



U.S. Department  
of the Interior

# Undeveloped Coastal Barriers: Report to Congress







## **UNDEVELOPED COASTAL BARRIERS: REPORT TO CONGRESS**

This is a report to Congress on the findings and conclusions of the study conducted by the Secretary of the Interior pursuant to section 341(d) of the Omnibus Budget Reconciliation Act of 1981 (P.L. 97-35).

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## I. Introduction

On August 13, 1981, the Omnibus Budget Reconciliation Act of 1981 (hereafter referred to as the Reconciliation Act) was signed into law. Section 341(d) prohibits the issuance of new Federal flood insurance coverage, beginning October 1, 1983, on undeveloped coastal barriers as designated by the Secretary of the Interior. This provision of the Reconciliation Act reflects a growing public understanding of the nature of coastal barriers and the effects of Federal support for private development of these areas.

Located at the interface of land and sea, the coastal barrier is a buffer zone and shock absorber for the continent. The mitigating effect of coastal barriers on winds and waves generated at sea is the basis for the generic name of these protective landforms. Coastal barriers are just that--barriers protecting the mainland and landward aquatic habitats, capable of absorbing daily marine energies as well as a hurricane's first blow.

Composed largely of sand and other sedimentary material, coastal barriers can assume an endless variety of shapes and sizes. Their continually evolving forms are defined by the dynamic wind, wave, and tidal energies that act upon them and the supply of sediments that constitute them. On coastal barriers, ocean energies are tirelessly at work--reshaping the barriers with the gentle hand of normal tides and currents or the powerfully destructive force of a hurricane. Coastal barriers curve, rise, and fall in ceaseless accommodation to these elements, and regardless of man's engineering inventiveness and ingenuity, their movements remain difficult to predict and control.

Their inherent vulnerability to wind, wave, and tidal energies makes coastal barriers hazardous and expensive for human habitation and development. However, they provide excellent habitats for wildlife and protect the wetland nurseries that support the Nation's finfish and shellfish resources. They also provide open space and unparalleled public recreation opportunities.

Yet, actions and programs of the Federal Government have facilitated and even encouraged private development on coastal barriers. Then, after inevitable

erosion and storm damage, the government has expended substantial amounts of money and resources to assist in reconstructing development and stabilizing shorelines. In this way, taxpayers have subsidized initial development on coastal barriers, and then, after a storm, have helped to finance the rebuilding that reinforces an unending cycle.

There has been little focus on the cumulative impacts of these Federal policies subsidizing development at direct taxpayer risk. The Nation has found itself locked into very ambitious and, at times, competing Federal programs that on the one hand subsidize private development, while on the other hand attempt to protect the natural resources of these fragile areas. Additionally, the imposition of Federal solutions on local and State governments, either through incentives or disincentives for development, have aggravated their good faith attempts to wrestle with immediate "on the ground" problems.

In enacting section 341(d) of the Reconciliation Act, Congress took a first step to interrupt the subsidy cycle and establish a consistent Federal policy with regard to coastal barriers. This provision advances the common sense approach that risk associated with new private development on undeveloped coastal barriers should be borne by the private sector, not underwritten by the Federal taxpayer.

In accomplishing this objective, the Reconciliation Act is elegant in its simplicity. The statute provides a simple three-step definition of a coastal barrier. To qualify, an area must: 1) be composed of unconsolidated sedimentary materials; 2) be subject to wind, wave, and tidal energies; and 3) protect landward aquatic habitat from direct wave attack. The Act further stipulates that only those coastal barriers that are substantially undeveloped and not otherwise protected be designated.

To carry out this initiative, the Reconciliation Act states:

The Secretary of the Interior shall conduct a study for the purpose of designating the undeveloped coastal barriers....Not later than one year after the date of enactment of this Act, the Secretary shall transmit to the Congress a report of the findings and conclusions of such study together with a proposed designation of the undeveloped coastal barriers and any recommendation regarding the definition of the term 'coastal barrier'...

This report responds to the requirements of the Reconciliation Act. It culminates an intensive year-long process during which we have not only reviewed the Department's previous work in this area, but have also broken new ground in compiling a massive amount of detailed information and gaining substantial new understanding concerning coastal barriers along the Atlantic and Gulf coasts.

The Department's findings and conclusions are discussed in section VI of this report. These findings and conclusions include our proposed definitions and delineation criteria (Appendix A) and proposed designations (Appendix B) covering nearly 750 miles of beach in 16 Atlantic and Gulf coast States. These proposed documents are being released at this time for 90 days of public comment. Final designations will be made after the close of that comment period.

The statutory definition of a coastal barrier, though brief, includes the essence of the many complicated factors and forces which comprise, shape, and sustain a coastal barrier system. The definition shadows science while generally avoiding technical scientific dispute concerning, for example, the geologic origin or evolution of specific coastal barriers. Our study indicates, in fact, that the statutory definition has been remarkably successful in defining units that the scientific community agrees are "true" coastal barriers. We believe that the language of the statute is appropriate and effective in achieving the intent of Congress.

The Department recommends one change, however. As currently written, the Reconciliation Act provides that an otherwise undeveloped coastal barrier shall not be designated if it is within the boundaries of an area which is established under Federal, State, or local law, or held by a qualified private organization, for the purpose of natural resource conservation. This means that Federal flood insurance will be available for sale in coastal barrier areas that should logically not use such a program. We find this result contrary to the purposes of the statute and inimical to the status of such protected areas. Therefore, we recommend that the exception be deleted.



## II. The Nature of Coastal Barriers

From Maine to Texas our coastline is fronted by more than 400 coastal barriers totalling approximately 2,700 miles of shoreline. Coastal barriers vary from small areas of only a few acres to large landforms encompassing thousands of acres. Some are little more than elevated sand or gravel bars; others are complex landforms of higher elevation, covered with terrestrial vegetation.

Coastal barriers are commonly composed of sand or gravel which has not been cemented or compacted to form sedimentary rock. Herein lies the peculiar strength of the barriers in dealing with the substantial wind, wave, and tidal forces that buffet them. These forces manifest themselves in a single linear or curvilinear feature--the beach and associated berm--on the seaward side of the barrier. Dunes, more or less continuous mounds of sediment, often occur and form the crest of the barrier. On the seaward side, submerged bars are also typical. Collectively these features--the beach, dunes, and submerged bars--form the sand-sharing system of the coastal barrier.

Although often referred to as "barrier islands," not all coastal barriers are islands; bay barriers, tombolos, and spits, for example, are connected directly to the mainland. However, they are readily distinguished from mainland beaches. A landform can be considered a coastal barrier only if it also protects landward aquatic habitat from direct wave attack. This landward aquatic environment can be a body of open water or a wetland. The role of reducing the open sea energies so that this landward environment may persist is a critical element in the scientific definition of a coastal barrier and one of the barrier's most important functions.

A complex interaction of natural forces and conditions control the position and form of coastal barriers. The action of the wind, waves, and tides on the barriers' unconsolidated sediments causes erosion or accretion on the seaward margin, thus resulting in changes in size, shape, and location. A major factor affecting coastal barriers has been the inexorable rise in sea level. Scientists

estimate that the ocean's level is presently rising at a rate of about a foot per century in relation to the land surface along much of the Atlantic and Gulf coasts. This change in sea level has increased the threat of coastal flooding and is a principal contributor to the landward migration of most coastal barriers. The type and amount of available sediment, local tidal ranges, climate, off-shore topography, previous geologic history, and the slope and surface of the underlying coastal plain are also important factors that help determine the rate of change and the present configuration of a coastal barrier. The power and complexity of these factors are attested to by the great diversity in the types of coastal barriers existing today.

Left alone, coastal barriers adapt by changing shape and moving landward. They move up the broad, gently sloping coastal plain to remain above sea level, always managing to retain the integrity of their ecosystems in spite of the often total rearrangement of their particle components. The sand-sharing system can be extremely dynamic. It is not at all unusual for several hundred thousand, even several million, cubic yards of sand to be moved by littoral currents past a given point on a beach during the course of a year. Interruption of this flow of sand, either naturally or by man's intrusion into the sand-sharing system, has often resulted in the loss of beaches.

With this continuous longshore transport of sediments and landward migration of many coastal barriers, lands previously considered safe for building have become extremely hazardous or have simply disappeared. In south Bethany, Delaware, for example, the first row of beach houses disappeared into the ocean in 1962. On Folly Island in South Carolina, the Army Corps of Engineers predicts that in 50 years, if shoreline erosion continues at present rates, about 40 percent of the houses now standing on land will be in the sea. Another coastal island, in Florida, has lost 700 feet to the ocean in the last 30 years. Alternatively, new coastal barriers may, in a few years, form in places that before had been open water.

The processes that shape coastal barriers are most visible during periods of storm. Even a comparatively mild "nor'easter" can wreak havoc, as the Ash Wednesday

storm of March 1962 demonstrated. Twenty-foot high waves breached dunes from Georgia to New York, overwashed many coastal barriers, and cut numerous new inlets. The damage was estimated at a half billion dollars--a fraction of the damage that would be inflicted by a similar storm on the much more developed coastal barriers of today.

Even more awesome are hurricanes that can strike any section of the Atlantic or Gulf coast, from June through November. These storms gather energy from warm tropical waters and humid air as they move westward, usually from the west coast of Africa along the trade winds route, organizing in counter-clockwise rotation with the strongest winds closest to the calm, humid eye. As this enormous force approaches and passes over a coastal barrier, there are a series of progressive impacts that dramatically highlight the distinctions between mainland areas and coastal barriers.

Before the full fury of the storm assaults the barrier, sea levels begin to rise as water is pushed up against its shore and into partially confined lagoons and bays behind it. Frequently, the first substantial impact of a hurricane is the flooding of low-lying areas, often including the approaches to bridges and causeways that link the barrier to the mainland. Recognizing this serious threat to escape routes, the goal of the National Hurricane Center is to predict where a hurricane will come ashore at least 12 daylight hours in advance of landfall.

As a hurricane nears the coast, the winds intensify. They can exceed 175 miles per hour near the eye of the most severe hurricanes. Substantial amounts of exposed sand can be blown away, trees and other vegetation uprooted, and entire buildings blown off their foundations.

Even more destructive than the wind is the "storm surge," a huge mass of water as much as 50 miles wide, 20 feet higher than normal tides and topped by waves. It often appears as a wall of water that sweeps across the shoreline when the eye of the hurricane makes landfall. This aspect of the hurricane is perhaps less understood by coastal residents than other storm impacts, yet it causes the



greatest damage. Nine out of ten people who die in a hurricane drown in the storm surge. When it arrives, there often remains no avenue of escape.

In addition to the storm surge, waves crashing against the barrier erode and flatten the beach and dunes. Especially when the tide cycle is high, the dunes can be overtopped and considerable quantities of sand swept inland. Once the storm passes, the water pushed over the barrier and into the lagoons and estuaries must return to the sea. At the very least, the dunes and beach are further eroded. In more extreme cases, this excess water escapes by creating new inlets.

Years of development can be totally and massively wiped out by one hurricane. Shore residents can suffer severe injury, trauma, and death. In this century, at least 18,000 Americans have been killed in storms along the Atlantic and Gulf coasts. Yet, coastal barriers devastated by storms are often quickly redeveloped. For example, Westhampton Beach on Long Island was hit by a 1938 hurricane, which destroyed all but 23 of 179 homes. By 1980 more than 900 new homes had been built on that same coastal barrier. On the North Carolina coast, Long Beach Island is located just west of Wilmington. In 1954 there were 357 homes in that community before Hurricane Hazel arrived, and after the storm only five remained. There are 2,000 homes in that area today.

Man-made protection against these forces is extremely difficult. In many cases, man's attempts to stabilize these inherently dynamic coastal landforms actually threaten their natural stability. Artificial stabilization can interfere with the ability of wind and water to transport new sediments for building beaches and dunes, severely affecting maintenance of the natural equilibrium between landform and ocean energies. The artificial systems that are created can deteriorate rapidly and are often protected and maintained only at great cost in both energy and materials. Such actions can also have far-reaching effects. Efforts to stabilize a beach in one place may affect the supply of sediment elsewhere, with the unintended result being accelerated erosion of another beach some distance away.

Coastal barriers may be hazardous for man's permanent structures, but nature is well adapted to their dynamic ways. Coastal barriers provide natural resources of significant value to society. They create and maintain wetlands and estuaries, which nurture finfish and shellfish stocks vital to our Nation's commercial and recreational fishing interests. From Long Island south, most estuaries are bounded on the seaward side by coastal barriers. More than 80 percent of the finfish and shellfish caught by sport fishermen on the Atlantic and Gulf coasts are dependent upon these estuaries during some stage in their life cycles. The National Marine Fisheries Service estimates that over 90 percent of the U.S. commercial catch in the Gulf of Mexico and more than 80 percent of the commercial harvest on the Atlantic coast are comprised of species dependent on habitats associated with coastal barriers. In 1980, this commercial harvest translated into a dockside value in excess of one billion dollars.

Large populations of migrating and wintering waterfowl rely on coastal barriers and their associated wetlands. During the winter, over 40 percent of the Atlantic Flyway black duck population depends on the marshes created and maintained by coastal barriers. The Texas coastal region supports more than half, and at times as much as two-thirds, of the Central Flyway waterfowl population each winter. While the habitat of these populations is not confined solely to coastal barriers, the areas of highest concentrations are there. For instance, 80 to 90 percent of the world population of redhead ducks winter in the Laguna Madre, Texas, which is created and maintained by Padre Island, a coastal barrier.

In addition, coastal barriers provide habitat for more than twenty species federally listed as endangered or threatened. These include endangered raptors such as the bald eagle and peregrine falcon, as well as the whooping crane, Eastern brown pelican, manatee, American crocodile, and the green, loggerhead, Ridley, and hawksbill sea turtles. Many more species dependent upon coastal barriers, like the osprey, have been recognized by the States as needing special consideration if their survival is to be assured.

One out of every four Americans lives within 100 miles of the Atlantic or Gulf coasts, so coastal barriers can and do provide open space and public recreation

opportunities for a significant portion of the population. Probably most popular are the traditional activities of swimming, sunbathing, and picnicking. Camping, hiking, surfing, and water-skiing are also available.

Fishing and waterfowl hunting were two of the earliest sport uses of coastal barriers and associated wetlands, and they remain popular activities. Birders and nature photographers are also drawn to coastal barriers. A recent survey conducted by the U.S. Fish and Wildlife Service indicates that approximately \$1.1 billion is spent annually on fish and wildlife-oriented recreational pursuits in the 18 Atlantic and Gulf States, most of which is associated with activities on coastal barriers.



### III. Man and Coastal Barriers

The allure of coastal barriers--the clean salt air, wide open ocean, abundance of fish and wildlife, and recreational opportunities--has tempted many to ignore the potential hazards associated with living on them. Development on coastal barriers is not entirely new; Absecon Island became Atlantic City, New Jersey, by the middle of the nineteenth century. Before World War II, however, approximately 90 percent of coastal barrier real estate was undeveloped and largely inaccessible to the public. In the years immediately following the war, the rate of second home development on coastal barriers escalated in response to increasing affluence, mobility, and available leisure time. This trend was especially rapid in the urbanized northeast, where numerous coastal barriers lie within a few hours drive of major population centers. By the early 1960's, many of the small hamlets and fishing villages that had co-existed in easy harmony with the sea and the delicate barrier ecosystems were transformed into heavily developed strips of land. Since then, development has further accelerated and is now spread along almost the entire chain of coastal barriers on the Atlantic and Gulf coasts. By 1980, more than 29 million people lived in metropolitan areas that contained coastal barriers.

Over the past 20 years, much of this development on coastal barriers has been underwritten by the American taxpayer. The Federal Government has helped to create both air and automobile travel systems that have made many of our coastal barriers easily accessible and profitable to develop. Once access is provided, Federal subsidies have helped provide for utilities and assistance in construction. Then, Federal financial guarantees have ensured that private development can be reconstructed in the event of storms or hurricanes.

Federal assistance, direct and indirect, comes in many forms. Direct expenditures include grants for highway and bridge construction, assistance in providing water supply and sewer systems, and projects to stabilize coastal barrier beaches. Indirect assistance includes Federal flood insurance or loan guarantees for home construction.

Not including flood insurance, the Federal Government has spent at least \$800 million since fiscal year 1975 to assist private construction on coastal barriers. For example, highway and bridge construction on coastal barriers financed by the Department of Transportation cost taxpayers \$80 to \$90 million. Ninety million dollars was provided through the Economic Development Administration to support activities that promoted development of coastal barriers. More than \$50 million was committed to coastal barrier development through insured and guaranteed loans and grants provided through the Farmers Home Administration Grants for the construction of sewage treatment facilities on coastal barriers, provided through the Environmental Protection Agency, exceeded \$400 million during this period.

Once sited on a coastal barrier, buildings, roads, and utilities have been protected from natural processes by stabilization projects, again often supported by the Federal Government. Two basic techniques have been used in attempting to secure the barriers: structures, such as groins, jetties, and seawalls; or non-structural techniques, such as artificial beach nourishment and dune construction. The price tag is high. Beach nourishment projects, for example, average a million dollars per mile of shoreline and may exceed that by several times. The recently completed Miami Beach restoration project cost more than \$60 million for 9.3 miles. Given the highly dynamic nature of these landforms, and because the sediments used for beach nourishment often are inadequate substitutes for natural beach materials, these costs may recur at progressively shorter intervals.

Federal flood insurance and disaster assistance programs have also substantially helped to reduce the property owners' risk of development on coastal barriers. The National Flood Insurance Program was established in 1968 to provide federally underwritten flood insurance to owners of property situated in flood-prone areas. This program is now one of the largest liabilities against the Federal Treasury; the Federal Emergency Management Agency (FEMA) estimates that it has \$10-\$15 billion in flood insurance coverage in coastal areas along the Atlantic Ocean and Gulf of Mexico.

Federal Insurance Administrator Jeffrey S. Bragg testified at Congressional hearings on June 22, 1982, that while premiums are being raised, it would be extremely difficult to establish Federal rates that properly reflect the true risks of building and living in these hazardous areas. While FEMA is revising the rates for new structures in Coastal High Hazard Areas (Velocity or V Zones) where wave height has been added as a risk factor, the Federal Insurance Administrator noted that the V Zone rating was not designed to meet the total risk exposure to undeveloped coastal barriers. V Zones do not necessarily include all of a coastal barrier; as a rule they include only the area between the ocean and the dunes. The methodology for determining wave heights is often not applicable to the landward side of coastal barriers which, although quite hazardous, is more commonly built upon. In addition, erosion of the magnitude present on coastal barriers is not taken into account, even in the V Zones. Moreover, many coastal areas that are expected to be identified as V Zones have not been mapped, so the new rates do not yet apply. This mapping process could take a number of years to complete.

The Administrator went on to point out that even if Federal flood insurance rates were actuarially sound, they would account for neither the risk to human safety; nor the costs to the Federal Government of responding in time of an emergency with evacuation assistance, supplies, and temporary shelter; nor the cost of replacing public infrastructure. It is not wise public policy, Mr. Bragg concluded, to provide Federal flood insurance for new construction on undeveloped coastal barriers.

Federal flood insurance is not the only Federal program that reduces the risk of development. Federal programs for disaster assistance provide additional help for private reconstruction on coastal barriers after a storm. Federal grants through several agencies, including FEMA, are available to individuals to repair and rebuild their homes. The Small Business Administration and Farmers Home Administration administer loans for restoration of property to pre-storm conditions. The Army Corps of Engineers often helps to rebuild jetties and seawalls or replenish beaches. In sum, the Federal Government helps clean up and restore the coastal barrier to its previously developed state, usually at

substantially higher costs to the taxpayer than incurred during the original development.

A study of several already developed coastal barriers estimates that the cost of Federal subsidies assisting initial construction in these areas averages in excess of \$25,000 per acre. Moreover, these are recurring costs; when the inevitable next storm or hurricane strikes, the Federal Government will again be expected to help replace the bridges and roads, utilities and buildings. In terms of replacement costs, the estimated Federal subsidies are more than \$53,000 for each developed acre.

With no change in Federal policy, Federal expenditures on undeveloped coastal barriers could cost the American taxpayer from \$5.5 billion to \$11 billion during the next 20 years. And this estimate does not reflect the additional economic drain on local and State governments, which must shoulder a significant portion of the development and redevelopment costs while coping with the loss of revenue that follows a disaster.

What is more, these cost estimates cannot reflect the intangible costs, especially the cost to human safety. We know that the economic damage inflicted by coastal storms can be tremendous; Hurricane Frederick in 1979, for example, caused \$2.3 billion in property damage, much of it on coastal barriers. But we cannot measure the cost of lives lost. A hurricane can kill hundreds, even thousands, of people as well as cause billions of dollars of property damage.

Human safety should be of paramount concern. An atypical lull in the landfall of hurricanes during the past two decades, coupled with the enormous population increases in most coastal counties from Texas to Maine, pose major concerns to experts at the National Hurricane Center in Miami, Florida. Seawalls and other man-made barriers have encouraged development in hazardous areas by offering a false sense of safety; such structures would be of little or no avail in the event of a direct hit from a hurricane. Bridges and causeways are often flooded or become bottlenecks when time for evacuation is

short. On many coastal barriers, roadbeds are easily flooded. Neil Frank, Director of the National Hurricane Center, has testified that this Nation has a very serious hurricane problem. He believes that these factors are setting the stage for a major hurricane disaster where the death toll could equal or exceed the worst natural disaster America has ever seen. To the extent that Federal assistance encourages the development of these unstable landforms, it also invites risk to human safety.

Intense development and human use of coastal barriers also have costs in diminished productivity of these important natural resource areas. Disposing sewage effluents, dredging canals and channels, filling wetlands, leveling dunes, clearing vegetation, constructing hurricane protection and erosion control projects, stabilizing inlets--all these activities and more--in many cases, spell trouble for the coastal barrier ecosystems that protect and sustain natural resources of immense aesthetic and economic value.

But at the same time that the Federal Government has encouraged development on coastal barriers, it has recognized their unique natural resources and has sought, through traditional means, to preserve undisturbed examples of these natural systems. Sometimes as a direct response to the very development pressures which other Federal policies have encouraged, the Federal Government, as well as State and local governments and private conservation organizations, have made significant investments in acquiring coastal barrier acreage for recreation and conservation purposes. Since 1961, National Park Service-administered coastal barrier real estate has increased from 19,000 to almost 276,000 acres. In the same period, the U.S. Fish and Wildlife Service established 12 new refuges encompassing almost 206,000 acres within coastal barrier systems. The network of State and local parks has also grown to meet the needs of more and more beach-oriented recreationists, and private conservation organizations have protected other coastal barriers as nature preserves or wildlife sanctuaries.



# The Allure of Coastal Barriers



Fire Island National Seashore, NY, NPS photograph



Fire Island National Seashore, NY, NPS photograph



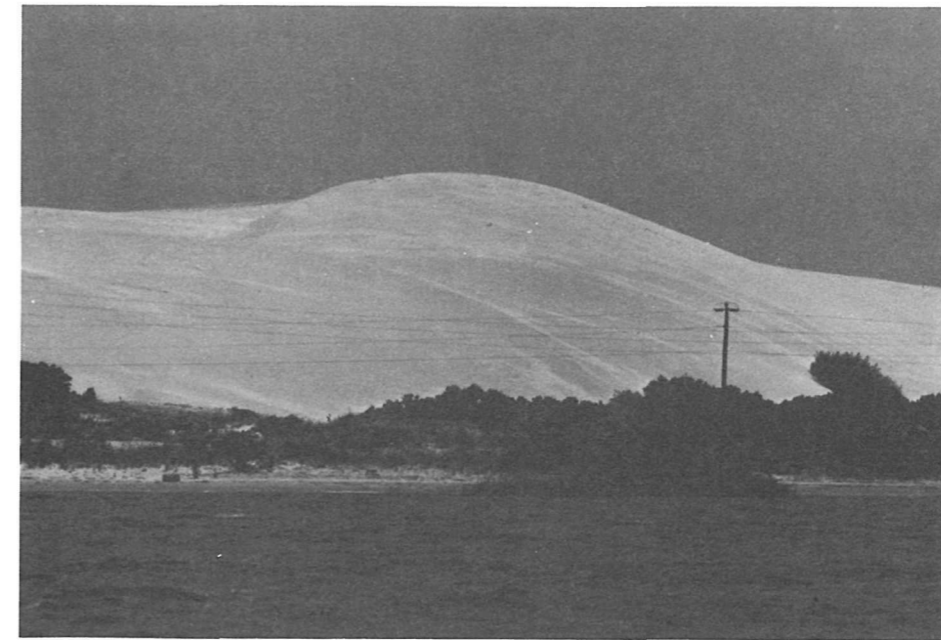
Assateague Island National Seashore, MD-VA, NPS photograph

Assateague Island National Seashore, MD-VA, NPS photograph

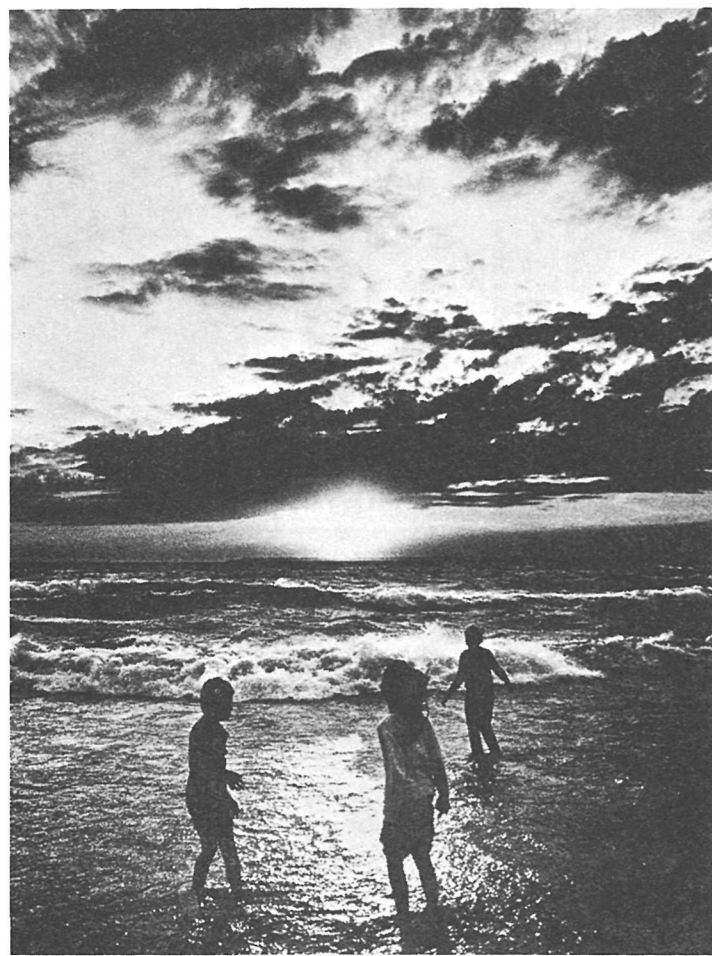


## The Nature of Coastal Barriers

Core banks, Cape Cod National Seashore, MA Paul J. Godfrey

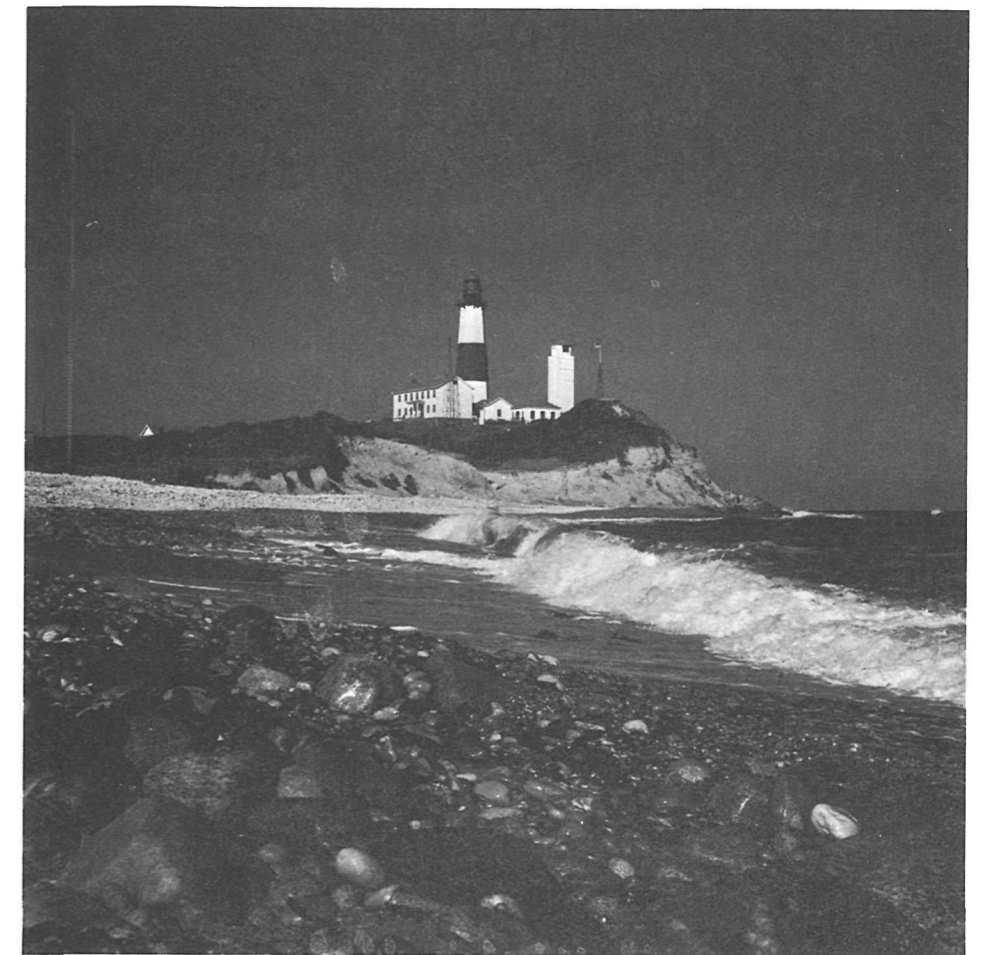


Dune behind beach, Nags Head, NC Paul J. Godfrey



Assateague Island National Seashore, MD-VA  
NPS photograph

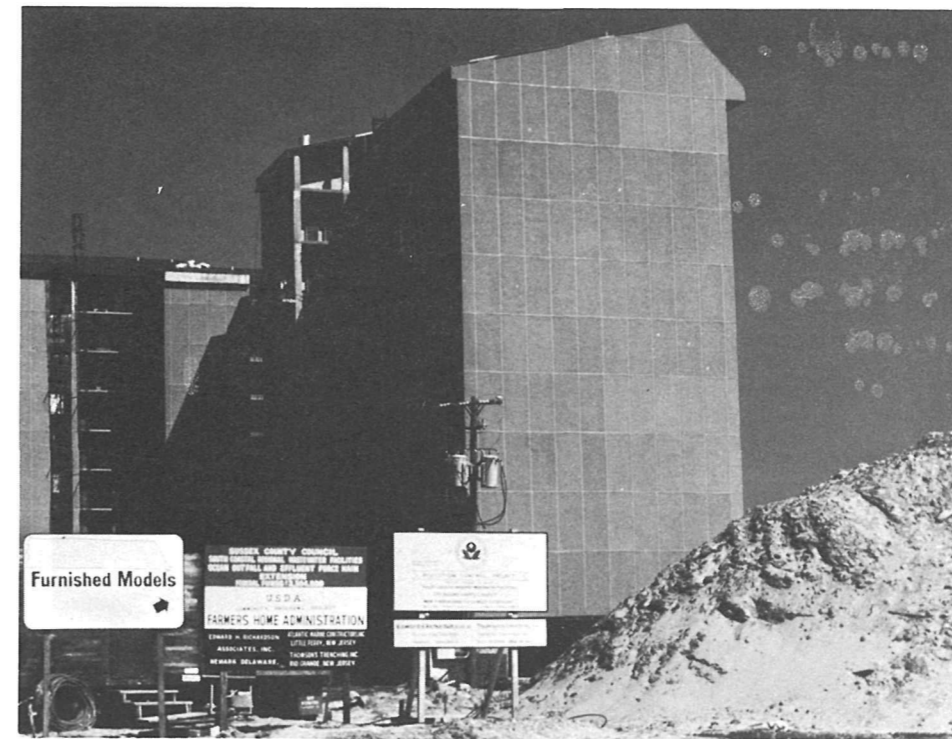
## Man and Coastal Barriers



Fire Island National Seashore, NY, NPS photograph



Assateague Island National Seashore, MD-VA, NPS photograph



Condominium Development, Fenwick Island, MD Paul J. Godfrey





## The Risk of Development



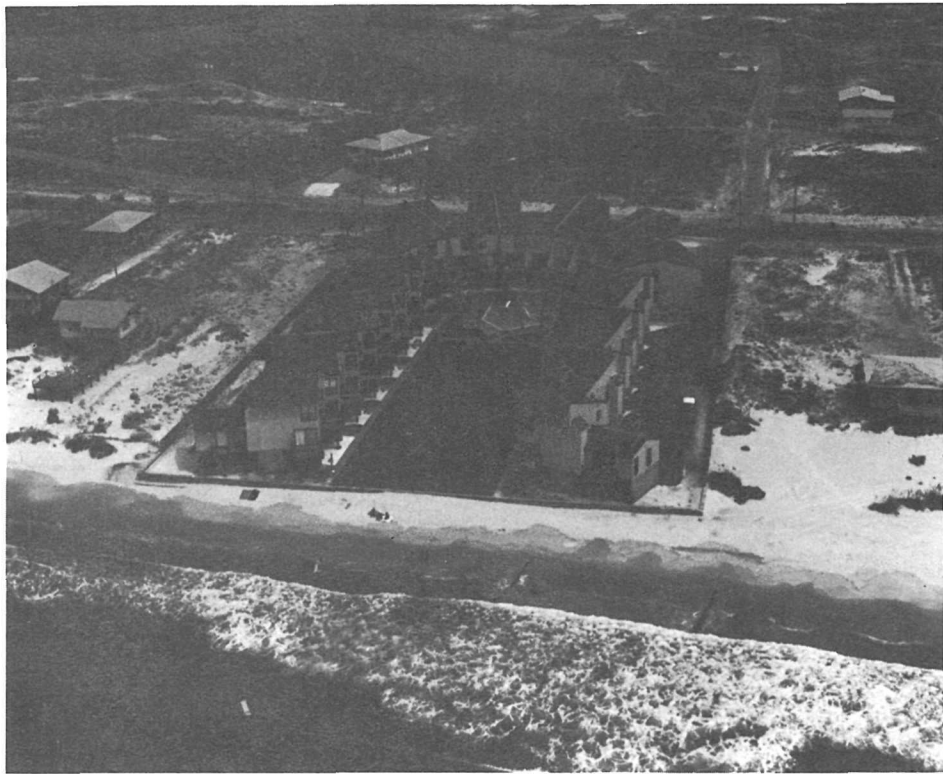
Falling seawall, Bethany Beach, DE Jim McFarland

Storm damage in progress, Coast Guard Beach, Cape Cod National Seashore, MA Stephen P. Leatherman

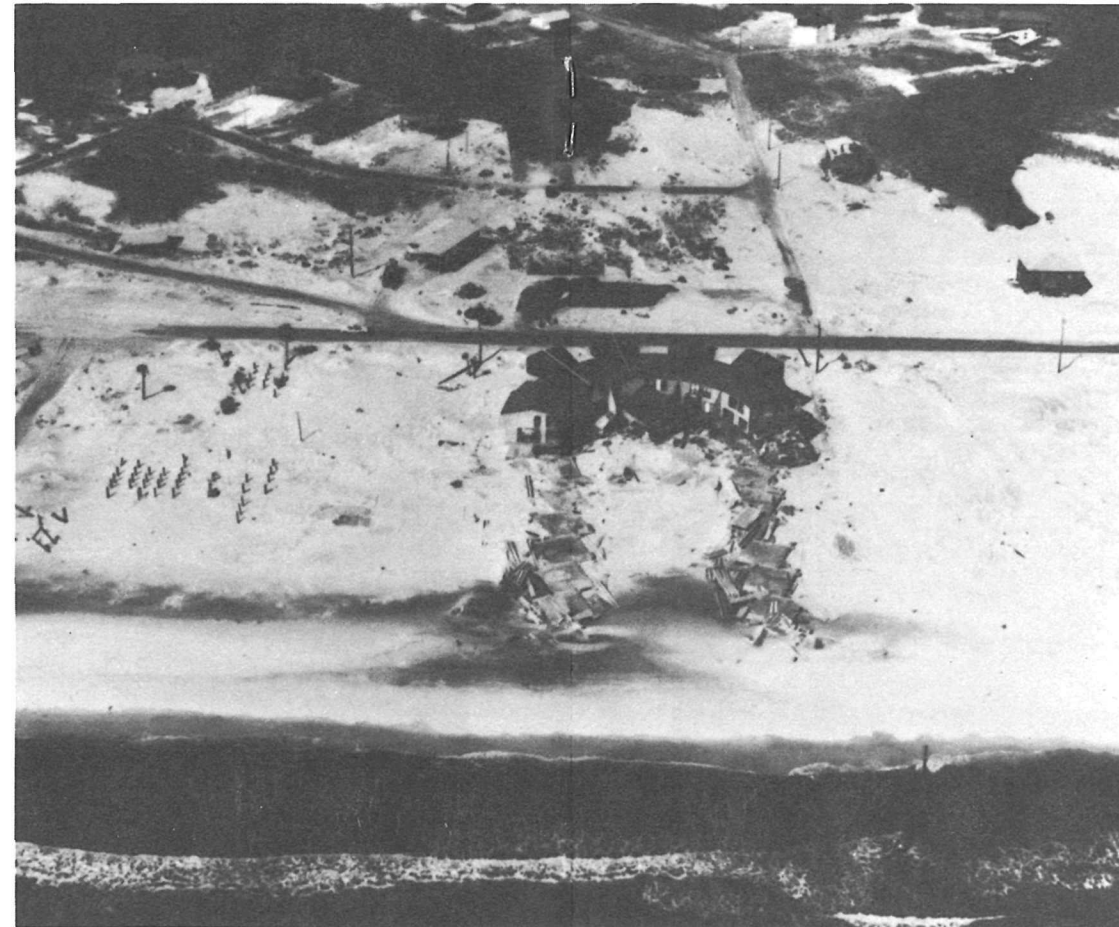


Scituate Beach, MA, after a storm, 1978 Sterling Wall

# An Unending Cycle



Gulf Shores, AL, before Hurricane Frederick Bert Lacey



Gulf Shores, AL, immediately after Hurricane Frederick (Sept. 1979)  
Bert Lacey



Gulf Shores, AL, 1982: rebuilt after Hurricane Frederick Bert Lacey



# The Storm's Fury



Damage to Holly Beach, LA, from Hurricane Audrey Bill Goffert

#### **IV. The Omnibus Budget Reconciliation Act of 1981**

The Federal Government has invested billions of dollars to subsidize private development of coastal barriers, while at the same time acquiring other coastal barriers to protect the fragile and environmentally sensitive resources associated with these coastal systems. Public policy, therefore, has both encouraged development and fostered protection. Within the last few years there has been a recognition that these Federal programs are working at cross purposes, and that the costs of development, including the threats to man and natural resources, are more significant than previously understood.

Legislation introduced in the 96th Congress attempted to address this problem. In the 97th Congress, over one hundred members of the House and almost half of the Senate have cosponsored the Coastal Barrier Resources Act introduced in April 1981 by Congressman Thomas B. Evans, Jr. (H.R. 3252) and Senator John H. Chafee (S. 1018). Essentially, these two bills would prohibit new Federal expenditures and financial assistance on undeveloped coastal barriers with some exceptions. They recognize that, while the Federal Government should not dictate what private owners do with their property, the American taxpayers should not be expected to subsidize the recurring costs and high risks of private investment on coastal barriers. The bills would also provide the framework for a consistent and reduced Federal role regarding undeveloped coastal barriers.

A ban on future sales of Federal flood insurance on undeveloped coastal barriers, an element common to all of these legislative proposals and the first initiative to be enacted, was signed into law with the Omnibus Budget Reconciliation Act of 1981. Section 341(d) of the Reconciliation Act adds a new section 1321 to the National Flood Insurance Act of 1968 to prohibit the issuance of Federal flood insurance coverage, beginning October 1, 1983, for new construction or substantial improvement of existing structures on undeveloped coastal barriers as defined by the Act and as designated by the Secretary of the Interior.

In making these designations, the Secretary was directed to conduct a study and, within one year of the Reconciliation Act's enactment, report his findings and conclusions to the Congress, along with proposed designations. In addition, the report was to include any changes which the Secretary might recommend concerning the statutory definition of the term "coastal barrier."

In response to this directive, Secretary Watt established the Coastal Barrier Task Force, an interdepartmental group of professionals representing various agencies in the Department of the Interior, including the U.S. Geological Survey, National Park Service, and the U.S. Fish and Wildlife Service. Representatives were also included from the Federal Emergency Management Agency. The Task Force was charged with implementing the Secretary's responsibilities under the Reconciliation Act.

## V. The Study Process

Using information on coastal barriers accumulated by the Department and from other sources over many years to interpret the statutory definition, the Task Force prepared a detailed statement of definitions and delineation criteria to apply these tests in specific situations (Proposed Undeveloped Coastal Barriers: Definitions and Delineation Criteria, Appendix A). This document and delineations derived from it (listed in Appendix B) have been released simultaneously with submission of this report for 90 days of public comment. A draft environmental impact statement (DEIS) has also been prepared and public comments have been received. The DEIS assesses the consequences of designating coastal barriers under draft definitions, as well as a number of alternatives considered in the development of this report. In addition, an aerial photographic survey provides substantial evidence of the physical characteristics and development status of the coastal barriers in question. In short, the Department's study of this issue is not a single document but rather a collection of documents, data, and extensive public comment.

### Prior Involvement by the Department of the Interior

In conducting the study required by the Reconciliation Act, the Department drew upon a long record of involvement and experience with coastal barrier issues. This record includes years of scientific research by government, university, and other scientists. This research has resulted in the accumulation of a significant body of scientific data on coastal barrier systems; the management of these resources; and the impacts of land uses, development, and human activities upon them. Scientific research efforts of the Department in this area include intensive research by the National Park Service (NPS) on North Carolina's outer banks and various National Seashores; extensive fish and wildlife research; an ecological inventory of the Atlantic and Gulf coastlines and the National Wetlands Inventory, both conducted by the U.S. Fish and Wildlife Service (FWS); a comprehensive bibliography prepared in 1977 by FWS and updated in 1981 by NPS; and an analysis of land use and land cover data on Atlantic and Gulf Coast Barriers by the U.S. Geological Survey.

In 1977, the Department established a Barrier Island Work Group, composed of representatives of NPS, FWS, the former Heritage Conservation and Recreation Service, the Office of Coastal Zone Management in the Department of Commerce, and the Council on Environmental Quality. The work group was charged with identifying undeveloped coastal barriers and making recommendations on measures to reduce Federal assistance and encouragement of unwise development in these areas.

From 1977 through 1980, the Barrier Island Work Group amassed large amounts of scientific, technical, and descriptive information on the Nation's coastal barriers; prepared analyses of alternative Federal actions to promote their protection and appropriate use; and provided a focal point for interagency collaboration in the study of coastal barriers and the Federal policies and programs affecting them. The work group inventoried units and classified them as developed, undeveloped, or protected. Public review of the amassed information on coastal barriers and Federal programs, as well as a draft environmental impact statement on possible alternative Federal actions, provided still more information.

In response to other initiatives, NPS and FWS have each prepared additional inventories of coastal barriers on the Atlantic and Gulf coasts. Over 400 coastal barrier study units have been identified and inventoried since 1977.

We are confident that the Department's extensive studies of coastal barriers which preceded passage of the Reconciliation Act established a firm foundation for fulfilling our current study and reporting requirements.

#### Development of Definitions

The definition provided by the Congress in the Reconciliation Act was taken as a starting point in the development of a detailed statement of definitions and delineation criteria to be used in actual case-by-case designation of undeveloped coastal barriers. While the legislative history of the Act indicates that the Congress did not intend for the Department to merely include areas identified during previous studies, it is clear that Congress did intend that the



Department use such previous information in amplifying and clarifying the statutory definition for application with precision in specific situations. It was within this framework that the Department developed a set of draft definitions for undeveloped coastal barriers which elaborated on the statutory definition. A set of criteria for delineating areas to be considered for designation as undeveloped coastal barriers was also prepared. This draft document was then used as the basis to identify and prepare draft maps of those coastal barriers which appeared to qualify for designation.

On December 1, 1981, the Department published a "notice of intent" to issue a proposed rule in the Federal Register. This notice announced the Department's intention to make available for public review and comment a proposed set of draft definitions and draft maps of areas under consideration for possible designation as undeveloped coastal barriers. An initial intergovernmental review of the proposed draft definitions was also announced. Shortly thereafter, the Secretary requested comments on the definitions from Members of Congress and from the Governors of the involved coastal States.

#### Draft Delineations

The draft definitions document and draft maps of 159 areas initially identified as undeveloped coastal barriers were released by the Department for public review and comment on January 15, 1982. The Department provided draft maps and related documentation on specific units to all affected State and local jurisdictions. This material was also provided on request to landowners and other interested parties.

Comments from about 1300 different agencies, organizations, and individuals, including more than 500 comments relating to the delineation of specific coastal barrier units, were received during the 60-day comment period. In addition, Departmental representatives participated in a series of public information sessions in Connecticut, Florida, Massachusetts, and South Carolina during the comment period and conducted on-site inspection of units in

Louisiana, Florida, and North Carolina. These sessions and inspections provided a forum for the Department to explain the study process, as well as to receive comments on the delineation of specific units. Representatives of the Department also participated in more than fifty meetings, at the request of individual landowners, private organizations, and State and local agencies, to receive comments on specific unit delineations. When necessary to refine unit delineations, the Department contacted personnel of State or local governments and others who commented for additional information.

Many of the comments received during the initial comment period identified additional areas that respondents believed qualified as undeveloped coastal barriers. As a result of these comments, draft maps of an additional 55 areas were released for review on May 21, 1982. The formal comment period on these additional draft maps ended June 11, 1982.

#### Verification of Delineations

Aerial photographs commissioned by the Department have been taken of candidate coastal barriers along the Atlantic and Gulf coasts. This task was performed and interpreted by the Environmental Protection Agency and is being used by the Department to verify the level of development of each unit and refine the maps. Flights commenced on March 16, 1982.

Color infrared photographs (1:12,000 or 1:24,000 scale) providing stereographic coverage were taken of each candidate area. A multi-volume atlas of all photographs taken during the survey is available for public review at the Department of the Interior. Complete sets or individual photographs will be available for purchase through the U.S. Geological Survey.

#### Unit Files

The Department maintains a complete file on each unit identified for possible designation by the study. Included in each unit file are maps and photographs of the study unit; information from previous studies by the Department; all comments received on that unit and a summary of those comments; a staff

analysis of issues raised concerning that unit; and staff recommendations on the unit's delineation, in the form of a decision memorandum to the Secretary. The individual unit files, along with administrative files relating to the study process itself, are available for review at the Department of the Interior.

### Proposed Delineations

Between June 18 and July 2, 1982, the Department made interim proposed designations available for review by Members of Congress, Governors, and the interested public. Upon request, the Task Force continued to meet with any interested party during this period to receive comments on specific units. All comments received as of July 14, 1982, were considered in developing the Department's proposed delineations.

Proposed delineations of undeveloped coastal barriers are being released for public review on August 16, 1982, pursuant to a notice of proposed rulemaking published in the Federal Register. Copies are being distributed to affected Members of Congress, Governors, local governments, and other interested parties, and will also be available for purchase through the U.S. Geological Survey. The formal comment period on these proposed delineations will extend for 90 days, through November 15, 1982. Final designations will be announced in the Federal Register, pursuant to a final rulemaking, following the close of that comment period. Based on these final designations, the Federal Emergency Management Agency will implement the prohibition of new Federal flood insurance in designated areas.

### The Draft Environmental Impact Statement

To comply with the National Environmental Policy Act of 1969 (42 U.S.C. 4321), the Department prepared an environmental impact statement containing a review of the environmental impacts of possible actions under the Reconciliation Act requirements. The draft environmental impact statement focused on the definitions prepared for use in delineating and designating coastal barriers, as well as reasonable alternatives, and on the cumulative environmental and socioeconomic impacts of designating coastal barriers

under each of the alternatives presented. On December 21, 1981, the Department issued a "notice of intent to prepare an environmental impact statement" in the Federal Register. On May 21, 1982, the DEIS was released for review.

Four alternatives, including the proposed action and the "no action" alternative, were considered in the DEIS. Under the proposed action, the Department endorsed the general definition of undeveloped coastal barriers contained in the Reconciliation Act and recommended that this general definition be implemented through the more detailed draft definitions, and delineation criteria proposed by the Department on January 15, 1982. Although based upon the January 15 draft definitions and draft maps, the proposed action very closely parallels the proposed designations provided with this report.

The "no action" alternative assumed that no exclusion of Federal flood insurance coverage for undeveloped coastal barriers would be implemented. This alternative provided a baseline against which to evaluate the potential cumulative impacts of implementing the Reconciliation Act provisions.

The remaining two alternatives involved sets of criteria that would have resulted in, respectively, the designation of fewer (Limited Alternative) or more (Broad Alternative) areas as undeveloped coastal barriers than the proposed action. The Broad Alternative considered the entire U.S. coastline (as opposed to only the Atlantic and Gulf coasts) and would have included all undeveloped areas, including those in the early stages of development. The Limited Alternative considered only the Atlantic and Gulf coasts and would have excluded from designation those areas in the early stages of development or under imminent development pressure.

The analysis contained in the DEIS was considered in developing the findings in this report and the proposed rulemaking. The Department intends to issue a final environmental impact statement as soon as possible after submission of this report.

## VI. Findings and Conclusions

The Department of the Interior study process has produced a number of significant "findings and conclusions." Perhaps most important is the development and refinement of a series of standards and criteria to be used in the designation of undeveloped coastal barriers, published in proposed form as Undeveloped Coastal Barriers: Definitions and Delineation Criteria (Appendix A). These guidelines have been applied in the proposed map delineations (Appendix B), covering almost 750 miles of ocean-facing shoreline in 188 units along the Atlantic and Gulf coasts. The Department makes one recommendation with regard to the provisions of the statute: that all undeveloped coastal barriers be designated, regardless of their protected status. Otherwise, we have found the statutory framework extremely workable in identifying, on the ground, areas where the continuation of federally underwritten flood insurance is inappropriate.

We have focused our study process on coastal barriers of the Atlantic and Gulf coasts for several reasons. First, the legislative history of the Reconciliation Act stipulates this geographic constraint. Second, we believe that areas along the Atlantic and Gulf coasts are particularly vulnerable to hurricanes and other severe coastal storms. Third, confinement to these geographic areas is consistent with the Department's long history of involvement in, and study of, barriers along the Atlantic and Gulf coasts. Although some information is already available, geographic expansion to include coastal barriers in Alaska, the Pacific, and the Great Lakes would require additional study to accumulate sufficient data to make accurate delineations.

With the passage of the Reconciliation Act, the Congress provided a definition and set of instructions for the designation of undeveloped coastal barriers. It provides as follows:

For purposes of this section --

(1) the term 'coastal barrier' means--

- (A) A depositional geologic feature (such as a bay barrier, tombolo, barrier spit, or barrier island) which--

- (i) consists of unconsolidated sedimentary materials,
  - (ii) is subject to wave, tidal, and wind energies, and
  - (iii) protects landward aquatic habitats from direct wave attack; and
- (B) all associated aquatic habitats including the adjacent wetlands, marshes, estuaries, inlets, and nearshore waters;
- (2) a coastal barrier or any portion thereof shall be treated as an undeveloped coastal barrier...only if there are few manmade structures on the barrier or portion thereof and these structures and man's activities on the barrier do not significantly impede geomorphic and ecological processes; and
  - (3) a coastal barrier which is included within the boundaries of an area established under Federal, State, or local law, or held by a qualified organization as defined in section 170(h)(3) of the Internal Revenue Code of 1954, primarily for wildlife refuge, sanctuary, recreational, or natural resource conservation purposes shall not be designated as a undeveloped coastal barrier....

In short, the definition contained in the Reconciliation Act holds three tests. To be included, an area must be a "coastal barrier," it must be "undeveloped," and it must not be "otherwise protected."

#### **Definition of a "Coastal Barrier"**

To qualify as a coastal barrier under the criteria of the Reconciliation Act, an area must be a depositional feature consisting of unconsolidated sedimentary material; be subject to wind, wave, and tidal action; and protect landward aquatic habitat. The coastal barrier is also to include all associated aquatic habitats.



### Unconsolidated Sediments

The terms "depositional" and "sedimentary materials" refer to situations where materials, usually sand and gravel, are deposited in or by water. These sedimentary materials may also include finer particles (clay or silt), coarser materials (cobbles or boulders) or organic debris (shells, grasses, or driftwood).

"Unconsolidated" means the sediments are loosely aggregated and have not been cemented or compressed into solid rock. In some regions, local surface deposits of beach rock (gravel or sand cemented together by calcium carbonate left when sea water evaporates) may occur with unconsolidated sedimentary material on a coastal barrier. This condition differs from the occurrence of extensive and continuous deposits of consolidated material, like limestone deposits of coral or coquina in Florida, or bedrock deposits along the New England coast.

### Wave, Tidal and Wind Energies

Wind, waves, and tides are the immediate forces that maintain and modify coastal barriers. The complex interaction of these ocean energies is responsible for the great diversity of coastal barriers existing today. Four examples are named in the statute -- bay barriers, tombolos, barrier spits, and barrier islands. As part of our study we have identified nine physiographically different coastal barriers illustrating the range of variation produced by the interaction of these forces. The common denominator, however, is that these ocean energies, acting upon unconsolidated sedimentary materials, will result in a continuous linear or curvilinear feature, i.e., a beach ridge or berm, located along the seaward side of the coastal barrier. It is the existence of this feature which demonstrates that the unconsolidated sedimentary material is subject to significant levels of wind, wave, and tidal energies.

In addition to barriers located directly on the open coast, some barriers in open embayments are directly exposed to ocean winds, waves, and tides acting through large inlets. Unimpeded wave and wind energy can often penetrate a considerable distance into such bays; in fact, there may even be an increase in sea energy when concentrated on the relatively smaller bay area.

The Department received strong support from the northeastern States for the inclusion of such areas, and we have followed this approach for the purposes of our proposed delineations. Ten units have been proposed for designation based upon the Department's finding that exposure to significant levels of sea energy, rather than location in an embayment, should be the principal criterion for designation. Specifically not included are areas within enclosed bays such as the Chesapeake Bay, Pamlico Sound, Tampa Bay, and Galveston Bay, where winds and waves generated primarily within the water body itself may create barrier-like features.

The difficult question concerns how far sea energy of sufficient magnitude to create and maintain a barrier extends into such open bays. As with the basic definition of coastal barriers themselves, this question can be answered only with on-site evidence. A linear ridge of unconsolidated sediment indicates that a significant level of wave energy impinges on that site. The nature of the aquatic system seaward of the barrier is also an indicator; emergent vegetation indicates that relatively little sea energy reaches the fastland on a daily basis. In addition, the configuration of the bay, including the islands in it, influences the magnitude and distance of sea energy penetration. For instance, an abrupt change in orientation of a bay may be sufficient to dampen most ocean energy.

#### Landward Aquatic Habitat

Not all of the coastal barriers we have identified are clearly separated from the mainland by large bodies of water. Largely in response to rising sea level, many barriers have rapidly retreated landward and are now in close proximity to mainland areas. The key to identification is that, in each case, the area delineated as a coastal barrier protects some form of landward aquatic habitat from direct wave attack. These aquatic habitats are very diverse and include semi-enclosed bodies of water, such as estuaries, bays, salt ponds, or lagoons. They can take the form of emergent wetlands such as salt marshes, submerged wetlands such as seagrass beds, or tidal flats. They can also appear as tidal channels, inlets, or tidal creeks.

In essence, protected landward aquatic habitats are those that would undergo rapid physical and ecological alteration by direct wave attack if the fastland portion of the coastal barrier were not there. In determining this, it is helpful to examine the nature of the landward aquatic habitat. For example, the aquatic area should have flora and fauna indicative of a sheltered, low-energy environment. In general, it should also be contiguous with, and form a continuous band behind, the fastland that protects it.

Protection of a landward aquatic habitat is a critical function of coastal barriers for two reasons. First, the existence of an aquatic system behind the barrier tends to increase the hazards to human occupancy by introducing the risk of flooding from the backside as well as the ocean side. On mainland areas threatened by flooding, people can move to higher ground, whereas on coastal barriers, their options are limited by the presence of water or wetlands lying between them and safety with only narrow corridors of escape.

Second, the wetlands and estuaries protected by coastal barriers are among the most productive ecosystems in the world, rivaling or exceeding prime agricultural land and tropical rain forests in the amount of organic matter produced per acre. Studies of coastal marshes show that they often produce as much as 10 tons of organic material per acre, an amount exceeding the production of our most fertile agricultural lands. The nutrients made available in this organic matter form the basis of the food chain on which many finfish, shellfish, waterfowl, and other wildlife species depend.

In addition to the requirement that a coastal barrier protect landward aquatic habitat, the Reconciliation Act directs inclusion of all associated aquatic habitats in the delineation. The landward aquatic environments associated with coastal barriers can be very expansive, especially where tidal range is high, as along the coasts of South Carolina and Georgia, or where newly accreted land is close to sea level, as on the margins of the Mississippi River Delta in Louisiana. In such areas, these habitats can include miles of open water or wetlands behind a coastal barrier. Conversely, these landward aquatic habitats can be much more limited in extent.

In view of the fact that the Reconciliation Act focuses only on Federal flood insurance, and because of the extreme reach of this phrase in certain cases, the Department has been conservative in its interpretation for the purposes of our proposed delineations. At the present time, we have encompassed only those aquatic habitats in reasonably close proximity to the fastland portion of the coastal barrier. For consistency and to the extent discernible, the natural channel or contiguous wetlands closest to the fastland portion of the coastal barrier has been used as the boundary. Nonetheless, given the diversity of aquatic environments associated with coastal barriers, site-specific delineation problems exist. Due to the lack of more detailed statutory guidance on where the landward boundary should be drawn, we are requesting comments on this issue during public review of the proposed definitions and delineations.

#### Other Issues

In simple terms, the preceding discussion outlines how we have defined a coastal barrier. However, other factors were considered during the study period. For example, extensive debate arose concerning the significance of the geologic age of the sedimentary materials that constitute a coastal barrier. Although the statute does not specify age as a criterion, some individuals commented that the definition should differentiate between very recently deposited sediments (Holocene) and those deposited in an earlier geologic period (Pleistocene or older). We have found no uniformity of opinion on this issue within the scientific community. Most technical definitions of coastal barriers do not cite the age of sediments as a criterion; in fact, most technical definitions are quite similar to the statutory definition. Furthermore, there is little evidence to indicate that age itself significantly affects the functions and dynamics that distinguish coastal barriers. Therefore, the Department has concluded that age is not an appropriate criterion for delineating coastal barriers.

During the study process, concerns were also raised that a coastal barrier be designated only in cases where there is a direct evolutionary relationship between the fastland portion of, and the aquatic habitats protected by, the

barrier. This consideration was referenced neither in the statutory definition, nor its legislative history. Coastal barriers evolve in many different ways. Determining the genesis of aquatic habitats would require detailed stratigraphic studies of each unit. We believe that the expense of such studies is not necessary to provide an adequate basis for designating coastal barriers. It would introduce unnecessary complexity into the definition and considerable problems in interpretation and application. The existence of a present day protective relationship with an inshore aquatic habitat, not how that relationship evolved, is the real concern of the law.

Finally, caution was expressed in the Congressional floor debates on the Reconciliation Act that we should address only "environmentally fragile" and "unstable" coastal barriers. Others have also suggested that stability or susceptibility to flooding be considered in designating coastal barriers. On this point, the statute is straightforward; the relative stability or susceptibility to flooding exhibited by a coastal barrier is not a factor. However, in response to these comments, this issue has been considered during the study process.

As we have discussed throughout this report, all coastal barriers are dynamic environments. The action of ocean energies on their unconsolidated sediments causes erosion and accretion resulting in changes in their size, shape, and location. While the rate of these changes depends on a variety of factors, the relatively few studies of long-term changes in particular coastal barriers demonstrate that even apparently stable coastal barriers may suddenly, and often inexplicably, begin to erode or accrete. Further, due to their location, coastal barriers also bear the brunt of hurricanes and off-shore storms. All are, therefore, potentially subject to flooding and severe damage from winds. The occurrence of water or wetlands behind these landforms increases the potential flood hazard.

We recognize that coastal barriers differ in both stability and susceptibility to flooding. Incident wave energy, tidal range, slope of the nearshore zone, number and elevation of dune ridges, distribution and type of vegetation, and the extent of open water landward of the barrier are all variables. Taken together or individually, however, these factors would not substantially change

our delineations. The existence of a linear or curvilinear beach feature is a readily observable and reliable indicator that an area is subject to significant levels of wind, wave, and tidal energies which have the potential to cause erosion, storm flooding, and damage to structures.

In summary, the Department has found that the statutory definition of a coastal barrier, though brief, includes the essence of the many complicated components comprising a natural coastal barrier system. While additional factors might be proposed, their exclusion does not detract from the validity of the definition for the purpose intended by Congress or diminish its scientific rationale or credibility. The presence of the three structural and functional characteristics required by the statute demonstrates, at once, the hazards and values of coastal barriers and provides a logical basis for identifying them.

We note, however, that the Reconciliation Act fails to account for one aspect of coastal barrier dynamics. The Act does not appear to address the question of whether the delineations should be periodically updated to modify boundaries when barriers migrate or to add coastal barriers when development has been erased by nature.

#### **Definition of "Undeveloped"**

The second part of our responsibility under the Reconciliation Act is to identify which coastal barriers are "undeveloped." In short, Congress provided that areas with development already constructed on the ground should not be designated.

The statute defines an undeveloped coastal barrier, or portion thereof, to exist only if there are few man-made structures and these structures and man's activities do not significantly impede geomorphic and ecological processes. In general, the Department considered as undeveloped areas that as of March 15, 1982, had fewer than one structure for every five acres of fastland, did not have a full complement of infrastructure, and were not phased development projects. Furthermore, if there were any structures at all in an area, these structures and man's activities had to be determined not to significantly impede geomorphic and ecological processes.



### Date of Determination

The Department based its proposed designations upon the level of development on the ground as of March 15, 1982. The public was notified of the importance of this date by the Department's Federal Register announcements of December 1, 1981, and January 15, 1982. This date was chosen to provide a grace period from the date of enactment of August 13, 1981. It was also chosen to ensure that the proposed designations could be provided within one year of enactment of the Reconciliation Act, as required by the Congress. Any later date would have made such a schedule virtually impossible, causing a delay in the final designations. In turn, this would have reduced the period needed by FEMA and private property owners to prepare for the cut-off of new Federal flood insurance beginning on October 1, 1983.

### Structures

We have used a density threshold of one structure per five acres of fastland to categorize a coastal barrier as developed. This standard is cited in the legislative history of the Reconciliation Act and has been used in previous Departmental delineations. From experience, we know that structures and the associated levels of human activity at densities greater than this threshold tend to interfere with the natural processes that build and maintain coastal barriers.

In this context, we have used the term "structure" to refer to a legally authorized building larger than 200 square feet in area, regardless of the size or number of housing units it contains. The effect of multiple-unit structures, like high-rise condominiums, is taken into consideration by assessing the impact of the structure, associated infrastructure, and the often considerable human population on the ecological and geological process of the coastal barrier. Thus, an area in which a multiple-unit structure is located that does not meet the one structure per five acre threshold can, nevertheless, be considered an undeveloped coastal barrier only if these impacts do not significantly impede natural processes.

We have not considered permits, approved development plans, or other legal indicators of an intent to develop as constituting evidence of development under this law. Neither the specific language of the Reconciliation Act, nor its legislative history, support reliance on any development that is not visible on the ground. In lieu of considering planned or proposed future development, Congress provided a delay in the date for terminating the availability of Federal flood insurance until October 1, 1983. Anyone with the legal right to develop can do so before that date and still be eligible for Federal flood insurance coverage. It is also important to emphasize that designation of a coastal barrier as undeveloped does not in any way prohibit development of that property after October 1, 1983; it merely transfers some of the risks of development back to the private sector.

#### Infrastructure

Consistent with this approach, the legislative history of the provision shows that the existence of infrastructure on the ground could substitute for the actual existence of structures. Accordingly, the Department has also considered a unit developed if it has a full complement of infrastructure--a concept we have defined to mean improved road access to each building lot or site plus the reasonable availability of water, sewage treatment capability, and electrical service adequate to support the proposed development.

Implicit in this criterion is the requirement that the developer must have expended private capital to make these services available. Only those areas that are clearly being developed or capitalized "on the ground" have been deleted. The entire development concept rests on this premise. A general availability of utilities, particularly if provided at little or no expense to the property owner, does not meet this critical requirement; the determinant is the level of private capital involvement on the ground. Development is not inevitable until direct private construction begins in earnest.

#### Portions of a Coastal Barrier

The statute provides that a portion of a coastal barrier may be designated. The Department's definition and the legislative history of the Act state that the

minimum ocean-facing shoreline of a coastal barrier should be, in general, at least one-quarter mile. This is only one of several factors that must be considered, however. While in most instances, unit boundaries are established by natural breaks, such as inlets, or by intervening areas that are otherwise protected or clearly developed, the proposed definitions contain two exceptions to this general rule.

The first exception applies to large single ownerships that are being developed under a phased development plan. We have not created a new discrete segment at the edge of a clearly developed area in those cases where initial construction has been substantially completed on at least one phase of a project involving 100 or more building sites being developed by one entity, and where the phasing of this development has been publicly documented and diligently implemented from the outset of the project. Instead, the remaining portion of that single ownership has been considered an integral part of the existing development.

Since the edge of a developed area typically represents a break in ownership, as well as a break between developed and undeveloped areas, using the edge of clearly developed areas to establish a unit boundary is a pragmatic and practicable approach. In the phased development situation, however, this is not true; there is no break in ownership at the edge of an area that has been developed. Rather, there is a large remaining portion of a single owner's property that has been planned for development on a phased timetable.

The substantial completion of one phase of a project demonstrates the commitment of the owner to complete the entire project. The existence of infrastructure alone would not constitute completion of the first phase of development in this case; to be a phased development project, one phase must be substantially completed. In addition, investment on the ground for that initial phase must have been committed based upon the plan for the overall project, and this interrelationship among the various phases must have been publicly documented from the initiation of the project.

We believe this approach is both consistent with the history of the coastal barrier effort and with the intent of Congress. However, the number of areas

revised or deleted in the application of this concept has expanded from three in our draft delineations to more than ten in the proposed delineations. The Department remains concerned about the application of phased development in a fair and even-handed manner. For example, we are still considering additional measures to ensure that there is an actual, on the ground interrelationship between completed and planned phases. The Department has highlighted this issue for public review during the comment period on the proposed designations.

In addition to the phased development exception to this general quarter-mile rule, the Department has evaluated the relationship between the proposed segment and man's activities in the adjacent area. This means that an area smaller than a quarter-mile might be designated if it is surrounded by an otherwise protected, undeveloped area. Alternatively, the existence of dense, intrusive development in the surrounding area may serve to move the unit boundary from the edge of the development to an area beyond its direct impact. Some large development projects may have a continuing impact beyond what would typically be considered a break in development. If so, the segment is begun only at the point that the area is judged to be free from significant impacts of such development. In this manner, a unit somewhat larger than a quarter-mile may not be included if surrounded by dense, intrusive development.

Finally, the proposed designations include portions of coastal barriers only when the unit responds to the three descriptive and functional characteristics of a coastal barrier contained in the statute. In other words, each unit must have a beach zone, a fastland portion, and landward aquatic habitat. A portion, therefore, is included only if it is substantially undeveloped from beach to bay. We have found that there are cases where the beach area is not developed but the rearward portion is, or vice versa. However, due to the lack of specific Congressional direction on this point, such portions have normally not been designated as undeveloped for purposes of the proposed delineations, unless the area of scattered development is very small in relation to the size of the unit.

### Impediment to Natural Processes

A unit also would not be considered undeveloped if it had at least one structure and a substantial level of human activity within the unit itself which, together, significantly impede the geomorphic and ecological processes of the barrier. Structures and human activities significantly impede these natural processes only if they interfere with the long-term perpetuation of the coastal barrier system. This level of interference is found to occur primarily when the surface of a coastal barrier has been stabilized through artificial means. This provision would not normally be applicable to activities that mimic, enhance, or restore natural systems, or to any activity that does not threaten the integrity of the coastal barrier landform.

### "Otherwise Protected" Areas

The Reconciliation Act also provides that an undeveloped coastal barrier shall not be designated if it is what we have termed "otherwise protected." This applies to two different categories of properties. The first type concerns coastal barriers which are included within the boundaries of an area established under Federal, State, or local law. The second type concerns those held by qualified not-for-profit organizations. In both cases, however, the purpose must be the same: the area must be held primarily for wildlife refuge, sanctuary, recreational, or natural resource conservation purposes. We have interpreted this to require that the interest owned be adequate to protect the area and that the property be dedicated to one of these purposes. In addition, the non-governmental owner must meet the standards provided by Congress in the Tax Treatment Extension Act of 1980 which amended Section 170 of the Internal Revenue Code. It must not only be a private, non-profit organization; it must also be an organization with the commitment and resources to enforce the interests it owns and protect its holdings for conservation purposes.

A substantial number of coastal barriers, or portions of barriers, have not been designated because of this stipulation, giving rise to two concerns. First, not all of the areas which are excluded under the terms of this provision are



actually protected. Determining with certainty that protection is actual and permanent is extremely difficult and requires the detailed examination of the terms of each statutory authorization or deed. More significant, however, is the difficulty in cataloguing privately-owned properties within the boundaries of governmental conservation areas. Because these inholding areas are privately owned, they are generally subject to development, even though within the boundaries of a conservation area.

Our second concern is whether there is any reasonable purpose in excluding "otherwise protected" areas from designation. From our perspective, this aspect of the Reconciliation Act does not appear to be consistent with the overall intent of Congress. To the degree such areas are truly "otherwise protected" and not subject to development, Federal flood insurance seems not to be necessary or appropriate. The sale of Federal flood insurance for development within governmental areas set aside for conservation purposes seems particularly inappropriate. Not only is this inconsistent with the protection of the conservation area, but it is also inconsistent with the treatment of similar lands outside of the boundaries of the "protected" governmental unit.

Therefore, we recommend an amendment to the Reconciliation Act to provide that all undeveloped coastal barriers be subject to designation, regardless of their protected status. We will submit to Congress by mid-November 1982 a tentative identification of these "protected" areas that appear to otherwise qualify as undeveloped coastal barriers. After thorough consultation with affected State and local governments, and opportunity for public review and comment, we believe we could complete final delineation of these areas prior to October 1983.

Should Congress amend the Reconciliation Act by deleting the provision regarding "otherwise protected" areas, about two-thirds of the coastal barriers on the Atlantic and Gulf would likely be designated as part of the system of undeveloped coastal barriers where new Federal flood insurance would no longer be available after October 1, 1983. Such a result would, in our view, be most consistent with the intent of Congress in enacting Section 341(d) of the Reconciliation Act.

## Summary

The Department's proposed definitions and delineations and our recommendation for amendment of the statute are the direct and tangible products of the study requested by Congress. Based upon our intensive experience with this legislation for the past year, however, we have drawn one additional conclusion. Congress has shown that important budgetary problems and vital natural resource issues can be addressed without relying on Federal acquisition or regulation. Moreover, with a relatively simple but carefully thought-out definition of a natural resource classification, such an approach can be implemented quickly and efficiently.

With the Reconciliation Act, Congress provided us with a very simple definition of an undeveloped coastal barrier. We have found that its simplicity is its strength. This definition effectively segregates and identifies a specific type of natural resource area on the ground, an identification that can be confirmed by objective means such as aerial photography. Equally important, the definition can be implemented in a manner that carefully shadows scientific consensus in the area without being overwhelmed by scientific debate. We are confident that our efforts under this provision will achieve the intent of Congress--to limit new Federal flood insurance in these vulnerable coastal areas in a logical and rational manner.

**Undeveloped Coastal Barriers**

**Proposed Designations**

**Beach Lengths (by State)**

<b><u>State</u></b>	<b><u>Approximate Beach Length (miles)</u></b>	<b><u>Number of Units</u></b>
Maine	7.0	10
Massachusetts	65.8	41
Rhode Island	20.7	11
Connecticut	7.0	11
New York	21.4	12
New Jersey	3.8	2
Delaware	19.5	2
Virginia	13.8	4
North Carolina	56.2	10
South Carolina	38.9	12
Georgia	28.3	7
Florida	150.3	35
Alabama	18.4	4
Mississippi	6.9	4
Louisiana	113.6	12
Texas	<u>176.0</u>	<u>11</u>
Totals	747.6	188

