of areas that added sand to the supply in motion, may accelerate erosion of the fronting beaches and nearby areas.

(4) Revetments. Revetments are blankets of non-erodible material placed on a bank, bluff, or escarpment to prevent erosion. Stone or concrete blocks are commonly used. In function, revetments are similar to seawalls except they are more flexible, generally of lighter construction, and less costly.

(5) Breakwaters. Breakwaters for shore protection are usually massive stone structures located in the sea parallel to the shore; they interrupt the wave before it reaches the shore. This interruption of wave action causes a calm landward of the breakwater which slows the alongshore currents and causes sand to impound behind the structure. This impoundment is at the expense of downdrift beaches and their erosion follows.

(6) Other Methods. Sand fences are effective protection for beaches and dunes behind the shoreline. The ridges or dunes formed by the fence prevent storm waves from overrunning a low beach, barrier beach, or spit. Vegetation serves a similar purpose in stabilizing dunes or beach areas which are not intensively used for recreation. Vegetation also is effective in reducing erosion of shorelines in bays and estuaries.

Cost Estimates.

The cost estimates developed in the Regional Inventory Reports are based on broad assumptions of shore and littoral characteristics, severity of problem and suitable methods of protection, and on the 1970 price level. Costs were derived from coastal construction expenses in the area. Therefore, estimates are preliminary and should be considered only as indications of probable costs. Table 2 shows miles of critical erosion and cost of protection in the categories of priority described on the next page.

The total cost of remedial measures to halt erosion on the 2,700 miles of shoreline undergoing critical erosion is about $1.8 billion, plus an average annual beach nourishment cost of about $73 million.

A groin system maintains adequate width of beach for recreation in an area of concentrated residential development.

Plant cover stabilizes reconstructed dune.

Priorities.

The areas of critical erosion have been divided into four general categories.

Priority 1: Areas where continued critical erosion is likely to endanger life or public safety within 5 years.

190 miles of shoreline; remedial cost $240 million

Priority 2: Areas where continued critical erosion is likely to endanger property, scarce wildlife habitats, or landmarks of historical or natural significance within 5 years.

1,030 miles of shoreline; remedial cost $660 million

Priority 3: Areas where continued critical erosion is likely to endanger life, public safety, property, scarce wildlife habitats, or landmarks of historical or natural significance within 5 to 15 years.

690 miles of shoreline; remedial cost $390 million

Priority 4: All other areas undergoing critical erosion.

780 miles of shoreline; remedial cost $520 million.

TABLE 2

Priorities for Action to Halt Erosion
(Costs in millions of dollars)

Region	Priority 1 Miles	Priority 1 Cost	Priority 2 Miles	Priority 2 Cost	Priority 3 Miles	Priority 3 Cost	Priority 4 Miles	Priority 4 Cost	Total Miles	Total Cost
North Atlantic	130	180 (4)	442	350 (10)	248	220 (7)	274	270 (12)	1094	1,020 (33)
South Atlantic - Gulf	0	0 (0)	356	160 (5)	334	70 (3)	291	40 (2)	981	270 (10)
Lower Mississippi	0	0 (0)	29	10 (*)	0	0 (0)	0	0 (0)	29	10 (*)
Texas Gulf	2	** (8)	13	10 (*)	47	40 (1)	33	20 (1)	95	70 (2)
Great Lakes	33	10 (1)	139	70 (1)	23	10 (*)	21	20 (*)	216	110 (2)
California	21	50 (3)	23	40 (4)	23	30 (2)	14	30 (2)	81	150 (11)
North Pacific	0	0 (0)	16	10 (1)	3	10 (*)	54	40 (12)	73	50 (13)
Alaska	0	0 (0)	0	0 (0)	0	0 (0)	95	100 (0)	95	100 (0)
Hawaii	4	(*)	12	10 (1)	13	10 (1)	2	** (*)	31	20 (2)
Total for Nation	190	240 (8)	1,030	660 (22)	691	390 (14)	784	520 (29)	2,695	1,800 (73)

*Less than $½ million
**Less than $5 million

Figures in parentheses are estimated average annual beach nourishment costs

SHORE MANAGEMENT

The authorizing act requires that management information be provided to State and local authorities. The elements which the term "shore management" bring to mind suggest the breadth of this requirement — coastal zone management, master plans, regulation of land use and development by such means as zoning and permits, acquisition of land necessary for public use, construction and operation of coastal projects, research to predict project effects, and coastal management organizations.

Management information for the entire coastal zone appears well beyond the scope of this National appraisal of shore erosion problems. However, the shoreline is inseparable from the coastal zone, and its problems are intimately interwoven with coastal zone management. Shore erosion may be viewed as one of a series of land and water elements, such as urban development, water quality control, waste management, fish and wildlife enhancement, seaports, and transportation that make up the whole coastal zone management package. Active participation of all owners, public and private, local, State, and National organizations, and people with knowledge of land and sea are needed to solve a spectrum of problems and resolve continuing conflicts for different kinds of coastal uses. These principles of full participation by interested and knowledgeable organizations apply also to problems of shore management.

Erosion and damages are likely to increase in developing areas. Land use controls and shore management are needed.

Shore management techniques to minimize damages appear more appropriate than protection to halt erosion for about 87 percent of the shoreline undergoing significant erosion. This was discussed earlier. A combination of protection and management-type measures may prove most economical and practical in many locations when detailed studies are made. In response to the Authorizing Act, a useful approach is to look at shore management as a process leading to preserving and enhancing the shore in the best interest of all concerned. The principal steps of such a process (and they may be listed in different forms and sequences) are:

(1) Analyzing the shore history, erosion, development, damage, and related factors.

(2) Evaluating present uses, effects of future demands, and shore requirements to satisfy demands.

(3) Setting objectives and goals from the National, State, and local viewpoints.

(4) Comprehensive planning, using alternative techniques and approaches responsive to public needs or desires.

(5) Predicting physical, biological, economic, and social effects on the basis of available information and required research.

(6) Decision making by responsible local, State, and Federal interests to develop practical plans.

(7) Developing programs to implement the plans by regulation, management, development, or other means.

The National Shoreline Study, and its family of reports, is a first step toward providing information needed for shore management.

Regional Statistics.

The Regional Inventory Reports are building blocks of data on shore ownership, use and development, and descriptions and other information pertinent to planning and management of the shoreline. This information is furnished in text, tables, and graphical form. Because Alaska is largely undeveloped and largely publicly owned, it merits separate attention and appears separately. Brief summaries from the national and regional viewpoints follow. More detailed tables are located at the end of this report. (Note: Totals in various tables do not always agree because of rounding during aggregation.)

Shore Ownership.

Shore ownership is a major consideration in coastal planning and management. Seaward of the mean highwater line, the foreshore and beach are generally held in trust by the States for the public welfare; landward of this line, the shoreland is held by individual property owners. Rights of upland owners and definitions of the highwater boundary line vary and in some States public ownership extends up to the maximum highwater mark or line of vegetation.

Title Uncertainty.

The Federal Government owns about 45,300 miles (54 percent) of the U.S. shoreline but 41,400 miles of this is in Alaska. State and local governments own another 10,100 miles (12 percent). Of the remainder, about 26,300 miles is privately owned, and title to about 2,600 miles is uncertain.

TABLE 3

Shoreline Ownership

Owner	U.S. Excluding Alaska		Alaska		U.S. Including Alaska	
	Miles	Percent	Miles	Percent	Miles	Percent
Federal Government	3,900	11	41,400	88	45,300	54
State & local governments	4,600	12	5,500	11	10,100	12
Private	25,800	70	500	1	26,300	31
Uncertain	2,600	7	0	0	2,600	3

Shore Development.

A small portion of the total shoreline is presently developed, but three fourths of the undeveloped shoreline is in Alaska. If Alaska is excluded, three fifths is undeveloped. About one half of the developed shoreline is used for recreation. Table 4 shows the distribution of use of the shore.

TABLE 4

Shoreline Use

Use	U.S. Excluding Alaska		Alaska		U.S. Including Alaska	
	Miles	Percent	Miles	Percent	Miles	Percent
Recreation, Public	3,400	9	0	0	3,400	4
Recreation, Private	5,800	16	0	0	5,800	7
Non-recreational Development	5,900	16	300	1	6,200	7
Undeveloped	21,800	59	47,000	99	68,800	82

Beaches.

Shorelines with natural beaches are a relatively limited and special resource. An examination of the lengths of non-Alaskan shore with and without a beach determined that beaches exist on about 12,200 miles of shoreline and the remaining 24,800 miles are without beaches. No data are available for the State of Alaska. This information and percentage values are shown on Table 5.

TABLE 5

Shoreline Physical Characteristics

Characteristic	U.S. Excluding Alaska	
	Miles	Percent
With beach	12,200	33
Without beach	24,800	67

TABLE 6

Ownership of Critically Eroding Areas

Region	Total Shoreline (miles)	Critical Erosion (miles)	Private (miles)	Federal (miles)	Non-federal Public (miles)
North Atlantic	8,620	1,090	680	130	260
South Atlantic–Gulf	14,620	980	720	140	80
Lower Mississippi	1,940	40	30	0	0
Texas Gulf	2,500	100	90	0	10
Great Lakes	3,680	220	150	10	50
California	1,810	80	30	0	50
North Pacific	2,840	70	40	10	20
Alaska	47,300	100	50	50	0
Hawaii	930	30	20	0	10
Total	84,240	2,700	1,810	340	480

* Sum of ownerships does not agree with total because ownership data is incomplete in some regions.

Ownership of Critically Eroding Shores.

Ownership of the shores undergoing critical erosion is summarized in Table 6. These are the shores for which conceptual plans, order-of-magnitude cost estimates, and relative priorities are furnished. The North Atlantic and South Atlantic-Gulf regions contain four-fifths of the critically eroding shorelines. These two regions contain only one-fourth of the total National shoreline, but they contain almost two-thirds of the non-Alaskan shoreline. Nationwide, about two-thirds of the critically eroding shoreline is privately owned. Exclusion of Alaska does not change this statistic.

Shore Management Guidelines.

Separate publications entitled, Shore Management Guidelines[1] and Shore Protection Guidelines have been prepared in further response to the authorizing legislation.[2]

The Shore Management Guidelines examines a procedure that can assist those who make decisions (1) to evaluate the need and feasibility of preserving and enhancing their shores, and (2) to develop and implement a plan for doing so. They include examples and discussions which illustrate:

[1] *Prepared under contract by Center For The Environment and Man, Inc.*
[2] *Items (6) and (7) of Authorizing Act.*

(a) The bewildering array of conflicting claims that face the manager — for residential, commercial, industrial, recreational land uses, commercial fishing privileges, transportation, ecological and wildlife protection, resource extraction, waste disposal, and more.

(b) Key questions of objectives, goals, and methods:

Who is to do the necessary planning?

What kind of shore is needed?

What techniques are available for satisfying these needs?

How can these needs and techniques be formulated into a plan?

How can lessons learned in implementing the plan be applied?

(c) Essential Management and Planning Techniques:

—Agreements such as voluntary acquisition and contract zoning.

—Public-policy inducements such as property taxes, cost sharing, land-use maps, and policies for the protection of private property.

—Regulatory controls such as zoning, subdivision regulation, building codes, ordinances, permits, and orders, in conjunction with approved master plans.

—Compulsory taking, such as condemnation and inverse condemnation.

General guidelines for comprehensive planning and management are included in the Shore Management Guidelines. The shore is considered as part of the larger coastal zone, in a complex web of associations in which the shoreline is intimately affected by the land and by the sea. Human uses must be decided in the context of an environment of continually changing natural and social forces.

Present Shore Protection Law and Procedure.

A compendium on existing law is included in the public information report entitled Shore Protection Program. This report contains general information on assistance by the Corps of Engineers in shore protection. It will be noted that Federal participation is greatest where the shores are publicly owned and appropriate facilities to encourage full public recreational use are provided; where the shore is privately owned and there is no public use, no Federal funds can be provided.

Full public recreational use, combined with the conservation of natural resources.

AUTHORIZED FEDERAL PROJECTS

The Corps of Engineers in cooperation with local interests and in accordance with authorizations enacted by the Congress has constructed — or contributed to the construction of — 61 projects protecting 110 miles of shore. The construction costs for these projects total $45 million; the Federal contribution was $28 million. Another 17 projects to protect 171 miles of shore are now underway. The estimated construction costs for these total $423 million and the Federal share is estimated to be $279 million. Four of the completed projects and 6 of the projects underway also provide hurricane protection and the major part of their costs is properly attributable to the hurricane protection features. Not yet started are another 43 projects which will protect about 300 more miles. More information on authorized projects is given in Tables 10 and 11.

COORDINATION WITH OTHER AGENCIES

Agencies with an interest in shore erosion were invited to participate at the beginning of the study. Many concerned State, local, and Federal interests have contributed essential basic information and reviewed the regional studies. The views of coastal States and Federal agencies on the National Shoreline Reports will be printed and appended to this report.

Recreation shore use at Jones Beach State Park along the south shore of Long Island in Nassau County, New York.

CONCLUSIONS

The United States had its beginnings in the coastal zone. Now, after three centuries of focus on the interior, attention is again focusing intently on the coastal zone. In his annual report to the Congress on marine resources and engineering development in April 1971, the President stated: "During the past few years no single body of marine problems has attracted as much attention as those encompassed in the U.S. coastal zone." The shoreline is at the heart of the coastal zone – here land, people, and sea meet. Erosion of the shoreline is one of the major problems in the coastal zone.

About 42 percent of the 37,000 miles of shoreline outside of Alaska is undergoing significant erosion – that is, the shoreline is regressing. The erosion is widely distributed, without respect for political boundaries or property lines. Private and public owners suffer alike. Shore protection programs are not keeping pace with needs, and this is particularly evident where private (non-public) owners are involved and public funds are not available. In general, programs and projects with substantial Federal and State funding are more apt to be implemented than those heavily dependent on local or private funding.

Justification for erosion control, whether by public or private interests, is based on a comparison of the cost of protection with the value of tangible benefits, such as damages prevented, and intangible benefits, including both ecological and aesthetic values, all based on projected growth and land use. Measures to halt erosion appear justified for 2,700 miles of U.S. shoreline at an estimated cost of about $1.8 billion. First priority should be given to about 200 miles of shoreline where, if erosion is allowed to continue, the public safety is likely to be endangered within five years, and second priority should go to 1,000 miles of shoreline where, property or scarce wildlife habitat or important historical or natural landmarks are likely to be endangered within five years. A lesser sense of urgency adheres to the remaining 1,500 miles, but as conditions change, some of these may take on a new urgency.

Much of the shoreline that is undergoing critical erosion is in private hands, and erosion on such lands is increasing. Erosion is increasing for publicly owned lands also, but necessary remedial action can be taken through public institutions whereas the public has limited voice in the management of privately held lands. Yet the public interest in such private shores is considerable. The management of private lands often affects public beaches, navigation channels, and other facilities. Ecological and environmental problems are not stopped by private fences, nor are the problems associated with storm flooding and disaster-related emergencies. Private as well as public lands need to be considered in shoreline and coastal zone planning in order to reflect the total public interest.

Cooperative planning, funding, design, and construction by Federal, State, County, and private interest resulted in this mecca for shore recreation at Marina Del Rey, California. This complex includes wide sandy beaches, berths for 6,000 sail and power boats, hotels, motels and restaurants; all the facilities to enjoy the ocean and beach.

About one-fourth of the total beach frontage of 12,000 miles outside of Alaska has been developed for public recreation, and serves the present recreational demand of many hundred million beach visits each year. Beaches located near major population centers and available for public use are already overcrowded and cannot satisfy the foreseeable recreational demands of those populations. Additional beaches are urgently needed. Public acquisition of privately owned beaches is a partial — but not a complete — solution. In some areas, natural beaches must be supplemented by manmade beaches if recreational demands are to be satisfied. At the same time, traditional upland sources of sand are rapidly being exhausted or becoming prohibitive in cost; the large deposits known to be offshore can be exploited without doing violence to the marine environment and ecology. An economical method for moving sand from submarine deposits to shore areas is needed. Beaches and shore areas used for recreation require protection from pollution and ocean dumping of waste products to insure safe and attractive quality of water for human contact.

Shore erosion cannot be considered or countered in isolation from other coastal zone problems. Land use and development are inseparable from erosion control. In many cases, natural erosion should be permitted to continue. In such cases, zoning or other management regulation is necessary to preclude development that might be damaged.

The conclusions of the National Shoreline Study show a pressing need for:

(a) Coordinated action by Federal, State, and local governments in concert with action by corporate and private owners to arrest erosion of some parts of the national shorelines;

(b) Coordinated and comprehensive planning and management to insure the use of the national shoreline in the national best interest; and

(c) Intensified research and investigation of the processes contributing to shore erosion, and development of improved methods and techniques for controlling erosion.

The National Shoreline Study is a building block of national information on problems, causes, opportunities and options for the solution of shore erosion problems for the use of concerned representatives of State and local governments, private interests and the Federal Government — those involved in the decision-making processes at all levels. For concerned agencies and individuals it is an opportunity to apply the special talents available to resolve controversial issues, technical, financial, functional and institutional; to assist in defining State and national goals; to help direct overall efforts to meet national needs in the fastest growing part of the Nation while preserving environmental quality; and to assist in planning the kind of shores and coastal zones that are desired in the future.

When beach is available people of all ages, sizes, and shapes will participate in outdoor recreation.

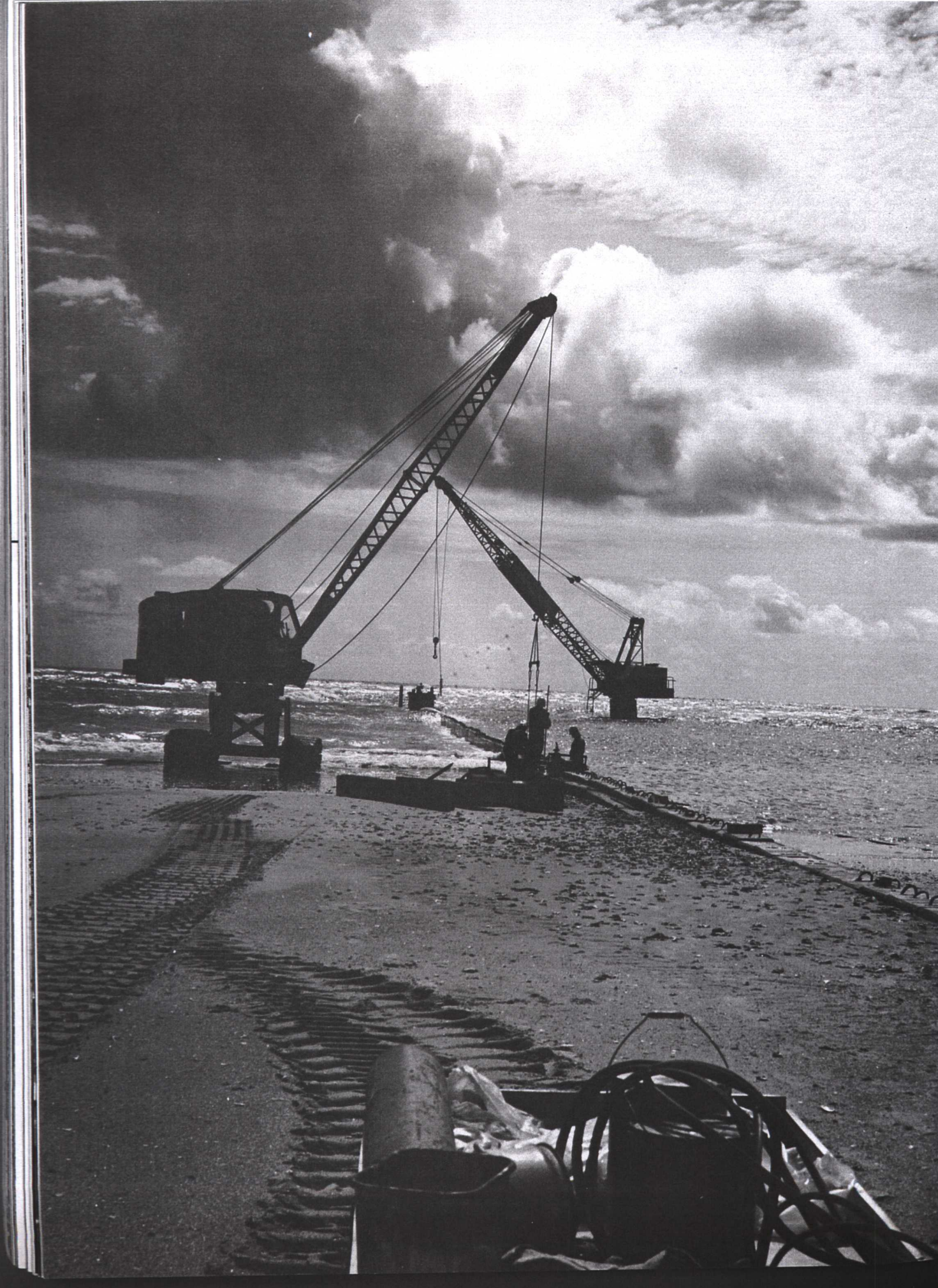


TABLE 7

Shoreline Characteristics

REGION	TOTAL SHORE-LINE (miles)	SHORELINE EXPOSED (miles)	SHORELINE SHELTERED (miles)	HISTORICAL SHORE CHANGES CRITICAL EROSION (miles)	NON-CRITICAL EROSION (miles)	NON-ERODING (miles)	SHORELINE WITH BEACH (miles)	SHORELINE WITHOUT BEACH (miles)
North Atlantic	8,620	4,730	3,890	1,090	6,370	1,160	2,320	6,300
South Atlantic–Gulf	14,620	2,470	12,150	980	1,840	11,800	3,600	11,020
Lower Mississippi	1,940	810	1,130	30	1,550	360	830	1,110
Texas Gulf	2,500	370	2,130	100	260	2,140	380	2,120
Great Lakes	3,680	3,020	660	220	1,040	2,420	2,110	1,570
California	1,810	1,320	490	80	1,470	260	680	1,130
North Pacific	2,840	650	2,190	70	190	2,580	2,050	790
Alaska	47,300	20,250	27,050	100	5,000	42,200	Unknown	Unknown
Hawaii	930	900	30	30	80	820	180	750
TOTAL FOR NATION	84,240	34,520	49,720	2,700	17,800	63,740	12,150*	24,790*

*Not including Alaska

Masonboro Jetty Contract, Wrightsville Beach, N.C.

TABLE 8

Shoreline Ownership and Use

Region	OWNERSHIP Federal Government (miles)	OWNERSHIP State & Local Government (miles)	OWNERSHIP Private (miles)	OWNERSHIP Uncertain (miles)	SHORE USE Recreation Public (miles)	SHORE USE Recreation Private (miles)	SHORE USE Non-Recreational Development (miles)	SHORE USE Undeveloped (miles)
North Atlantic	580	840	7,200	0	1,020	2,600	2,430	2,570
South Atlantic—Gulf	1,870	1,960	8,250	2,540	690	1,500	2,440	9,990
Lower Mississippi	240	330	1,370	0	20	30	50	1,840
Texas Gulf	390	50	2,060	0	400	160	110	1,830
Great Lakes	130	520	3,030	0	370	1,220	250	1,840
California	380	350	1,080	0	440	190	230	950
North Pacific	240	270	2,310	20	350	120	190	2,180
Alaska	41,350	5,500	450	0	10	0	330	46,960
Hawaii	110	260	560	0	90	0	200	640
TOTAL FOR NATION	45,290	10,080	26,310	2,560	3,390	5,820	6,230	68,800

TABLE 9

Estimated Cost of Protection by Priority
(Costs in Millions of Dollars)

Region	State	Priority	Miles	Cost
North Atlantic	Maine	1	–	–
		2	–	–
		3	–	–
		4	20	26.0 (1.5)
		Total	20	26.0 (1.5)
	New Hampshire	1	–	–
		2	–	–
		3	–	–
		4	2	5.0 (.2)
		Total	2	5.0 (.2)
	Massachusetts	1	–	–
		2	51	75.0 (3.7)
		3	52	77.0 (3.8)
		4	33	48.0 (2.5)
		Total	136	200 (10.0)

Figures in parentheses are estimated average annual beach nourishment costs.

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Rhode Island	1	4	5.0 (.2)
		2	–	–
		3	–	–
		4	17	25.0 (1.3)
		Total	21	30.0 (1.5)
	Connecticut	1	3	4.0 (.2)
		2	–	–
		3	–	–
		4	22	31.0 (1.8)
		Total	25	35.0 (2.0)
	New York**	1	101	137 (2.3)
		2	115	121 (3.8)
		3.	84	70.1 (.7)
		4	–	–
		Total	300	328.1 (6.8)

**This is the Atlantic Ocean shoreline. New York also has shoreline in the Great Lakes Region.

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	New Jersey	1	–	–
		2	8	21.4 (.6)
		3	41	36.8 (1.9)
		4	72	83.0 (2.6)
		Total	121	141.2 (5.1)
	Delaware	1	–	–
		2	1	.3 (.1)
		3	7	1.4 (.1)
		4	23	10.0 (1.0)
		Total	31	11.7 (1.2)
	Maryland	1	9	10.3 (.2)
		2	22	12.6 (1.4)
		3	64	34.5 (.6)
		4	85	46.3 (1.5)
		Total	180	103.7 (3.7)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Virginia	1	13	21.0 (.8)
		2	245	119 (0)
		3	–	–
		4	–	–
		Total	258	140 (.8)
Total for Region		1	130	177.3 (3.7)
		2	442	349.3 (9.6)
		3	248	219.8 (7.1)
		4	274	274.3 (12.4)
		Total	1094	1020.7 (32.8)
South Atlantic–Gulf	North Carolina	1	–	–
		2	226	90.0 (2.2)
		3	108	16.7 (.5)
		4	205	29.5 (.7)
		Total	539	136.2 (3.4)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	South Carolina	1	–	–
		2	35	7.9 (.6)
		3	22	4.0 (.3)
		4	–	–
		Total	57	11.9 (.9)
	Georgia	1	–	–
		2	–	–
		3	7	2.9 (.2)
		4	–	–
		Total	7	2.9 (.2)
	Florida	1	–	–
		2	93	56.8 (2.3)
		3	153	31.9 (1.4)
		4	47	12.5 (.4)
		Total	293	101.2 (4.1)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Alabama	1	–	–
		2	–	–
		3	33	4.9 (0)
		4	–	–
		Total	33	4.9 (0)
	Mississippi	1	–	–
		2	–	–
		3	6	4.8 (0)
		4	37	0 (.2)
		Total	43	4.8 (.2)
	Puerto Rico	1	–	–
		2	2	2.4 (.1)
		3	5	4.6 (.2)
		4	–	–
		Total	7	7.0 (.3)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Virgin Islands	1	–	–
		2	–	–
		3	–	–
		4	2	2.0 (.4)
		Total	2	2.0 (.4)
Total for Region		1	–	–
		2	356	157.1 (5.2)
		3	334	69.8 (2.6)
		4	291	44.0 (1.7)
		Total	981	270.9 (9.5)
Lower Mississippi Valley	Louisiana	1	–	–
		2	29	5.4 (.2)
		3	–	–
		4	–	–
Total for State & Region			29	5.4 (.2)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
Texas Gulf	Texas	1	2	1.4 (.1)
		2	13	14.1 (,4)
		3	47	35.3 (.9)
		4	33	20.1 (.5)
Total for State & Region			95	70.9 (1.9)
Great Lakes	New York***	1	–	–
		2	–	–
		3	–	–
		4	17	15.7 (0)
		Total	17	15.7
	Pennsylvania	1	–	–
		2	6	4.8 (0)
		3	–	–
		4	–	–
		Total	6	4.8 (0)

***This is Great Lakes shoreline. New York also has shoreline in the North Atlantic Region.

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Ohio	1	–	–
		2	12	6.3 (0)
		3	12	6.0 (0)
		4	1	.4 (0)
		Total	25	12.7 (0)
	Michigan	1	33	13.1 (.7)
		2	60	22.6 (1.3)
		3	11	4.3 (.2)
		4	–	–
		Total	104	40.1 (2.2)
	Indiana	1	–	–
		2	10	8.0 (0)
		3	–	–
		4	3	2.4 (0)
		Total	13	10.4 (0)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Illinois	1	–	–
		2	11	7.6 (0)
		3	–	–
		4	–	–
		Total	11	7.6 (0)
	Wisconsin	1	–	–
		2	39	23.4 (0)
		3	–	–
		4	–	–
		Total	39	23.4 (0)
	Minnesota	1	–	–
		2	1	1.4 (0)
		3	–	–
		4	–	–
		Total	1	1.4 (0)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
Total For Region		1	33	13.1 (.7)
		2	139	74.1 (1.3)
		3	23	10.3 (.2)
		4	21	18.5 (0)
		Total	216	116.0 (2.2)
	California	1	21	48.6 (3.2)
		2	23	38.6 (3.5)
		3	23	30.9 (2.1)
		4	14	28.0 (1.8)
Total for State & Region		Total	81	146.1 (10.6)
North Pacific	Oregon	1	–	–
		2	13	3.4 (1.1)
		3	–	–
		4	52	38.6 (12.2)
		Total	65	42.0 (13.3)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
	Washington	1	—	—
		2	3	4.0 (0)
		3	3	7.3 (0)
		4	2	1.2 (.1)
		Total	8	12.5 (.1)
Total For Region		1	—	—
		2	16	7.4 (1.1)
		3	3	7.3 (0)
		4	54	39.8 (12.3)
		Total	73	54.5 (13.4)
Alaska	Alaska	1	—	—
		2	—	—
		3	—	—
		4	95	95.0 (0)
Total For Region & State			95	95.0 (0)

TABLE 9

(Continued)

Region	State	Priority	Miles	Cost
Hawaii	Hawaii	1	4	3.6 (.2)
		2	12	13.5 (.7)
		3	13	13.2 (.7)
		4	2	1.6 (.1)
Total for Region & State			31	31.9 (1.7)

TABLE 10

Authorized Beach Erosion Control Projects
(Inactive projects are not included)

Region	Number	Miles Protected	Federal Construction Cost*	Total Construction Cost*	Annual Beach Nourishment Cost*
		COMPLETED			
North Atlantic	27	23	2.9	8.2	0.2
South Atlantic – Gulf	11	38	3.6	8.0	0.9
Lower Mississippi	0				
Texas Gulf	2	4	1.8	1.8	0
Great Lakes	5	12	1.2	4.0	0.1
California	9	25	7.5	10.0	1.0
North Pacific	0				
Alaska	0				
Hawaii	3	1	0.6	1.3	0
Total for Nation	57	103	17.6	33.3	2.2
		UNDERWAY			
North Atlantic	5	8	4.0	10.0	0.4
South Atlantic – Gulf	2	3	1.2	1.9	0.1
Lower Mississippi	0				
Texas Gulf	0				
Great Lakes	0				
California	3	18	8.7	13.8	0.8
North Pacific	0				
Alaska	0				
Hawaii	1	2	3.7	0	5.9
Total for Nation	11	31	17.6	25.7	7.2
		NOT STARTED			
North Atlantic	16	49	29.8	50.9	1.7
South Atlantic – Gulf	13	88	10.5	29.6	2.4
Lower Mississippi	0				
Texas Gulf	1	1	0.6	1.3	0
Great Lakes	0				
California	0				
North Pacific	0				
Alaska	0				
Hawaii	2	1	0.2	0.4	**
Total for Nation	32	139	41.1	82.2	4.1

*Cost in millions of dollars
**Less than $50,000

TABLE 11

Authorized Multiple Purpose Projects Which Include Beach Erosion Control
(Inactive projects are not included)

Region	Number	Miles Protected	Federal Construction Cost*	Total Construction Cost*	Annual Beach Nourishment Cost*
			COMPLETED		
North Atlantic	0				
South Atlantic – Gulf	2	5	3.1	4.9	0.3
Lower Mississippi	0				
Texas Gulf	0				
Great Lakes	0				
California	0				
North Pacific	2	2	7.1	7.2	0
Alaska	0				
Hawaii	0				
Total for Nation	4	7	10.2	12.1	0.3
			UNDERWAY		
North Atlantic	3	83	64.0	113.5	0.6
South Atlantic – Gulf	2	38	19.5	28.6	0.8
Lower Mississippi	1	19	178.0	255.0	0
Texas Gulf	0				
Great Lakes	0				
California	0				
North Pacific	0				
Alaska	0				
Hawaii	0				
Total for Nation	6	140	261.5	397.1	1.4
			NOT STARTED		
North Atlantic	7	69	135.4	84.2	5.2
South Atlantic – Gulf	4	90	32.9	62.3	1.5
Lower Mississippi	0				
Texas Gulf	0				
Great Lakes	0				
California	0				
North Pacific	0				
Alaska	0				
Hawaii	0				
Total for Nation	11	159	168.3	146.5	6.7

*Cost in millions of dollars

REVIEW COMMENTS AND RESPONSES

TABLE OF CONTENTS

Federal Agencies

States

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D. C. 20250

January 25, 1972.

Honorable Robert F. Froehlke
Secretary of the Army

Dear Mr. Secretary:

This is in response to Lieutenant General F. J. Clarke's letter of September 27, 1971, requesting comments and recommendations of the Department of Agriculture, in accordance with Section 106 of Public Law 90-483, pertaining to the views of Federal agencies on the National Shoreline Study. This Department was happy to have made contributions of available data to this study from agencies such as the Soil Conservation Service and Forest Service.

Our review of the Report on the National Shoreline Study, the nine separate Regional Inventory Reports, and the Shore Protection and Shore Management Guidelines shows this study to be an excellent assessment of erosion problems along our ocean and Great Lakes shorelines.

Since only 23 percent of the U.S. shoreline, excluding Alaska, is known to be in public ownership (Federal, State, and local governments), we feel that increased emphasis needs to be placed on overall regional comprehensive planning to insure coordination and interlocking objectives at local and private planning levels. Additional emphasis on the use of management techniques, through State and local governmental entities, to control undesirable land use and development in the coastal zone, is needed throughout all the reports. Land use, zoning, building and subdivision codes, and other coastal zone management regulations are most essential if we are to reduce present and potential erosion-induced damages, especially where protective works to halt the erosion may not be justified. The study found that some two thirds of the areas where shoreline erosion is a serious problem is privately owned. The Corps points out that protective works on private lands are not eligible for Federal assistance under its existing authorities. This is most significant and accentuates the need for additional and expanded shore protection programs.

In the volume, Shore Protection Guidelines, there is little mention of the use of vegetation in stabilizing dune areas and controlling wind erosion. We strongly urge that greater emphasis be given to the need for adequate vegetation, especially where dunes are rebuilt artificially to simulate natural protection.

This study overemphasizes water erosion problems and does not adequately recognize the erosion problems and conditions created by wind action. Many coastal areas have a history of eroding and moving sand dunes. Some of these situations are caused by overgrazing of vegetation, some by man's actions, and others by long-term climatological cycles or geological conditions. Over a long period of time, wind action on dune areas assumes a considerable importance, causing beach recession and damage to the land and developments.

The Department of Agriculture, in cooperation with conservation districts and local governments, has assisted many public and private landowners in stabilizing dune areas through extensive vegetative land treatment programs. Generally, this has been done in conjunction with community zoning measures.

To meet the increasing problem of shoreline erosion, especially on private lands, this Department offers the soil surveys, plant materials, and considerable experience of the Soil Conservation Service in vegetative stabilization of sand dunes.

Sincerely,

T. K. Cowden
Assistant Secretary

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO
DAEN-CWP

23 February 1972

Honorable Thomas K. Cowden
Assistant Secretary of Agriculture
Washington, D. C. 20250

Dear Dr. Cowden:

Thank you for your letter commenting on the National Shoreline Study. We appreciate your continued participation. Your letter will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

We centainly agree that overall regional comprehensive planning is the only sure route to coordinated and interlocking objectives at all levels. The National Shoreline Study emphasizes this, and the Corps of Engineers has long advocated comprehensive planning. The National Shoreline Study recognizes the importance of management in general, and land use controls in particular. Shore Management Guidelines provides decision makers at local and State levels with information and techniques to help them to evaluate the need for, and feasibility of, preserving and enhancing their shores, and to develop and implement plans for doing so.

You urge greater emphasis on the use of vegetation to stabilize dunes and control wind erosion. We agree that vegetation is important and feel that the stabilizing effect of controlling wind erosion may be greater than is now generally recognized. We believe that more research is urgently needed and suggest that continued, cooperative research by our two departments will develop needed information. The use of vegetation to stabilize shore areas was addressed by the National Shoreline Study and is mentioned on pages 5 and 25 of the report on the study. While the legislative directive is concerned mainly with shore erosion by ocean and lake waves and currents, we appreciate your comments on the importance of wind erosion of dune areas.

Sincerely yours,

(Signed)

F. P. KOISCH
Major General, USA
Director of Civil Works

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Rockville, Md. 20852

3 January 1972

Lt. General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Clarke:

The Department of Commerce has reviewed your report on the National Shoreline Study.

In general, the report is comprehensive and achieved its stated objectives. We have received from reviewers some recommendations for changes, but we believe the document is excellent for its intended purpose and should be transmitted to Congress in its present form.

However, I believe the statement below based on a study by the National Ocean Survey of the National Oceanic and Atmospheric Administration could be used by Secretary of the Army to strengthen the case presented in his covering letter or in testimony before Congress.

> "The small but consistent rise in relative sea level is the most important single parameter effecting the Corps' continued activity in the field of beach erosion. If sea level fell for several years, expenditures for beach erosion protection works would be greatly reduced. Continuous sea level monitoring at about 150 locations along the coasts of the United States by the National Ocean Survey show that although the rise in sea level reduced sharply from about 1946 to 1968, it is now on a rise again comparable to that experienced from about 1929 to 1946. Thus, it can be expected, based on historical sea level trends, that beach erosion problems will continue to plague the United States in the foreseeable future."

Thank you for the opportunity to review this study.

Sincerely,

Robert M. White
Administrator

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

8 February 1972

Dr. Robert M. White
Administrator, National Oceanic
and Atmospheric Administration
U.S. Department of Commerce
Rockville, Maryland 20852

Dear Dr. White:

Thank you for your letter commenting on the National Shoreline Study. Your letter and this reply will be appended to REPORT ON NATIONAL SHORELINE STUDY.

We agree that the small consistent rise in relative sea level is one of the important parameters affecting beach and shore erosion, but we are reluctant to label it the most important. Although the change in sea level can for several years vary radically from its long term average, the long term average for most of the Atlantic Coast seems to be on the order of 0.01 to 0.015 feet per year. On the Pacific Coast, it is even less. Historically, relatively great rates of rise over relatively short periods (e.g., 0.6 feet rise at Charleston, South Carolina between 1942 and 1949) have been followed by drops.

As you know, severe storms cause temporary increases in sea levels which are many times greater than those associated with changes in overall sea level. Storm surges of 5 or 6 feet are relatively common, and a surge of over 20 feet was reported from Hurricane Camille in 1969.

In summary, although sea level rise is a factor affecting beach erosion and shore protection, it is by no means the major factor in terms of normal shore protection project life. It may, however, be a major factor insofar as long-term projects, marginal local self-help projects, and shoreline management zoning are concerned.

Sincerely yours,

F. P. KOISCH
Major General, USA
Director of Civil Works

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
WASHINGTON, D.C. 20201

OFFICE OF THE SECRETARY

January 4, 1972

Lt. Gen. F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

Secretary Richardson has asked me to respond to your letter of September 27, 1971, which forwarded copies of the National Shoreline Study pursuant to the requirements of Section 106 of Public Law 90-483.

This Department has reviewed the Study and has no comments to offer; however, we would like the opportunity to review Environmental Impact Statements or studies related to future project proposals developed for the solution to erosion and flooding danger.

The opportunity to comment is appreciated.

Sincerely yours,

Robert D. Lanza

Robert D. Lanza
Special Assistant to the
Assistant Secretary for
Health and Scientific Affairs

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D. C. 20410

ASSISTANT SECRETARY FOR
COMMUNITY PLANNING AND MANAGEMENT

22 December 1971

Lieutenant General, F. J. Clarke
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

Dear Lieutenant General Clarke:

This is in response to your letter (Ref: DAEN-CWP-C) of September 27, 1971, to Secretary Romney requesting comments on the National Shoreline Study.

Our prime interest in the Reports is that distribution be made to appropriate state, regional, and local planning agencies. We were pleased to find that most of those agencies had already received copies from your District or Division Offices. In our Fort Worth Region and in California few of the planning agencies received them; however, some local development agencies in California did. We feel that these and other study reports by the Corps of Engineers would be valuable to the planning agencies and, in the future, copies should go directly to them. Current address lists can be obtained from the HUD Regional Offices.

The conceptual plans proposed for preventing beach erosion are primarily structural in nature. It would appear that non-structural measures such as zoning should have been considered as alternatives during evaluations. Also, a more detailed Corps of Engineer identification of problem areas would be very helpful to local planners in implementing non-structural programs. In determining "critical areas" local planners should have been consulted regarding land use and growth projections. It is recommended that this be accomplished prior to requesting any project authorizations.

We appreciate the opportunity to review these reports and request that you consider the late comments of state, regional and local planning agencies which did not receive copies in the original distribution.

Sincerely,

Charles B Rawlins

for Samuel C. Jackson

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

14 February 197

Mr. Samuel C. Jackson
Assistant Secretary for Community
Planning and Management
Department of Housing and
Urban Development
Washington, D. C. 20410

Dear Mr. Jackson:

Thank you for your letter commenting on the National Shoreline Study. Your letter and this reply will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

We certainly agree that zoning and other management techniques are alternatives to protection and that input from local, regional and State planning agencies is an indispensable part of project planning. The National Shoreline Study focuses attention on these fundamental points when it states:

> Active participation of all owners, public and private, local, state and national organizations and people with knowledge of land and sea are needed to solve a spectrum of problems and resolve continuing conflicts for different kinds of coastal uses. These principles of full participation by interested and knowledgeable organizations apply also to problems of shore management.
>
> Shore management techniques to minimize damages appear more appropriate than protection to halt erosion for about 85% of the shoreline undergoing significant erosion....A combination of protection

14 February 1972

and management type measures may prove more economical and practical in many locations when detailed studies are made.

As you noted, the conceptual plans for preventing erosion are primarily structural in nature. While management techniques are alternatives to protection, they are not substitutes for protection and do not generally halt or prevent erosion. With this in mind and in direct response to the legislative directive, the National Shoreline Study identified those areas where action to halt erosion appears justifiable and, for those areas, developed conceptual plans for halting erosion.

Sincerely yours,

F. P. KOISCH
Major General, USA
Director of Civil Works

United States Department of the Interior

OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20240

13 March 1972

Dear General Clarke:

This is in reply to your letter of September 27, 1971, requesting our views and comments on your National Shoreline Study Report. We believe the study provides a good reconnaissance grade inventory of the effects of erosion on our Nation's coastlines. The study uses a priority system for indicating the need for erosion control along the shoreline of the country and identifies those measures which might be employed to control erosion. While the report does not recommend any specific action programs, we assume it will be used to formulate a well balanced erosion control program for our Nation's shorelines.

Of the 84,000 miles of shoreline inventoried the report classifies 2700 miles as having a critical erosion problem. Most of the critical erosion occurs in the North Atlantic, South Atlantic and Gulf regions. The Department of the Interior has a deep and continuing interest in the erosion control inventory and any action programs stemming from this inventory since it manages a great deal of the Nation's coastline for the enjoyment of the general public. This is particularly true for the Atlantic and Gulf Coast regions and along the shores of the Great Lakes. In the event any action programs stem from this shoreline study that could impact on lands under the jurisdiction of our National Park Service, we would like to participate in the planning studies.

None of the 2700 miles of the shoreline identified as having a critical erosion problem involves lands under the jurisdiction of our Bureau of Land Management. However, we would appreciate being advised of any action program which might develop along the Pacific or Alaskan coast as the Bureau administers a large segment of the undeveloped coastline in those areas. We would also expect to participate in any specific action program plans which might impact on our land management program.

At the time of this shoreline inventory, we note that most of the Nation's shorelines did not have a critical erosion problem. We assume that any action program that would be implemented to correct the critical erosion areas would not be carried out at the expense of the non-critical areas. A well balanced work program would be a necessity. As the report points out, timely methods of control and rehabilitation can prevent many areas from reaching the critical erosion stage and programs of land use planning and control can be very effective controls.

The study provides little information on the mineral potential and related activities in assessing the erosion impacts. In some areas of the shoreline these factors are currently significant and in other areas potentially so. Erosion control programs stemming from this study should contain an adequate impact analysis on the mineral resources and related industries involved.

We had some difficulty in reconciling some of the shoreline statistics given in your report with those used in other Federal studies. For example, a recently issued report of the U. S. Department of Commerce, entitled "The Coastline of United States (NOAA/P171046, 1971), lists the mileage by State of the general coastline and tidal shoreline. The Corps report lists the shoreline by State under two headings: (1) exposed shoreline, and (2) sheltered shoreline. There is a substantial difference in shoreline mileage between these two studies which should be explained.

A similar uncertainty exists as to what use was made of the Bureau of Outdoor Recreation report entitled "Islands of America". The Corps report does not indicate if the islands were included in the inventory and if they were, whether total perimeter or ocean frontage was used in estimating the island shorelines.

We would also suggest that a glossary of terms be developed for this report. A common understanding of the derivation and meaning of report terminology would be very useful to those who wish to use the study as a basis for planning action programs. A bibliography would be of value to future planning efforts.

We have some additional comments of a general nature and others which deal with a specific regional inventory. We shall attach these comments as an enclosure to this letter.

In summary, I believe that the shoreline study provides a valid basis for developing an erosion control program for the Nation. However, I do believe that our respective agencies can be at variance with one another due to the overlapping jurisdiction and legislative mandates on specific reaches of the Nation's coastline, those areas designated as National Seashores and Lakeshores. To avoid any conflict between our agencies when a restoration program is being developed for these areas, it appears that a cooperative agreement is warranted. This agreement could clarify the role of our respective agencies when dealing with shoreline areas where jurisdictional or legislative mandates overlap and thereby eliminate any duplication of effort in developing programs to combat erosion of this shoreline. Such an agreement, if developed, could be reviewed and approved by the appropriate Congressional Committees dealing with our respective programs. I would appreciate hearing your views on this subject. I would also wish to point out that the agreement, while desirable, is not intended to be a condition for processing the report to Congress for it is in the area of program implementation, not the inventory phase, that we can mutually benefit from an agreement.

Sincerely yours,

Deputy Assistant Secretary of the Interior

Lt. Gen. F. J. Clarke
Chief of Engineers
Attn: DAEN-CWP-C
Department of the Army
Washington, D. C. 20314

Enclosure

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO
DAEN-CWP-C

14 April 1972

Honorable Rogers C. B Morton
Secretary of the Interior
Washington, D. C. 20240

Dear Mr. Secretary:

Thank you for the views and comments on the National Shoreline Study expressed in Mr. Lyons' letter of 13 March.

As you noted, the National Shoreline Study is essentially an inventory of erosion problems along the nation's ocean coasts and Great Lakes shorelines although it does address some additional concerns. As such, it does not purport to be an outline or plan for an action program. Its aims and purposes are quite clearly defined and limited by Section 106, P.L. 90-483.

Under existing law, projects to protect the shoreline cannot be constructed without detailed investigations which demonstrate that the particular project concerned is engineeringly feasible and economically justified. Specific authorization by the Congress and approval by the President are required for projects with a Federal cost in excess of $1,000,000. In accordance with law and already established procedures, each investigation - whether or not lands under your jurisdiction are affected - is coordinated with your department. I am aware of the extensive responsibilities attending your management of parts of the national shoreline and appreciate your concern. I, too, wish to preclude any conflict between our agencies, but it seems to me that a cooperative agreement of the type suggested by Mr. Lyons' letter would be redundant to the controls and constraints already established by law and proven by practice.

Our policies and procedures anticipate as well as welcome your active participation in planning studies whenever lands under your jurisdiction are involved. In my view such participation is not only desirable; it is essential.

DAEN-CWP-C 14 April 1972

Honorable Rogers C. B. Morton

Shoreline mileages reported by the National Shoreline Study are not reconcilable with the general and/or tidal shoreline mileages reported by the Department of Commerce report cited in your letter. The National Shoreline Study surveyed only those parts of the tidal shoreline deemed exposed to erosion by the waves and currents of the oceans or Great Lakes. Parts of the tidal shoreline not considered exposed to such erosion were excluded.

Sincerely yours,

(Signed)

F. J. CLARKE
Lieutenant General, USA
Chief of Engineers

DEPARTMENT OF THE NAVY
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D. C. 20390

30 November 1971

MEMORANDUM FOR LIEUTENANT GENERAL F. J. CLARKE, CHIEF OF ENGINEERS, U. S. ARMY

Subj: National Shoreline Study; comments on

Your letter of 27 September 1971 to Secretary Chafee, forwarding copies of the National Shoreline Study, has been referred to me for reply.

I have reviewed with interest the very informative reports on the protection and conservation of our Nation's shorelines. Because of the Navy's preponderant association with the sea and, in particular, this Command's responsibilities for maintaining waterfront lands and facilities, your reports possess a special interest.

The National Shoreline Study will be particularly valuable in the Navy's master planning efforts at activities with waterfront exposure. The documentation of shoreline usage, along with the existing and potential problem areas in the Regional Inventory Reports, provides an invaluable source of background planning data. In this connection, I am suggesting to each of our Engineering Field Divisions that they secure copies of the Regional Inventory Reports, particularly those reports which cover their areas of planning responsibility.

In addition to assisting the Navy in unilateral planning for effective land use, the National Shoreline Study will facilitate positive participation with state and local government bodies in the development of bilateral protection and management policies.

W M Enger

W. M. ENGER
Rear Admiral, CEC, USN
Commander
Naval Facilities Engineering Command

Copy to:
ASN (I&L)
CNO

DEPARTMENT OF TRANSPORTATION
UNITED STATES COAST GUARD

MAILING ADDRESS:
U.S. COAST GUARD (WS/83)
400 SEVENTH STREET SW.
WASHINGTON, D.C. 20590
PHONE: 426-2262

7 January 1972

Lt. General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

This is in response to your letter of 27 September 1971 addressed to Secretary Volpe concerning your proposed report on the National Shoreline Study and other reports resulting from this study.

The concerned operating administrations and staff of the Department of Transportation have reviewed your proposed Guidelines, Shore Management Guidelines and the Regional Inventory Reports for the nine major drainage areas fronting on the U. S. shorelines. It is the opinion of this Department that the reports are comprehensive in scope, exceedingly well done and informative. These reports will serve as a useful reference tool for future planning.

Noted in the Coast Guard review of the study and the additional reports is the following:

> "There are several facets of the study which make it valuable for use in some of the research areas in which we are concerned. For example, we are presently studying the degree of petroleum pollution on U. S. beaches. The information in the study concerning the ownership and use of beaches is valuable to us in determining additional sites to study. In addition, the pictorial descriptions of various beaches is useful. However, it would have been very desirable to have identified the type of beach and minerology in the list of captions."

This Department has no specific recommendations to make regarding the study since transportation aspects were not considered or germane to the study.

The opportunity for the Department of Transportation to review and comment on the National Shoreline Study and associated reports is appreciated.

Sincerely,

W. M. BENKERT
Rear Admiral, U. S. Coast Guard
Chief, Office of Marine Environment
and Systems

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

11 February 1972

Rear Admiral W. M. Benkert
United States Coast Guard
Department of Transportation
400 Seventh Street, S.W.
Washington, D. C. 20590

Dear Admiral Benkert:

Thank you for your letter commenting on the National Shoreline Study. Your letter will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

Our district offices have additional and more detailed information on many of the beaches along the shores of the United States. It is quite probable that this detailed information will be of value in the research areas with which you are concerned. Please feel free to contact the District Engineers concerned at your convenience. They will be happy to cooperate in any way they can.

Sincerely yours,

F. P. KOISCH
Major General, USA
Director of Civil Works

UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

Reference: DAEN-CWP-C

6 December 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

We have reviewed your proposed report on the National Shoreline Study as you requested. We find it an excellent treatment of the subject and note that copies of reports associated with it contain much useful information.

Since our activities are not significantly affected by shoreline considerations, we have no comments to offer.

Sincerely,

Joseph J. DiNunno, Director
Office of Environmental Affairs

ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D. C. 20460

12 January 1972

General F. J. Clarke
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

Dear General Clarke:

Mr. Ruckelshaus has asked me to supply you with our comments and recommendations concerning your proposed report on the National Shoreline Study and on the Shore Protection Guidelines which you requested on September 27, 1971. We have recently supplied our Regional offices with appropriate copies of the nine Regional Inventory Reports, and requested that they send their comments directly to you by January 17, 1972.

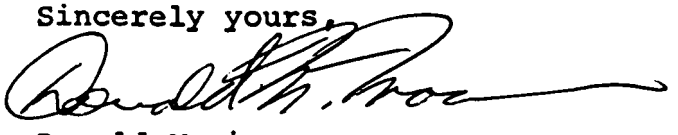
We are pleased to find that the great National importance of shorelines and their complex and changing nature is recognized in the study report. Our interest extends beyond the scope of your study to include the loss of beaches for specific human uses attributable to pollution. You may be aware that we have contracted with Plessey Environmental Systems (formerly Bissett-Berman) of San Diego, California, to perform an inventory of recreational beaches and identify those closed to human use as a result of pollution in 1971.

Coastal engineering techniques such as the building of dikes, revetments, groins, and breakwaters; the formation of ditches and channels; and the replenishment of beaches with dredged sand involve environmental changes with the potential of disrupting ecological balances. Environmental impact of shore protection measures is alluded to in the Shore Management Guidelines of the National Shoreline Study. For evaluating ecological impact, the EPA requires specific information on the effects coastal protection measures have on the environment; specifically, the change in circulation and flow patterns within water bodies, alteration in salinity structure, and change in turbidity to cite a few. Such changes in the environment affect aquatic life, siltation or erosion along coastlines, and water quality. The importance of the interrelationship of coastal engineering facilities and environmental quality deserves, in our view, emphasis upon the coordination and working relationships existing and required among the Corps of Engineers, the Environmental Protection Agency, and other

Federal, State, and local agencies concerned with environmental protection.

Information about the fate of beach stabilization facilities for different kinds of beaches would be useful. It is likely in our view that most shore stabilization facilities offer relief from erosion for a predictable maximum time or until the occurrence of an unpredictable event such as a severely damaging hurricane. In other words, the $1.8 billion specified in the report which is required to control erosion of 2,700 miles of shoreline cannot be expected to be effective in perpetuity, but no updating schedule is provided. Our interest in such figures is directed at obtaining estimates of the total public expense of maintaining shorelines and beaches for specific human uses.

Sincerely yours,



Donald Mosiman
Assistant Administrator for
Air and Water Programs

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

14 February 1972

Mr. Donald Mosiman
Assistant Administrator for
Air and Water Programs
Environmental Protection Agency
Washington, D. C. 20460

Dear Mr. Mosiman:

Thank you for your letter commenting on the National Shoreline Study. Your letter will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

We agree that shore protection and other works along the coasts involve environmental changes with the potential of disrupting ecological balances. It should be added that continued erosion of shorelines also involves environmental changes with similar potential. Evaluation of the ecological impact of a proposed action is incomplete unless the consequences of inaction are also examined. As you noted, and as the National Shoreline Study emphasizes, the interrelationships of coastal structures and environmental quality are complex and demand coordinated effort at all levels of government if the legitimate needs of society are to be served.

In accordance with the authorizing legislation, the National Shoreline Study provides preliminary cost estimates for remedial actions deemed generally suitable for areas that have serious erosion problems. The more detailed studies that precede any project authorization develop more precise data and offer a more reliable index to the cost of protecting shores and beaches. In these studies and the resultant reports, annual costs based on the life of the projects are also determined.

Sincerely yours,

William L. Starnes
Colonel, CE
for F. P. KOISCH
Major General, USA
Director of Civil Works

FEDERAL POWER COMMISSION
WASHINGTON, D.C. 20426

IN REPLY REFER TO:

2 December 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Reference: DAEN-CWP-C

Dear General Clarke:

This is in reply to your letter of September 27, 1971, inviting comments and recommendations by the Commission relative to your proposed report and to the other reports resulting from the National Shoreline Study.

The cited reports find that 20,500 miles of ocean and Great Lakes shores are undergoing significant erosion and that action to halt the significant erosion along 2,700 miles of shore appears to be justified. The cost of constructing suitable protective works for these shores is estimated to be $1.8 billion. The reports propose that priority attention be given to about 200 miles of shores for which the construction cost of protective works is estimated at $240 million.

The Commission staff has reviewed the reports on the National Shoreline Study to determine the effects that proposed actions might have on matters affecting the Commission's responsibilities. Such responsibilities relate to the development of hydroelectric power and assurance of the reliability and adequacy of electric service under the Federal Power Act, and the construction and operation of natural gas pipelines under the Natural Gas Act.

The staff review shows that numerous electric power and natural gas pipeline facilities are located in coastal and shoreline areas. Steam-electric generating stations are frequently located in such areas

because of the proximity to water transportation for fuels and the availability of condenser cooling water supplies. Transmission lines and natural gas pipelines are constructed to serve users in these areas. In some regions, especially the Gulf Coast area, natural gas pipelines are constructed from offshore areas onshore.

The electric power and natural gas pipeline facilities located along the shores for which protective measures are proposed have not been identified. The detailed planning for the protective works should include consideration of the possible effects on such facilities.

Based on its consideration of the reports of your Department and the review by its own staff, the Commission concludes that the National Shoreline Study presents information that should prove valuable in future planning for the management and use of shoreline areas. It recommends that possible effects on electric power and natural gas pipeline facilities be fully considered when further studies are made of proposed shoreline protective works.

Sincerely,

John N. Nassikas

John N. Nassikas
Chairman

UNITED STATES WATER RESOURCES COUNCIL

SUITE 800 • 2120 L STREET, N.W. WASHINGTON, D.C. 20037

11 January 1972

Dear General Clarke:

The Water Resources Council has reviewed your report on the National Shoreline Study and the Shore Protection Guidelines, Shore Management Guidelines and Regional Inventory Reports. We have received, and to the extent they have national import, have incorporated in this letter the views of the New England, Great Lakes, and Pacific Northwest River Basin Commissions. The Commissions are responding directly to you with respect to reports for their regions.

The reports are comprehensive, well done, and achieve their stated objectives. They will serve as valuable reference documents and will provide an excellent base for ongoing and future detailed planning efforts.

The regional reports provide comprehensive inventories and appraisals of the conditions, problems, and uses associated with the Nation's shorelines. It is recognized that the primary effort of the regional reports was to inventory the order of magnitude of regional shore erosion and flooding problems. However, the development and implementation of shore and coastal zone management programs must necessarily involve consideration of a great many other relevant factors. In this regard reference in your regional reports to individual appendices of completed or ongoing comprehensive water and related resources studies dealing with uses or resources associated with shorelines such as Estuaries, Fish and Wildlife, Land Use, Recreation, Transportation, and Waste Disposal, would be appropriate to assure that these uses or resources will be considered in the development of detailed shoreline plans.

The Shore Protection Guidelines present the general nature of shore erosion problems and their causes, types of natural protection, man-made protective devices, forces that effect beaches, the behavior of beaches to these forces, and some regional protective practices. In our view the report would be improved by going further into a discussion of the total

littoral process. An appreciation of the littoral process should underlie any program for managing the shoreline resource since sandy features on the shoreline are dependent, among other factors, on littoral currents and the availability of material for beach nourishment. The presentation of more data on the extent of accretion as opposed to erosion and a discussion of the effects of impoundments and the application of soil conservation practices on the supply of material available for beach nourishment would be appropriate for certain areas such as the Pacific Northwest.

The Shore Management Guidelines illustrate a wide range of shore management problems through the use of well chosen case examples. A planning process applicable to all conditions is developed and the value of long range planning coupled with the involvement and participation of the public in the planning process is demonstrated. The report on page 14 should make explicit reference to the Long Island Sound Study of the New England River Basins Commission as an example of broad planning for the area involving the shoreline and marine resources. Care should be taken so that separate publication of Protection Guidelines and Management Guidelines and the format of the Report on the National Shoreline Study does not tend to give the impression that Shore Protection is considered to be an entity unrelated to Development, Regulation, and Management. In our view the Protection Guidelines and Management Guidelines are interrelated and must be combined if a comprehensive national overview of immediate and potential shoreline problems and possible management approaches to their solution is to be obtained. Therefore, a more appropriate approach would structure Protection, Regulation, and Development as elements within Shoreline Management that may be alternatives to each other or complementary to each other.

The Shore Management Guidelines, although summarizing Federal Law regarding beach and shore protection, should also develop the need for further legislation to provide a more active Federal role in erosion control. The report emphasizes the fact that Federal funds are available only for protection of public property even though the great majority of damage is along privately owned shorelines. The report should stress that with increased erosion and associated coastal zone problems, there is a great need for more active Federal participation, from both the funding and program standpoints. A program focusing not only on damage prevention but also on providing greater availability of shore lands for public use could be recommended.

The data contained in the regional reports indicates that the study has been closely coordinated with ongoing comprehensive water and related land resources studies conducted under Water Resources Council aegis. This is commendable since such coordination resolves potential conflicts, eliminates duplication of effort, and results in corollary reports that are not only compatible but also complementary to each other. For coastal areas where comprehensive water and related land resources studies have not been initiated the National Shoreline Study should prove to be a valuable document and data source.

The opportunity to comment and make recommendations on the report is appreciated.

Sincerely yours,

W. Don Maughan

W. Don Maughan
Director

Lt. General Frederick J. Clarke, USA
Chief of Engineers
Department of the Army
Corps of Engineers
Washington, D.C. 20314

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

11 February 1972

Mr. W. Don Maughan, Director
United States Water Resource Council
2120 L Street, N.W.
Washington, D. C. 20037

Dear Mr. Maughan:

Thank you for your letter commenting on the National Shoreline Study. Your letter and this reply will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

While we agree in substance with the ends to which your comments are directed, we feel that their literal implementation would tend to expand the study somewhat beyond the scope intended by the Congress. As you noted, and as the legislative authority directs, the principal effort of the National Shoreline Study was to inventory the order of magnitude of shore erosion problems. Additionally, the authorizing legislation requires the development of guidelines for land use regulation in coastal areas and the provision of information to assist State and local authorities to create and implement shore protection programs. The constraints of time and money dictate that the National Shoreline Study limit its address to the matters enumerated by the authorizing act.

Sincerely yours,

F. P. Koisch

F. P. KOISCH
Major General, USA
Director of Civil Works

STATE OF ALABAMA

ALABAMA DEVELOPMENT OFFICE

R. C. "RED" BAMBERG, Director

GEORGE C. WALLACE
Governor

December 9, 1971

F. J. Clarke
Lieutenant General, USA
Chief of Engineers
Department of the Army
Corps of Engineers
Washington, D. C. 20314

Re: DAEN-CWP-C

Dear General Clarke:

We have reviewed your reports associated with the National Shoreline Study (NSS), and find errors or inconsistencies in Appendix E pertaining to Alabama as follows:

1. The NSS indicates 305.3 miles of estuary shoreline, while we have determined that there are 358.9 miles (see enclosed bulletin number 6). Our breakdown is as follows:

Perdido Bay Area	91.5 miles
Mobile Bay Area	142.4 miles
Mississippi Sound Area	125 miles

We did not separate our figures for Mobile County. The NSS credits Mobile County with 118.8 miles of bay/estuary shoreline, while according to our figures there are 125 miles in the Mississippi Sound alone, not including any of Mobile Bay. If we assume the NSS value for Baldwin County is correct, then this leaves a value of 171.9 miles for Mobile County by using our total and subtracting.

2. The NSS credits Gulf State Park with 1.0 miles of beach. This is incorrect and should be 2.25 miles.

3. The NSS omitted 0.45 miles of non-federal public beach on Dauphin Island adjoining the Bird Sanctuary which belongs to the National Audubon Society.

4. The name of the U. S. Shellfish Laboratory has been changed to the Environmental Protection Agency Laboratory.

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5. The NSS incorrectly listed the Alabama Marine Resources Laboratory as the Alabama Seafood Laboratory.

6. The NSS incorrectly states that Pelican Island was destroyed by Hurricane Camille. It is not an island, but exists only as a shoal, and it was not destroyed by the hurricane.

The values for bay/estuarine shoreline mileage and non-federal public beach mileage are incorrect in all the tables that list these values in each of the various publications. Therefore, the values used in your proposed report to Congress are questionable wherein data on Alabama are involved.

We appreciate the opportunity afforded us to participate in the review of this significant project.

Sincerely yours,,

R. C. "Red" Bamberg
Director

GC/RCB-r

Enclosure: Alabama Marine
Resources Bulletin No. 6

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

27 January 1972

Mr. R. C. Bamberg, Director
Alabama Development Office
State of Alabama
State Office Building
Montgomery, Alabama 36104

Dear Mr. Bamberg:

Thank you for your letter commenting on the National Shoreline Study. We have taken particular note of the errors and inconsistencies you found in APPENDIX E, REGIONAL INVENTORY REPORT, SOUTH ATLANTIC-GULF REGION and have appropriately corrected our records. Your letter will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

Certain of the inconsistencies you cited are attributable to the particular perspective of the National Shoreline Study rather than to inaccuracy. Numbered in accordance with your letter, these are:

1. The National Shoreline Study is primarily concerned with the erosion of shores by ocean waves and currents. With this in mind, we made judgment decisions as to where ocean waves and currents cease to be the dominant cause of erosion. The resultant limits quite likely differ from those commonly used to describe estuarine and bay shorelines.

3. National Shoreline Study reserves the term "non-Federal public lands" for shores owned by states or political subdivisions thereof. Accordingly, land owned by the National Audubon Society is considered to be privately owned.

Sincerely yours,

William L. Ogrens
Colonel, CE

for F. P. KOISCH
Major General, USA
Director of Civil Works

WILLIAM A. EGAN
GOVERNOR

STATE OF ALASKA
OFFICE OF THE GOVERNOR
JUNEAU

October 22, 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Office of the Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

Further to my letter of September 30, a member of my Cabinet has now had the opportunity to thoroughly review the National Shoreline Study, as well as the other reports mentioned in your letter of September 27. It is our conclusion that the recommendations and determinations made in the National Shoreline Study are well founded and will serve as a useful tool in future decision making.

Naturally, we are concerned that of all the regions investigated Alaska was the only area that did not have beach erosion control projects authorized by the Federal Government, completed, or even under way. I hasten to add that we do not feel this situation is a reflection on the Corps of Engineers but rather it emphasizes the need for additional study within Alaska. I would hope this study would include not only Alaska's coastal shore line but extend to the vast river system so important to the well-being of a large number of Alaskans.

I would like to thank you again for making these reports available to me.

Best personal regards,

William A. Egan

William A. Egan
Governor

NORMAN B. LIVERMORE, JR.
SECRETARY

RONALD REAGAN
GOVERNOR OF
CALIFORNIA

OFFICE OF THE SECRETAR
RESOURCES BUILDING
1416 NINTH STREET
95814

Department of Conservation
Department of Fish and Game
Department of Harbors and Watercraft
Department of Parks and Recreation
Department of Water Resources

Air Resources Board
Colorado River Board
State Lands Commission
Office of Nuclear Energy
State Reclamation Board
Regional Water Quality Control Boards
State Water Resources Control Board

THE RESOURCES AGENCY OF CALIFORNIA
SACRAMENTO, CALIFORNIA

MAR 13 1972

Lieutenant General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Re: National Shoreline Study

Dear General:

This is in reply to your letter of September 27, 1971 requesting our comments on the National Shoreline Study and other reports resulting from the National Shoreline Study, namely, Shore Protection Guidelines, Shore Management Guidelines and Inventory Report, California. Our comments have been coordinated with the State Departments of Navigation and Ocean Development, Agriculture, Conservation, Finance, Fish and Game, Parks and Recreation, Public Works, and Water Resources.

The study and supporting reports have met the objectives of the study, but considerable difficulty was experienced in relating the contents of the separate reports to the eight requirements imposed on the study by the authorizing legislation. This problem could have been eliminated if each of the three working reports had clearly shown the particular requirements to which the report was addressing itself. The report is an excellent summary of beach processes but other aspects of the coastal zone should be treated with similar thoroughness.

Several weaknesses might be enumerated. There appears to be a general lack of consideration of alternatives applied to specific areas, and of definitive procedures for evaluating the costs and benefits of the combined social, economic and environmental impacts. Comprehensive cost-benefit analysis and trade-offs seem to be ignored for various levels of development for specific sites including consideration of the relative construction cost of protective facilities versus maintenance costs for different standards of construction. Reliance seemed to be placed almost entirely upon documentation of several unique illustrations of apparently successful previous "artificial fill with

periodic nourishment projects" by the "Governmental Level" approach taken in the Shore Management Guidelines, or the "General Method of Construction" approach used in the Shore Protection Guidelines. Although it was probably beyond the scope of this study, more consideration should have been given to comprehensive multi-objective planning and identification of new solutions or alternatives to the traditional losing battle of man against the sea.

We question the basis of the entire report because it did not define in discernible terms the three shoreline erosion classifications which were used for recommending modification of existing conditions. The report supposedly identified those areas where the rate of erosion was a serious problem when considered in conjunction with economic, industrial, recreational, agricultural, navigation, demographic, ecological and other relevant factors. The justification for action to halt erosion was not based upon any one of the relevant factors but only on experienced judgment that indicated damage prevented would have tangible and intangible benefits.

The three shoreline erosion classifications which are the basis for the Corps recommendation to modify the shorelines' natural conditions have not been defined in any discernible terms. The usefulness of this report to state and local agencies in helping them identify the nature and magnitude of their shoreline erosion problems has been considerably diluted by the classification of problem areas as either "critical" or "non-critical". Since this approach provided the base upon which the "California Regional Inventory" was formulated, it precludes the development of definitive, consistently applicable criteria for classifying areas. As a result, there is no standard by which to judge the California product.

Likewise, the land use legend recognizes only recreational, non-recreational and undeveloped categories. In developing a comprehensive shoreline management plan, it would be desirable and possibly essential to know the nature of the non-recreational users (e.g., commercial or industrial) and the various products they are producing.

In addition, the report also recommends various methods of shore protection, structural and non-structural for a number of coast units of the California State Park System. Shoreline protective devices suggested are in many cases not consistent with the intended purposes and objectives for which the parks were originally established. Seawalls and rock groins are usually unsightly and are visual intrusions on the natural scene. There are exceptions which, through an on-site inspection, should be made before any recommendations for final analysis.

The following topics incorporate comments and suggestions digested from input from the various departments within the State of California:

Benthic Animals

We believe that where remedial action is taken in areas of serious beach erosion that the effects on the marine environment will not be detrimental. It has been our experience in the past that during and after this type of project marine life such as clams, sand crabs, etc., have been able to adjust to the changes.

This should not be interpreted as a blanket concurrence with all such projects prior to review of individual cases. We will still have to evaluate the impact of each individual project. Possibly, special studies will be required before changes in shoreline conditions are made to ensure that irreversible or significant ecological changes will not occur.

Coastal Agriculture

Critical erosion classified as non-critical erosion in the report is taking place on the California coastline which endangers the continued use of certain areas for agricultural production; a case in point being San Mateo County.

The climatic, edaphic, and plant response characteristics associated with certain sections of the coastline combine to create production capabilities that are unique. The effect of coastal erosion on agricultural production, while of little consequence to the overall State production, is nevertheless of significant impact to the agricultural industry in the areas affected and through that effect, on the total U. S. agricultural production of a few specialty crops. Many of these crops, such as brussel sprouts, broccoli, and artichokes, represent the total United States production. Projects designed to protect these areas from further erosion should be encouraged and evaluated not only on the cost of agriculture land but on the loss of future production from a limited resource.

Coastal and Marine Geology

Throughout these reports there is an apparent emphasis on the beach as the shoreline and recreation as its primary use. Little has been said for the coastal area as a place to live and work, but under the somewhat vague definition of the area, an important segment of the population lives and works in the coastal zone.

The California Regional Inventory documents mile-by-mile the beach in each county and describes the most used areas and some of the problems. There is abundant discussion on beach erosion, and this is an important geologic process. It would appear useful that coastal zone managers be aware that several areas where "critical erosion" has occurred are related by physical process to man-made facilities. Little attention has been given to geologic hazards in the report, which in many cases relate to

coastal erosion. What is needed is a knowledge of every particular situation, i.e., where faults cross the coastal zone, what geologic units are crushed in these tectonic zones, thus making them more easily eroded and more subject to landsliding. Landslides are a horrendous problem in the California coastal zone and have been mentioned several times in the report.

Either faulting or crustal warping during recent times have exposed soft or poorly consolidated material to marine erosion processes, and the occasional great storm can cause very rapid erosion. The subjective definition of "critical erosion" fails to define some areas where high erosion rates occur. Erodability or rate of erosion should be determined for each coastal unit which would give more credence to the classification of critical or non-critical irrespective of the degree of development adjacent to the shoreline.

The report says that an offshore mineral resources inventory may be justified under certain circumstances. Geologists within the State believe that a mineral inventory is mandatory for the following reasons: (1) to determine what minerals and their potential economic demand are present in the area, (2) to insure that relatively rare metals and industrial minerals not readily available elsewhere are not overlooked and lost forever, (3) to provide for current needs for common minerals in the shoreline zone, (4) to ensure multiple-use of all resources in the shoreline zone, (5) to establish basis for protective mineral zones, where necessary, in the shoreline area, (6) to establish the basis for legislation for mineral regulation and development, and (7) to provide data usable by a proposed mineral committee organized to inventory and provide recommendations for management for mineral resources along the shoreline.

More in depth treatment is needed, possibly, in future reports on water resources and the effect of salt water intrusion into the coastal groundwater storage areas. The ultimate development of this zone is directly related to water supplies that can support urban, industrial and agricultural development. Although this aspect is more related to coastal zone planning and management, the geologic characteristics of the surface and subsurface strata are directly related to ultimate development.

Shoreline Parks and Recreation

The State's interest, as proposed in the "California Preservation and Recreation Plan", Department of Parks and Recreation, are related to 38 coastal areas which possess significant natural, historic, and recreational values. The alteration of the natural

coastal areas, through the construction of seawalls and rock groins, etc., could seriously impair their preservation or recreation potential. Whenever construction of such facilities is an absolute necessity, we believe some method of shoreline protection could be designed which would protect and complement the natural values of these selected areas. While such design primarily deals with specifics which can only be handled on an individual project basis, the State would welcome the opportunity to cooperatively plan and design these facilities with the U.S. Army Corps of Engineers. The authors of your "Shore Protection Guidelines" believe conservation efforts that preserve and enhance existing natural protective features, and beach structures that simulate natural protective features are the best solution to a shore protection problem whenever they can be applied. This impression certainly is not borne out by the bulk of the report which addresses itself almost entirely to types of artificial protective structures and their costs. We feel that the report should have devoted as much discussion to natural beach structural and conservation solutions as it did to artificial solutions in view of the many scenic and recreational areas which should be preserved in their natural state.

Shoreline Highways

The reports are very informative and clearly define a number of critical shoreline areas where erosion is threatening California State Highways, urban developments and recreational beaches. The California Department of Public Works, Division of Highways, at appropriate times, will be pleased to work with the U.S. Army Corps of Engineers and other State and local agencies in solutions to alleviate these critical erosion problems. In the report shoreline protection or enhancement methods were well covered. Several of the methods of protecting highways from wave damage at critical locations have been used successfully namely seawalls, groins and revetments.

The National Shoreline Study only briefly discusses research activities. For example, it fails to mention the current investigation related to model studies to determine the feasibility of the "perched beach" concept as a means of widening beach area along the segment of State Route 1 in Los Angeles County between Santa Monica and Malibu. Although this study is not completed and the State's participation has been terminated, this valuable research should provide needed data for coastal engineers to engage in similar investigations at some future date.

Coastal Zone Management

Shore Management Guidelines appears to be the most valuable of the four reports, especially to those who are developing guidelines for evaluating environmental impact. "For comprehensive planning the focal point is often at state level" (Shore Management Guidelines, p. 22). The examples cited cover well the nature of some of the problems faced by coastal states and approaches which they can take to solve their individual shore management problems.

There is a solid argument that local management can accomplish a great deal to take advantage of an opportunity. San Diego's Mission Bay Park is an example where local public participation and enthusiasm coupled with enlightened concepts and engineering skill generated the requisite political and financial backing.

State Financial Participation

It is anticipated that an outgrowth of the studies of shoreline processes and identification of "critical areas" will be the development of specific projects by local interests in cooperation with the State and Federal Government.

To assure that no misunderstandings exist as a result of the coordinated review and comments which have been provided by the various state agencies, the Department of Finance must take the position that the State of California does not assume any fiscal obligations in connection with this study nor for project proposals which it may suggest. In addition, if project works suggested by this report are proposed for state authorization the extent of state involvement will be determined on the basis of specific review of a project plan by the appropriate state agencies.

Financial participation, if any, will depend upon final action by the Legislature and the Governor based on state law existing at that time.

In conclusion, the National Shoreline Study has accomplished the task of illustrating the need for shoreline protection and management along the entire shoreline of the United States.

This in itself is a monumental undertaking and could only be accomplished by a large governmental agency. It has been a pleasure to review and comment on this study.

Sincerely,

Secretary for Resources

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO
DAEN-CWP

21 April 1972

Mr. Norman B. Livermore, Jr.
Secretary
The Resources Agency of California
Room 1311, Resources Building
1416 Ninth Street
Sacramento, California 95814

Dear Mr. Livermore:

Thank you for your letter commenting on the NATIONAL SHORELINE STUDY. Your letter and this reply will be appended to the REPORT ON THE NATIONAL SHORELINE STUDY.

Your comments stress the desirability of more detailed study and research involved in resolution of shore erosion problems and management of the coastal zone. However, the report is an overall appraisal of erosion for about 84,000 miles of the Nation's shoreline to serve as initial guidance for the comprehensive planning to follow. The objective is to provide a national assessment of the erosion problems and this is contained in the REPORT ON THE NATIONAL SHORELINE STUDY.

The eleven supporting reports provide guideline material for the states and local interests and a basis for the more detailed studies required to provide answers for many of the valid points raised in your letter. The constraints of time and money limited these studies to matters addressed in the authorizing act. The studies are not intended to produce project authorization or commit states to the broad conceptual plans of shore protection or management described in the GUIDELINES and REGIONAL INVENTORY REPORTS.

Your detailed comments and suggestions are greatly appreciated.

Sincerely yours,

William L Starnes
Colonel, CE
for J. W. MORRIS
Major General, USA
Director of Civil Works

State of Florida

DEPARTMENT OF NATURAL RESOURCES

RANDOLPH HODGES
Executive Director

LARSON BUILDING / TALLAHASSEE 32304 / TELEPHONE 224-7141

November 17, 1971

F. J. Clarke
Lieutenant General, USA
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

This responds to your letter of September 27, 1971, and contains our comments relating to your proposed report on the National Shoreline Study.

We have reviewed and studied this report, and commend you and your organization for the excellent manner in which you have presented and discussed the various aspects of our National Shoreline problems. Certainly, the Congress should now have a more complete understanding of these problems and, consequently, will be in a much better position to consider comprehensive programs to restore, maintain and preserve our valuable shorelines.

It is apparent from your report, and from our experience in Florida, that present shoreline protective programs are falling far short of the needs. These programs must receive more serious consideration from Federal, State and Local interests. It is our hope that the Congress will give our shoreline problems high priority in the future, and that the Chief of Engineers will be given greater latitude in the application of technical solutions to these problems.

Sincerely,

Randolph Hodges

Randolph Hodges
Executive Director

RH:wch

Bureau of State Planning and Community Affairs
TOM LINDER, JR. STATE PLANNING AND COMMUNITY AFFAIRS OFFICER
270 WASHINGTON ST., S.W. ATLANTA GA. 30334

December 28, 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

Reference is made to your letter of September 27, 1971, requesting our comments on your proposed report, "Report on the National Shoreline Study."

We believe this study is an excellent overview of national shoreline problems, particularly with respect to your discussion on shore erosion and its relation to land-use controls. Your conclusion that land use and development must be considered in conjunction with erosion control is extremely important.

The concept of non-critical erosion areas represents an important option for solution of shore erosion problems. As you point out, non-critical does not imply non-serious. Non-critical areas are simply areas where, if development occurs without appropriate controls, future problems will be generated. Given limited funds for structural measures to combat erosion, zoning or other management techniques are often necessary to prevent unwise development from taking place.

Your report should be a valuable tool to assist government at all levels in planning for the nation's shoreline.

Sincerely,

Frank T. Benson

Frank T. Benson
Deputy State Planning and
Community Affairs Officer

FTB:rw

JOHN A. BURNS
GOVERNOR

FUJIO MATSUDA
DIRECTOR

E. ALVEY WRIGHT
DEPUTY DIRECTOR

LAWRENCE F. O. CHUN
DEPUTY DIRECTOR

MUNNY Y. M. LEE
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
869 PUNCHBOWL STREET
HONOLULU, HAWAII 96813

IN REPLY REFER TO:
HAR-EP
2089

December 23, 1971

Lieutenant General F. S. Clarke
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

Dear Sir:

Subject: National Shoreline Study

Copies of your proposed report, The National Shoreline Study together with the Shore Protection Guidelines, Shore Management Guidelines, and Hawaii Regional Inventory of the National Shoreline Study have been reviewed.

While more timely statistics would have been desired on the Inventory Report, it is recognized that the lack of updated data and time and funding constraints have prevented this. There have also been some changes in project status since the compilation of the Inventory.

These minor factors do not detract from the main purpose of the study of providing an excellent reference framework from which future shore protection and management programs can be developed.

Thank you for the opportunity to comment on these reports which should serve as the basis for advancing the state of the art in shoreline technology.

Very truly yours,

E. Alvey Wright

for FUJIO MATSUDA
Director

cc: Colonel William D. Falck

RICHARD B. OGILVIE
Governor

RAY C. DICKERSON
Director

STATE OF ILLINOIS

DEPARTMENT OF BUSINESS AND ECONOMIC DEVELOPMENT

October 19, 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Office of the Chief of Engineers
Department of the Army
James Forrestal Building
Washington, D. C. 20314

Dear General Clarke:

Reference is made to your letter of September 27, 1971, File No. DAEN-CWP-C requesting comment on your National Shoreline Study.

The Illinois Natural Resource Development Board has reviewed the report and has no adverse comment to make.

Sincerely,

Ray C. Dickerson

Ray C. Dickerson

STATE OF INDIANA

INDIANAPOLIS

46204

DEPARTMENT OF NATURAL RESOURCES

October 28, 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Office of the Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

This is in response to your letter of September 27, 1971, requesting the views and comments of the Department of Natural Resources on several reports resulting from the National Shoreline Study.

On page 77 of the report "Great Lakes Region Inventory Report, National Shoreline Study," the following sentence should be added following the paragraph immediately above figure 24; "However, authorizing federal legislation provides for the acquisition of the Indiana Dunes State Park only by donation."

We would also like to direct your attention to the fact that it is possible for lakeshore communities to make low cost flood hazard insurance available to their residents under the National Flood Insurance Act of 1968. While this program will not physically protect areas subject to erosion and high water damage, it will provide some degree of financial protection to homeowners and small business establishments. Also, as a condition of this program, the communities agree to adopt appropriate land use ordinances, which should inhibit the future construction of structures in areas subject to damage. Two Indiana lakeshore communities, Long Beach and Beverly Shores, are now participating in this program.

Very truly yours,

John R Lloyd

John R. Lloyd
Director
Department of Natural Resources

JRL/GRL/jl

STATE OF LOUISIANA
DEPARTMENT OF PUBLIC WORKS
BATON ROUGE, LA. 70804

C. H. DOWNS
DIRECTOR

February 2, 1972

Lt. General Frederick J. Clarke
Chief of Engineers
Department of the Army
James S. Forestal Building
1000 Independence Avenue
Washington, D. C. 20314

Re: DAEN-CWP-C

Dear General Clarke:

The report on the National Shoreline Study forwarded to this office with your letter of September 27, 1971, has been received and reviewed by this Department. Louisiana is in firm agreement with the need for a Shoreline Study since a large portion of our coastline zone is threatened and in a state of active erosion.

We look forward to a closer detailed study of the lower Mississippi region under this National Shoreline Study and will be most happy to cooperate in determining Louisiana's needs.

The report of the National Shoreline Study is a well presented publication and very timely in reporting general conditions. We are in agreement with the material furnished and have no other comments relative to the study at this time. We appreciate the opportunity to comment on this report.

Sincerely yours,

Hu B. Myers

HU B. MYERS
Acting Director

HBM/ean

STATE OF MICHIGAN

WILLIAM G. MILLIKEN, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING, LANSING, MICHIGAN 48926

RALPH A. MAC MULLAN, Director

February 18, 1972

F. J. Clarke
Lieutenant General, U.S.A.
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D.C. 20314

Dear Lieutenant General Clarke:

Pursuant to your letter of September 27, 1971, we have reviewed the proposed report on the National Shoreline Study and the associated reports entitled "Shore Protection Guidelines" and "Shore Management Guidelines".

We find all three reports to be comprehensive and complete and have no review comments to submit at this time. Our comments on the Great Lakes Regional Inventory report should have been forwarded to you by the Great Lakes Basin Commission.

Thank you for the opportunity to review these proposed reports.

Sincerely,

Ralph A. MacMullan

Ralph A. MacMullan
Director

cc: Louis D'Alba

MICHIGAN
THE GREAT LAKE STATE

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55101

February 1, 1972

F. G. Clarke
Lieutenant General, USA
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

RE: National Shoreline Study

Dear Sir:

The following is in response to your September 27, 1971 request for comments and recommendations regarding the Report on the National Shoreline Study. The report details the problems indigenous to the Great Lakes shoreline and appears to adequately inventory the problems related to Minnesota shoreline of Lake Superior.

The report reflects the conditions and problems which are inherent to high water periods which were observed by our staff investigations. It also mentions that with the exception of Minnesota Point and a few scattered sand and gravel beaches, the Minnesota Lake Superior shoreline is generally not subject to serious erosion. This substantiates what we found to be the case during our investigations, especially in regards to Minnesota Point. The eastern extremity of Minnesota Point is basically a residential district and this is where we noticed the greatest amount of erosion and associated high water problems.

With the exceptions of the Duluth and Two Harbors areas, erosion and high water conditions were generally limited to the sand and gravel beaches and banks which were exposed to the lake without any kind of protection. In some cases where protection was provided by masonry seawalls, riprapping and cribbing, the forces of the wave and ice action had substantially deteriorated these works. Generally speaking, however, only limited amounts of shoreline under critical erosion pressure are located in Minnesota.

This report does an adequate job of inventoring shoreline problems and uses along the Great Lakes shoreline, and it stresses the implementation of structural control methods to further protect and restore problem areas.

The report mentions non-structural controls such as zoning, easements and government agency policies. Due to the nature and limited extent of the shoreline problms associated with the Minnesota Lake Supervior shoreline, and the fact that non-structural controls are in the process of being implemented by Minnesota counties adjacent to Lake Superior, it is felt that greater consideration should be given this type of control within the scope of the study.

We feel that both forms of control should be carefully integrated to achieve the desired management goals and allow for wise resource utilization and protection.

The report represents a good job of resource problem and use identification and makes several valid resource management policy statements. It substantiates generally what we have found to be the case along the Minnesota Lake Superior shoreline and should prove useful in our efforts to implement various water resource management programs in regards to Lake Superior.

Sincerely,

Robert L. Herbst
Commissioner

RLH

RONALD W. PEDERSEN
FIRST DEPUTY COMMISSIONER

STATE OF NEW YORK
DEPARTMENT OF
ENVIRONMENTAL CONSERVATION
ALBANY

December 23, 1971

Dear Sir:

We have completed our review of the "Report on the National Shoreline Study" sent to us on September 27, 1971.

The Report is an excellent appraisal of national shoreline problems and provides a graphic representation of the critical areas and the associated factors to be considered in effective shoreline management.

Thank you for giving us the opportunity to review this Report.

Sincerely,

Ronald W. Pedersen

F. J. Clarke
Lieutenant General
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

STATE OF NORTH CAROLINA
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES
Box 27687
Raleigh 27611

CHARLES W. BRADSHAW, JR.
SECRETARY

ROBERT W. SCOTT
GOVERNOR

Office of Water and Air Resources
GEORGE E. PICKETT, DIRECTOR
TELEPHONE 829-3003

December 23, 1971

Lt. General F. J. Clarke
Chief of Engineers
United States Army
Washington, D. C. 20314

Dear General Clarke:

This is in response to your letter of September 27, 1971, concerning the National Shoreline Study. You asked for our comments and recommendations by December 28, 1971, on your proposed report. On behalf of the State of North Carolina, I concur in your report. In addition, I feel that the National Shoreline Study, and particularly the Shore Protection Guidelines, will be very useful to us.

As the study shows, almost half of the North Carolina coastline is in protective public ownership, and I do not anticipate that much more will come into public ownership. Our problem, then, is one of protection and/or land use controls for the remainder, which is in private ownership. Protection is difficult because of the high cost and the difficulty of keeping pace with uncontrolled development. In addition, sources of suitable sand are diminishing, and the use of sand from off-shore sources will increase project costs and compound the difficulties. We are therefore, turning to a policy of giving protection to only those areas that are now highly developed, and imposing land use controls to limit development of the new undeveloped areas. State agencies are working with local governments toward this end. A recent step has been taken by the adoption by the coastal counties of ordinances to preserve the protective dunes.

For those areas which warrant protection, the General Assembly this year established and funded a revolving fund to assist local governments in paying their share of the non-Federal costs of Federal projects. The General Assembly has provided funds for the State's 80% share of the cost each biennium since 1963. I feel that we are in a good position to participate in protective projects, and to

impose land use controls that will keep the problem manageable. The National Shoreline Study will be very helpful in this balanced effort.

Sincerely,

George E. Pickett

George E. Pickett

cc: Dr. Art Cooper
Colonal Albert Costanzo
Colonel R. J. B. Page

JOHN J. GILLIGAN
GOVERNOR

STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
OHIO DEPARTMENTS BUILDING
COLUMBUS 43215

WILLIAM B. NYE
DIRECTOR

November 29, 1971

F. J. Clarke
Lieutenant General, U.S.A.
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D.C. 20314

Dear General Clarke:

We have reviewed with interest and enthusiasm your draft report entitled "The National Shoreline Study". The Corps is to be congratulated for this report. It deals sensitively and clearly with a subject of urgent national significance.

We generally concur in the conclusions presented, particularly with recommendations for coordinated action by federal, state, local, and private interests. We would like to underscore or strengthen your discussion regarding need for further development and sharpening of state and national goals.

There are two suggestions which I would like to offer for consideration:

1.) The Corps' definition of "critical" shorelines is understandably based on degree of danger to life and structures. This approach can protect from existing danger but may not necessarily support actions most urgently needed to enable us to meet state and national goals and objectives. When program costs are expected to cost in the magnitude of billions of dollars, they should be evaluated in terms of our overall objectives rather than past dollar damage. I recognize that we have yet to draft these objectives, but urge that we begin immediately to draft them together.

2.) It is surprising indeed to note that Table 9 of the report indicates so little shoreline in the Great Lakes area to be in the most critical or first priority category. We wonder whether several miles of Ohio shoreline, along which homes and roads are in imminent jeopardy, should not be considered to be in critical need, as defined by your staff.

Again, congratulations for a fine report.

Sincerely,

WILLIAM B. NYE
Director

WBN/ss

cc: Fred Rouse

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

8 February 1972

Mr. William B. Nye, Director
Department of Natural Resources
State of Ohio
Ohio Departments Building
Columbus, Ohio 43215

Dear Mr. Nye:

Thank you for your letter commenting on the National Shoreline Study. We appreciate your support and reinforcement of our findings.

We certainly agree that state and national goals and objectives need early attention. We recognize - as you do - that these objectives are of mutual concern and that they can only be defined by the joint efforts of local, state and federal agencies. The ongoing framework study for the Great Lakes Basin offers a forum in which many of the issues and factors involved can be addressed by concerned state and federal officials. I have asked our North Central Division Engineer to explore your suggestion in more detail and to review the classification of the Ohio shoreline with you.

Sincerely yours,

William L. Barnes (signature)
Colonel, CE
for F. P. KOISCH
Major General, USA
Director of Civil Works

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF ENVIRONMENTAL RESOURCES
P. O. BOX 1467
HARRISBURG, PENNSYLVANIA 17120

In reply refer to
WCE
F 69:1

November 30, 1971

Lt. Gen. F. J. Clarke
Chief of Engineers
Office of the Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear General Clarke:

Reference is made to your letter of September 27, 1971, requesting our comments on the National Shoreline Study Reports.

Generally, our review of these reports has indicated that they are well documented and will have a valuable use as reference material. Since the coastal area of the Commonwealth is limited to the Lake Erie shoreline, we were of course, most interested in the Great Lakes Region Inventory Report. Our recommendation for minor additions to this Report has already been forwarded to Mr. William D. Marks, Chairman of the Ad Hoc Committee on the National Shoreline Study.

We noted in the Shore Protection Guidelines that all practical methods of beach protection are shown pictorially or by diagram with the exception of the off-shore breakwater. Perhaps a diagram or photograph of this type of structure should have been included for the benefit of the layman who will be using this report to acquaint himself with the available methods to solve beach erosion problems.

In reviewing the Report section of the shoreline study, which is in essence a summary of the component parts, we observed it to be, perhaps by necessity, too brief and too general to carry much impact. We feel that more specific information such as large interpretive maps compiled from the Inventory Reports to show significant erosion areas and where more public land is needed might have been included to better assess the overall problem. Proper concern is generally not initiated unless specific problems are defined.

Thank you for providing the Commonwealth of Pennsylvania the opportunity to comment on the reports of this important Study.

Sincerely yours,

Maurice K. Goddard

MAURICE K. GODDARD
Secretary

State of South Carolina
Water Resources Commission

Clair P. Guess, Jr.
Executive Director

November 2, 1971

Lieutenant General F. J. Clarke
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

Dear Sir:

We have received and studied with interest the reports resulting from the National Shoreline Study. The information contained in these reports will aid us in developing and implementing a shoreline management plan for South Carolina.

Following the development of the plan, South Carolina will have to turn to the Federal Government through the U. S. Army Corps of Engineers for help with its implementation. In the near future by working clasely with the District Engineer having responsibility for South Carolina's coast, we should be able to solve many of the problems currently plaguing our shoreline.

Sincerely yours,

Clair P. Guess, Jr.

Clair P. Guess, Jr.
Executive Director

CPGJr:fw

2414 Bull Street / Columbia, South Carolina 29201 / (803) 758-2514

EXECUTIVE DEPARTMENT
AUSTIN, TEXAS 78711

PRESTON SMITH
GOVERNOR

January 12, 1972

Lt. General F. J. Clarke
Chief of Engineers
Department of the Army
Washington, D.C. 20314

Dear General Clarke:

The Office of the Governor, Division of Planning Coordination (the State Planning and Development Clearinghouse), and the affected Texas State agencies have reviewed the National Shoreline Study of the U. S. Corps of Engineers.

This study summarizes most of the problems and presents the recommendations for corrective action. However, the Texas Water Development Board comments on the serious need for detailed discussion of locations, typesof treatment and proposed financial arrangements.

The Corps of Engineers and the Environmental Protection Agency currently have coastal studies nearing completion. These projects may have some bearing on the State's position as cited by the Texas Water Rights Commission.

Copies of the Texas State agencies' comments are enclosed.

Thank you for the opportunity to review this document.

Sincerely,

Ed Grisham
Director, Division of
Planning Coordination

EG:gtt

Encl.

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314

IN REPLY REFER TO

DAEN-CWP

11 February 1972

Mr. Ed Grisham, Director
Division of Planning Coordination
Office of the Governor
State of Texas
Austin, Texas 78711

Dear Mr. Grisham:

Thank you for your letter commenting on the National Shoreline Study. Your letter will be appended to REPORT ON THE NATIONAL SHORELINE STUDY.

As your letter notes, more detailed discussions of locations, types of treatment, and financial arrangements are a necessary prelude to any action program aimed at controlling erosion. The National Shoreline Study makes a broad appraisal of the overall erosion problem, describes generally suitable means for halting erosion where such action appears justified, and indicates the probable cost of that action. The findings are generally based on broad assumptions of shore and littoral characteristics, severity of problem and suitable methods of protection, and on coastal construction cost experience in the areas of concern. The study does not, and is not intended to, supplant preauthorization project studies.

By separate letter the Texas Water Rights Commission asked about the interrelationships between the Texas Coast Hurricane Study and the National Shoreline Study. A copy of our response to that inquiry is inclosed for your information.

Sincerely yours,

F. P. Koisch

F. P. KOISCH
Major General, USA
Director of Civil Works

COMMONWEALTH OF VIRGINIA

MARVIN M. SUTHERLAND
Director

CHARLES A. CHRISTOPHERSEN
Deputy Director

A. S. RACHAL, JR.
Executive Assistant

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DEPARTMENT OF CONSERVATION AND ECONOMIC DEVELOPMENT
1100 STATE OFFICE BUILDING
RICHMOND, VIRGINIA 23219

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FREDERICK W. WALKER, Roanoke

December 1, 1971

Chief of Engineers
Headquarters
Department of the Army
Washington, D. C. 20315

Dear Sir:

This is in reference to your letter of September 27, 1971 (DAEN-CWP-C) with which you provided for comment a copy of your proposed report on the National Shoreline Study in response to the provisions of Section 106 (a) of the River and Harbor Act of 1968.

The report is to be commended for the effective way in which it sets forth the need for the development and application of effective methods and techniques for controlling shoreline erosion.

Thank you for the opportunity to comment.

Sincerely yours,

M. M. Sutherland

MMS/jj

STATE OF WASHINGTON

DEPARTMENT OF ECOLOGY

DANIEL J. EVANS
GOVERNOR

JOHN A. BIGGS
DIRECTOR

December 29, 1971

Lieutenant General F. J. Clark, U.S.A.
Chief of Engineers
Department of the Army
Washington, D. C. 20314

Dear Sir:

We have reviewed your report on the National Shoreline Study and find the report extremely useful.

While the primary concern of the report was to evaluate the presence and extent of erosion along the marine shorelines, and how to control that erosion, it complements our own Shoreline Management Act of 1971 (#3584). By pointing out the problems incurred due to unwise shoreland development, our #3584 is intended to prevent the same problems through proper management.

The report also shows that in our Pacific Northwest the shorelines are still relatively undisturbed and the beaches are stable. It recognizes that natural beaches are a limited and special resource needing protection because man-made developments, unless carefully planned, tend to disrupt the equilibrium as it exists on natural shorelines.

The report also shows the considerable economic loss due to improper shoreline development and deplores the existing lack of effective zoning and other protective regulations, in face of rapidly growing demands in shorelands for recreational, residential, industrial and commercial uses.

While based on extensive research, the report presents its findings in a concise, easy to understand format, and as such is excellent material to reinforce our own work in furthering shoreline management within the State of Washington.

Sincerely yours,

DEPARTMENT OF ECOLOGY

John A. Biggs
Director

JAB:so

STATE OF WISCONSIN
OFFICE OF THE GOVERNOR
MADISON, WISCONSIN 53702

PATRICK J. LUCEY
GOVERNOR

January 5, 1972

Lt. Gen. F. J. Clarke
Chief of Engineers
Department of the Army
Office of the Chief of Engineers
Washington, D. C. 20314

Dear General Clarke:

I have reviewed the National Shoreline Study, Great Lakes Region Inventory Report. The report is an excellent survey of the existing conditions of the Great Lakes shoreline. The report also provides a detailed and useful description of the various land-use patterns along the Great Lakes shoreline. I have appointed the Wisconsin Land Resources Committee to study the problems of improper land use and the existing statutory controls over various types of land use. I am forwarding the Army Corps of Engineers report to the Committee for its information and study.

The report describes possible solutions to erosion damages on the Great Lakes shoreline. An important step in solving the problems of Great Lakes shoreline erosion would be to end the current ban on federal aid to non-public landowners. Congressman Les Aspin has introduced a bill, H.R. 11285, which would make federal aid to prevent erosion available to all shoreline owners, public and private. Erosion must be prevented on private lands as well as public lands if we are to make any significant progress in the control of Great Lakes shoreline erosion. The passage of Congressman Aspin's bill would be a major step in the control of shoreline erosion.

Thank you for the opportunity to review the Great Lakes Region Inventory Report.

Sincerely,

Patrick J. Lucey

PATRICK J. LUCEY
Governor

PJL:spb

cc: Congressman Les Aspin