ABSTRACT

Janet Paith. The Impact of the Coastal Barrier Resources Act on the Development and Environment of North Topsail Beach, North Carolina. 1995.

The Coastal Barrier Resources Act of 1982 provides an economic disincentive to the development of designated "undeveloped" coastal lands. By denying certain federal assistance, this law was intended to minimize the loss of human life and minimize the damage to fish, wildlife, and other natural resources associated with coastal barriers. North Topsail Beach, North Carolina is used as a case study to evaluate the effectiveness of the federal law. According to the data collected on population and development, government funding, and the environment, the federally designated "undeveloped" land at North Topsail Beach is being developed. The Coastal Barrier Resources Act has not met its objectives as an environmental policy in this investigation.

ACKNOWLEDGEMENTS

There are several people to thank for their contributions toward the completion of this project. I appreciate Dr. Turner's patience, timeliness, and his thorough examinations of my work. Dr. Brower inspired me to learn a great deal about the subject of coastal management. To him, I will ever be thankful for this knowledge. I am grateful to Milton Heath for accepting the responsibility of sitting on my committee and for being so kind, prompt, and courteous. To attend the University of North Carolina at Chapel Hill and to expand my thoughts on environmental matters through the Department of Environmental Sciences and Engineering was a valuable experience. The people from the public and private sectors who offered their information and insights are recognized on the following page. A large thank you is extended to everyone!

Most of all, I would like to thank my parents for their unwavering support and faith. The difficulties were great at times, but the encouragement and prayers of family and friends truly made the journey much easier. Thank you all for your love and understanding.

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List of Abbreviations

AAER	Average Annual Erosion Rate
AEC	Area of Environmental Concern
CAMA	Coastal Area Management Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resources System
DOI	Department of Interior
FEMA	Federal Emergency Management Act
GAO	General Accounting Office
LUP	Land Use Plan
NCDOT	North Carolina Department of Transportation
NFIP	National Flood Insurance Program
NTB	North Topsail Beach
NTW&S	North Topsail Water & Sewer
ORW	Outstanding Resource Water
SR	State Road
WOB	West Onslow Beach

Chapter 1

INTRODUCTION

Development in Federally Designated Units of Land Affects Human Safety, Costs the Federal Government, and Alters the Environment

Public Safety

In 1984, the coastal barriers were becoming urbanized at twice the national rate and one out of every four Americans lived within 100 miles of the Atlantic and Gulf Coasts (Kuehn, 588). Today, a larger coastal population places more people in danger of the damaging effects of natural disasters such as flooding and hurricanes. Yet, the pressure for increasing development and recreation continues. "By the year 2000, 3 out of every 4 Americans will be located within 50 miles of a shore, given current demographic trends (Godschalk, 1)."

Economic Cost

The American public assumes much of the economic costs of coastal development. "In 1979, the American taxpayer was underwriting $80 to $90 million through grants for coastal barrier highway and bridge construction, much of which created the mainland access necessary for profitable coastal barrier development (Kuehn, 590)." After the barriers became accessible, federal funds helped supply infrastructure such as water systems and wastewater treatment systems. "In 1981, the

Department of Interior (DOI) found that federal assistance to coastal barrier development and redevelopment amounted to $100 to $200 million per year (Kuehn, 629)." The DOI reported that from 1981 to 1985, about 23% of presidentially declared disasters involved coastal flooding due to hurricanes (GAO, 23). "The All-Industry Research Advisory Council goes even further, predicting that it is now possible for the United States to experience two $7 billion hurricanes in a single year, which would be disastrous for the insurance industry (Jones, 1027)." The government also paid for costly shoreline stabilization projects. Not only do financial concerns still exist, but the environmental concerns are great, too.

Environmental Concern

Coastal barriers and adjacent associated areas are important habitats for many species of fish, birds, and other wildlife. Large numbers of wintering and migrating birds depend on the wetlands and barriers for food and shelter. "More than half of the coastal wetlands in the lower 48 states have already been destroyed, and residential development is the culprit for more than ninety percent of the loss directly related to human activities (Jones, 1023)." Threatened species depend on coastal environments for survival. For instance, more than 20 endangered species find habitat on coastal barriers (Senate Report, 3214). Nationally, the importance of coastal habitats has been recognized by the establishment of United States Fish & Wildlife refuges and National Seashore Parks operated by the National Park Service.

The wetlands and estuaries nurture stocks of fish vital to commercial and recreational fishing. Many species depend on coastal barrier habitats during some stage of their life cycle. Shellfish are examples of species dependent on coastal barrier habitats. "The National Marine Fisheries Service estimated that more than 90% of the United States commercial catch in the Gulf of Mexico and more than 80% of the commercial harvest on the Atlantic coast was comprised of species dependent on coastal barrier habitats. The 1980 commercial value of these catches exceeded $1 billion dollars (Senate Report, 3213)."

Despite the value of this wildlife, coastal barriers are becoming urbanized. Development-related activities such as filling wetlands, disposing of sewage effluent, and clearing vegetation impairs coastal barrier ecosystems. The environmental impact of future development in high-risk zones could have profound consequences.

Addressing the Issue

Coastal Barriers of the Past

Before World War II, approximately 90 percent of coastal barriers were undeveloped and largely inaccessible to the public (Report to Congress, 10). After World War II, people became more mobile and prosperous. Aesthetics, tourism, and recreation drew affluent people to the coastline. The largely inaccessible and undeveloped coastal barriers crumbled under more intense development pressure. "Southern coasts were being developed at an estimated rate of 5,000 to 6,000 acres per year as of 1982 (Senate Report, 3214)."

Synopsis of Coastal Barrier Resources Act

Congress became cognizant of the need for coastal barrier protection. The federal law, the Coastal Barrier Resources Act (CBRA), was passed in 1982. It was designed to protect the "undeveloped" portions of coastal barriers. These "undeveloped" areas are known as Coastal Barrier Resource System (CBRS) units. The CBRA specifies three goals: "to minimize the loss of human life, wasteful expenditure of federal revenues, and damage to fish, wildlife, and other natural resources associated with coastal barriers.. (CBRA Public Law 97-348, 3214)." Figure 1 outlines the Congressional statement of findings and purpose of CBRA. Appendix A contains the Coastal Barrier Resources Act (1982) and Appendix B contains draft maps of the Coastal Barrier Resource System Units (1985). The Coastal Barrier Resources Act was amended in 1990 as the Coastal Barrier Improvement Act, but will be referred to as (CBRA) in this text.

The CBRA used an untested policy at the federal level, the expenditure's limitation approach, for the protection of natural resources. Without federal aid for flood insurance and certain infrastructure, the increase in the cost of development was intended to provide an economic disincentive for development on generally unsuitable land. Also, the federal government expected a cost savings. Without a change in policy, the DOI projected that the United States Federal Treasury would spend $5.5 to $11 billion over the 20-year period (1982-2002) plus significant costs to state and local governments (Senate Report, 3214).

§ 3501. Congressional statement of findings and purpose

(a) The Congress finds that—

(1) coastal barriers along the Atlantic and Gulf coasts of the United States and the adjacent wetlands, marshes, estuaries, inlets and nearshore waters provide—

(A) habitats for migratory birds and other wildlife; and

(B) habitats which are essential spawning, nursery, nesting, and feeding areas for commercially and recreationally important species of finfish and shellfish, as well as other aquatic organisms such as sea turtles;

(2) coastal barriers contain resources of extraordinary scenic, scientific, recreational, natural, historic, archeological, cultural, and economic importance;[1] which are being irretrievably damaged and lost due to development on, among, and adjacent to, such barriers;

(3) coastal barriers serve as natural storm protective buffers and are generally unsuitable for development because they are vulnerable to hurricane and other storm damage and because natural shoreline recession and the movement of unstable sediments undermine manmade structures;

(4) certain actions and programs of the Federal Government have subsidized and permitted development on coastal barriers and the result has been the loss of barrier resources, threats to human life, health, and property, and the expenditure of millions of tax dollars each year; and

(5) a program of coordinated action by Federal, State, and local governments is critical to the more appropriate use and conservation of coastal barriers.

(b) The Congress declares that it is the purpose of this chapter to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts by restricting future Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers, by establishing a Coastal Barrier Resources System, and by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved.

(Pub.L. 97-348, § 2, Oct. 18, 1982, 96 Stat. 1653.)

[1] So in original. The semicolon probably should be a comma.

Figure 1 **Coastal Barrier Resources Act: Congressional Statement of Findings and Purpose, 1982**

Source: *CBRA Public Law 97-348, 1982, p157.*

Purpose of Inquiry

It was previously thought that CBRA would have a major impact on coastal barrier protection. The CBRS units were expected to remain in a more natural state due to the economic disincentives to development set by the federal government. A coastal barrier is more stable in its natural state because vegetation slows its migration landward. Also, endangered species can find habitat in this environment. However, the expenditures limitation approach has not been effective in all cases. Some federally designated CBRS units have seen extensive growth. "Of the 34 CBRS units the General Accounting Office (GAO) reviewed, 9 have undergone significant new development since CBRA was enacted, and additional future development in these and other CBRS units that are attractive and/or accessible is planned (GAO, 3)." This report analyzes the effectiveness of this law at North Topsail Beach (NTB), North Carolina.

Characterization of Area of Research

North Carolina's Coastal Barriers

North Carolina contains diverse natural resources on its coastal barriers. Dynamic coastal processes and fragile ecosystems create land forms that are constantly in flux. Sloping sandy beaches and a range of small and large dune fields occupy the ocean side of the North Carolina coastal barriers.

"North Carolina has 23 separate islands on an ocean coastline of 324 miles (Report to Congress: CBRS v11, 1)." They form the seaward boundaries of two

Sounds, the Pamilico and Albemarle. The sound side of the islands exhibit extensive marsh and wetland complexes and many habitats. North Carolina contains the second-largest estuarine system among the lower 48 states. This estuarine system covers 4,500 square miles of shallow sounds, bays, tidal creeks, and salt marshes (Report to Congress, CBRS, V11 1). "Two significant public holdings, Cape Hatteras and Cape Lookout National Seashores, constitute 127 miles of ocean frontage (Report to Congress: CBRS v11, 1)." "Additional federal and state lands open to the public combined with these National Seashores, result in about 48% of North Carolina ocean coast being in public ownership (Congress Report CBRS v11, 1)." "Combining the miles of protected and designated undeveloped ocean-facing shoreline, some 61% of the North Carolina coastal barriers shoreline have significant constraints to further development (Godschalk, 11)."

There are eight federally designated CBRS units in North Carolina. See Figure 2. Together, they consist of 7,423 acres of fastland out of a total of 35,000 acres (Jones & Stolzenburg, 4). Fastland is potentially developable land above the mean high tide line. This report analyzes the Coastal Barrier Resource System unit, Topsail Island (L06). It has 2,617.8 acres: 588.6 acres of open water, 894.6 acres fastland, 1,127.1 acres wetland, and 7.5 acres developed (Watzin and Baumann, 124). Additionally, it is not contiguous; it has two separate parts.

In 1983, North Carolina was one of six Atlantic and Gulf Coast states experiencing development pressure in the CBRS (Jones & Stolzenburg, 7). More recent investigations indicate coastal development pressures continue to affect the

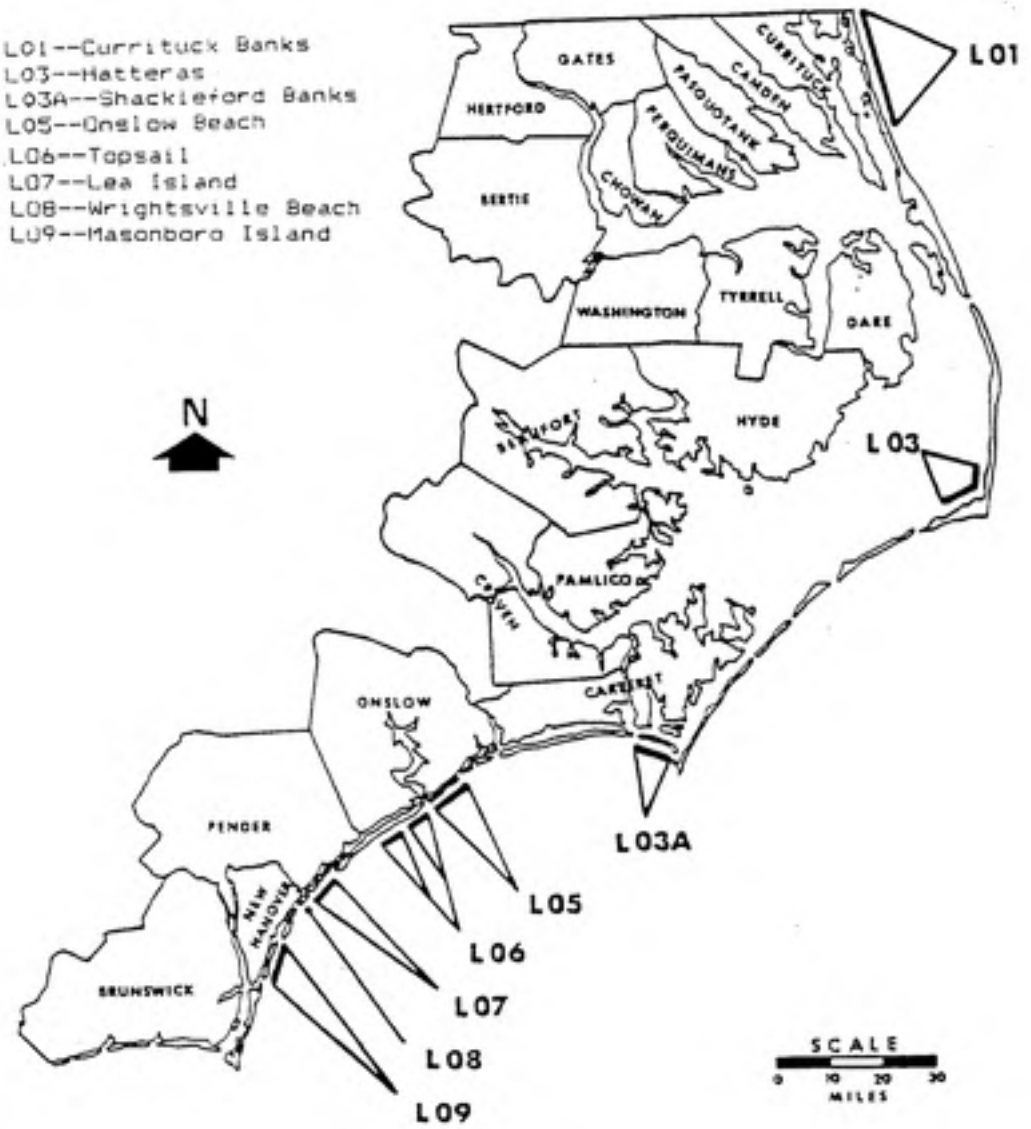


Figure 2 **Designated Undeveloped Coastal Barrier Units of North Carolina, 1982**

Source: *D. Godschalk, Impacts of Coastal Barrier Resources Act: A Pilot Study, 1984, p11a.*

coastal barriers of North Carolina. A 1989 study by the North Carolina Division of Coastal Management analyzed coastal growth and development. This research revealed the coastal region to be the fastest growing area in the North Carolina and tourism to be the fastest growing industry in the coastal region (Armingeon, 1). Previous peak years for issuing major and minor development permits under North Carolina's Coastal Area Management Act were 1985 and 1986 (Armingeon, 12). Also, permanent population growth rates over the next twenty years for coastal counties were projected to be greater than the state's projected growth rate (Armingeon, 27). This information seems to suggest North Carolina's coastal region is changing.

Topsail Island Orientation

Topsail Island, located in southeastern North Carolina, is mapped in Figure 3. Two bridges provide access to Topsail Island from the mainland. A small swing bridge on Highway 50, built in the 1950's, leads into Surf City. This bridge is very narrow and can only carry two-way traffic. If being crossed by a truck, it becomes a one-way bridge (NTB 1991 LUP, 41). Built in 1968 before CBRA, a large high bridge spans the Intercoastal Waterway into NTB by Highway 210 (NTB 1991 LUP, 41).

In the east, Topsail Island is bounded by the Atlantic Ocean and in the west, Stump Sound. The narrow island lies in a northeast to southwest direction. "Island elevation ranges from 1 to 29 feet National Geodetic Vertical Datum, although most

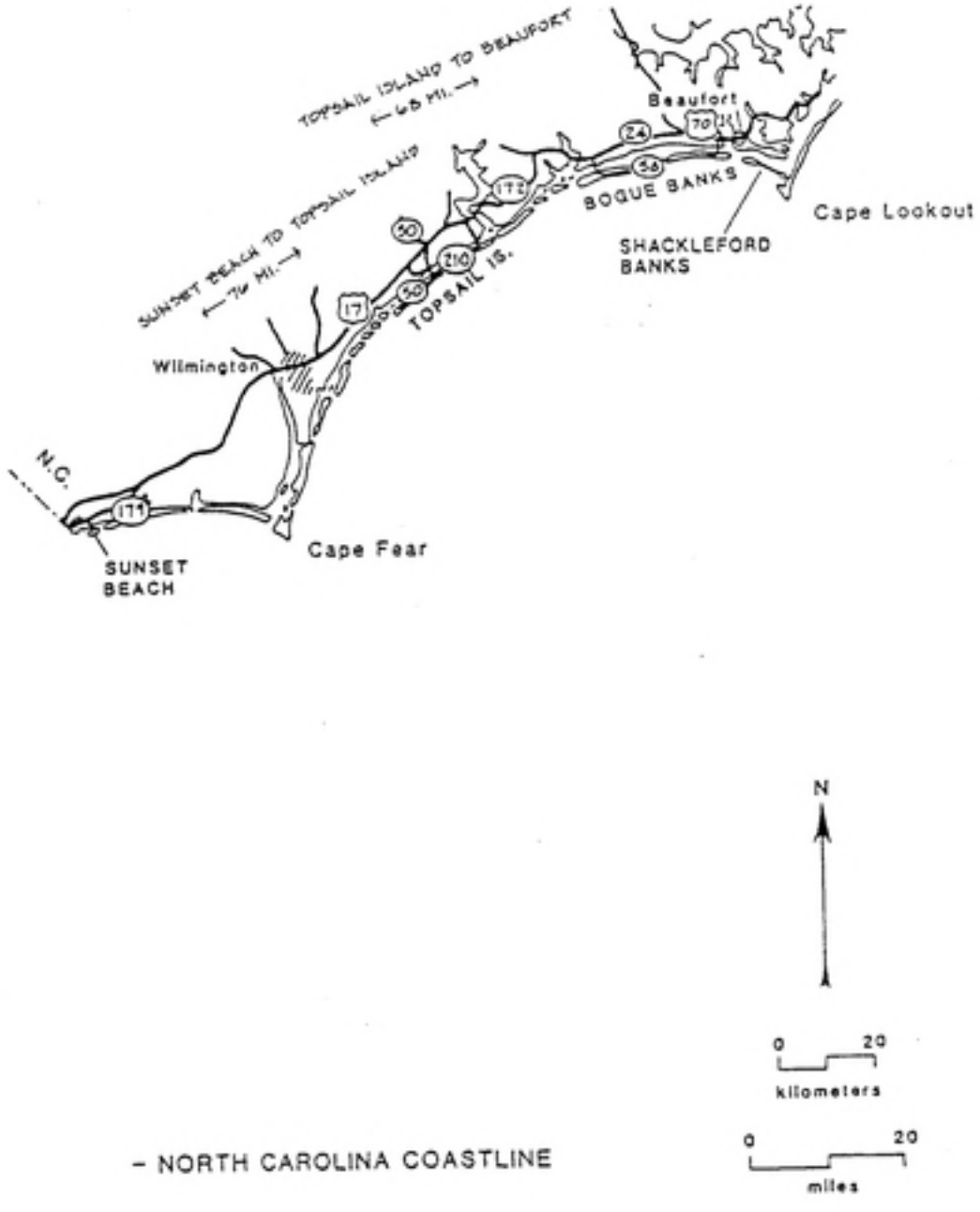


Figure 3 **Orientation of Topsail Island, North Carolina 1993**
Source: *B. Ache, Barrier Island Storm Hazard Assessment: An Intra-Island Scale Assessment of North Topsail Beach, North Carolina, 1993, p17.*

developed areas ranges from 5 to 20 feet National Geodetic Vertical Datum (Ache, 6)." "The interior of the island is open and flat and no interior dune field exists (Ache, 7)." Topsail Island is between New River Inlet and New Topsail Inlet and "is about 26 miles long with nearly 22 miles of ocean beach front (Godschalk, 12)."

Pender and Onslow Counties bisect this coastal barrier. The southern portion of the island supports two oceanfront communities in Pender County, Surf City and Topsail Beach. These towns were incorporated in 1951 and 1963, respectively (Robertson, 15). Upon incorporation in 1990, the town of West Onslow Beach (WOB) changed its name to North Topsail Beach (NTB). The area of research, NTB, occupies the northern part of the island. Among local officials, the Highway 210 bridge intersection is commonly regarded as the dividing line between the **northern end** and **southern end** of NTB. It will be referred to as such throughout the text. Figure 4 provides a magnified view of the island.

"During the period from 1980 to 1986, four of the five fastest growing counties in North Carolina were located in the coastal region (Armingeon, 4)." One of these was the coastal County of Onslow (Armingeon, 23). Figure 5 illustrates the townships in and the counties surrounding Onslow. North Topsail Beach is in the Stump Sound Township of Onslow County. It covers 7,390 acres or 11.5 square miles of Topsail Island (1991 LUP, 122).

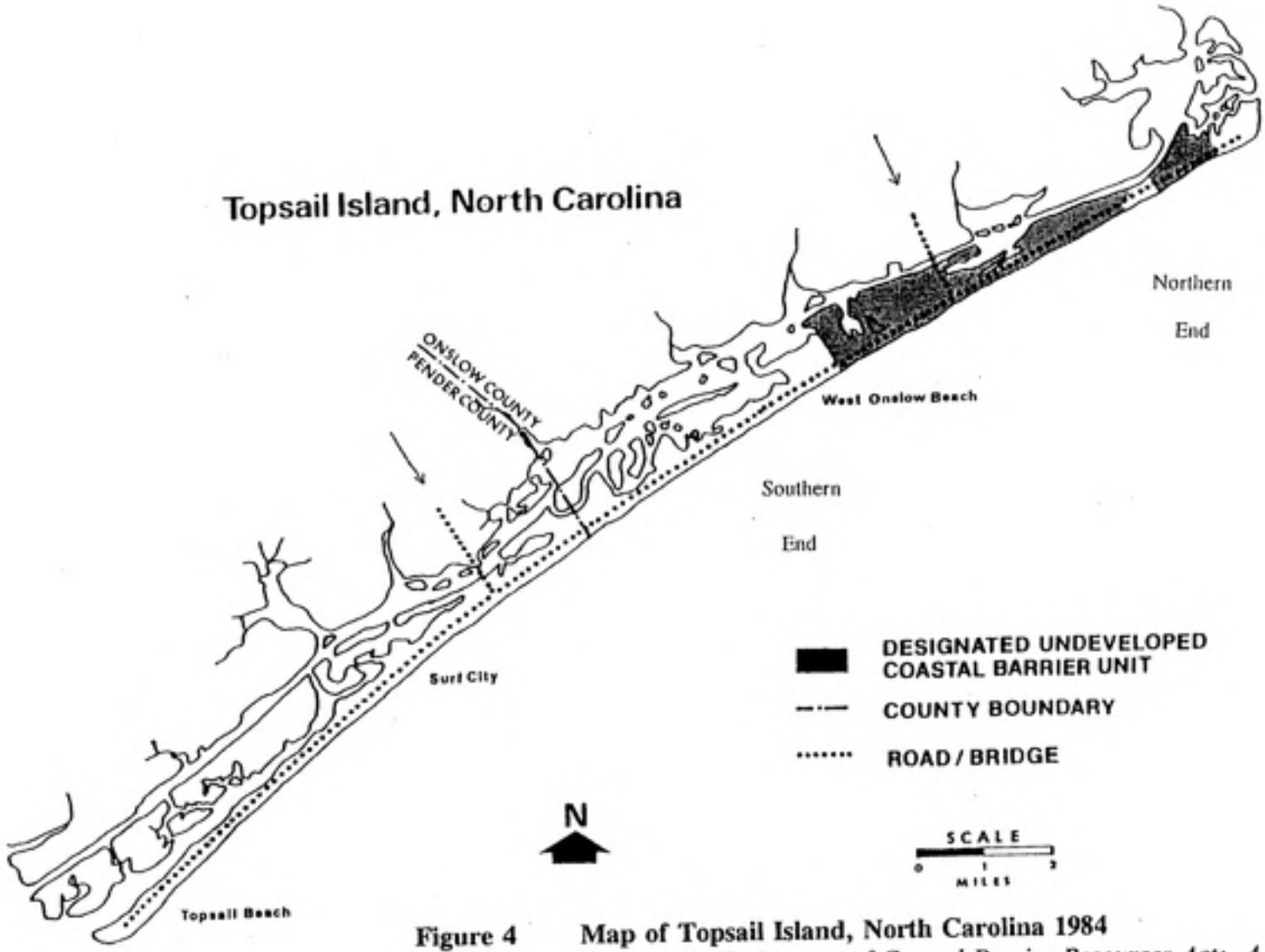


Figure 4 **Map of Topsail Island, North Carolina 1984**
Source: *D. Godschalk, Impacts of Coastal Barrier Resources Act: A Pilot Study, 1984, p12a.*

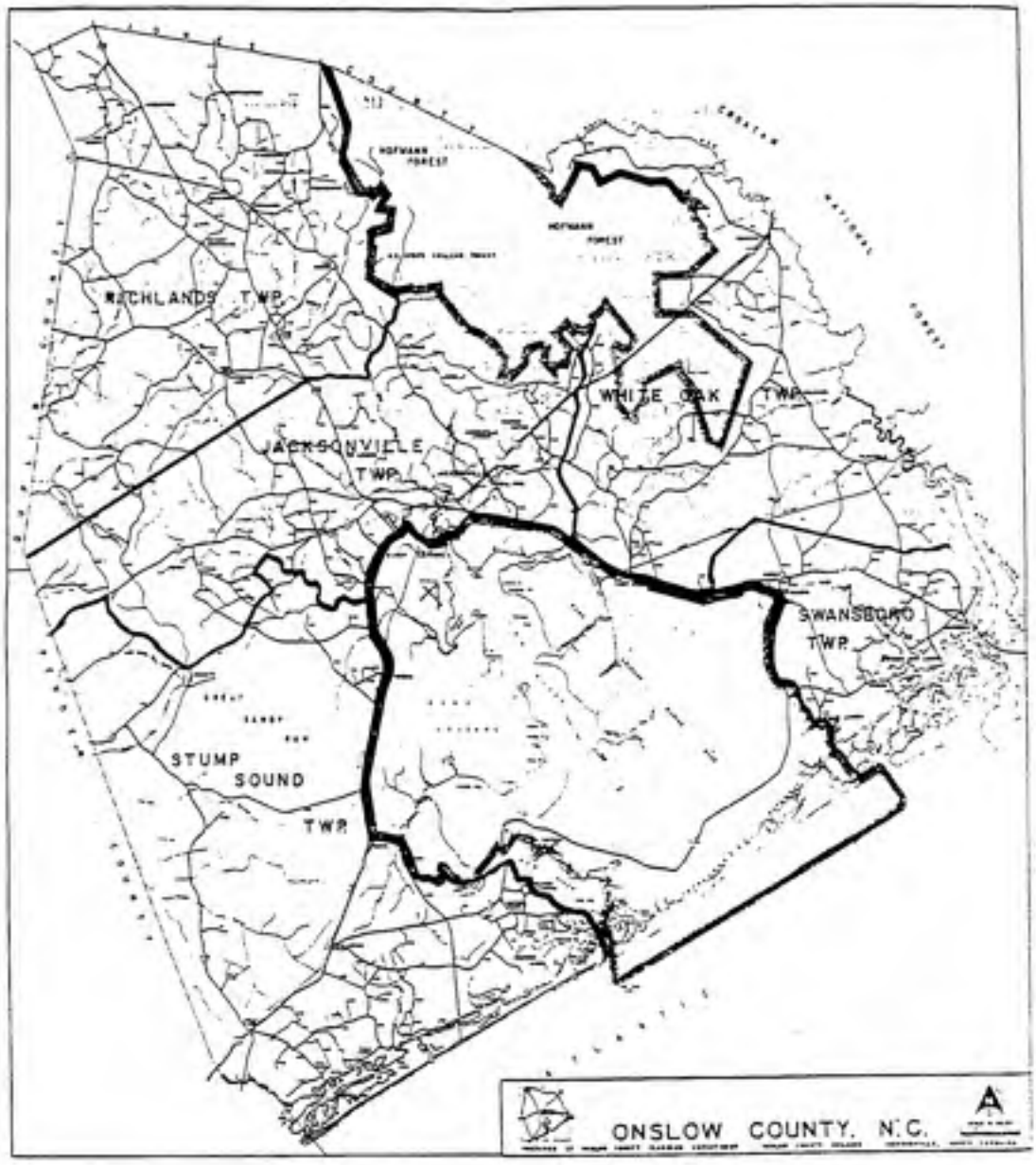


Figure 5 **Onslow County and Township Boundary Map, 1981**
Source: *Onslow County Land Use Plan of 1981, Onslow County Planning Department, piv.*

Historical Perspectives

The name Topsail Island, formerly called Ashe Island, comes from an 18th century tale. The legend says pirates would lurk in the back channels and sounds waiting to make surprise attacks on passing ships. In order to avoid such raids, the merchantmen began to look for the topsails of the pirate vessels showing above the dunes (Robertson, 14).

"Prior to 1941, the island was used for stock-grazing with boat access only (Robertson, 14)." During World War II, the government purchased the island as an extension of (then) Camp Davis. They paved roads, built a drawbridge, and occupied the island. The island went back to private ownership in 1947.

Increased development activity at North Topsail Beach, formerly West Onslow Beach, began in the early 1970's (Personal Communication, Town Manager). Historically, WOB has been a quiet, single-family residential and resort area. The southern end developed due to good access routes. Mobile homes take up a substantial amount of the southern end (Personal Communication, Town Manager). West Onslow Beach developed mostly during the 1980's north of the large bridge. High-density residential development dominated after 1982 (NTB 1991 LUP, 10). Today, the town has access to a complete infrastructure base and contains a mixture of residential structures: mobile homes, condominiums, and single-family homes.

Objectives of the Report

Investigation of the Coastal Barrier Resource System at North Topsail Beach

First, this investigation examines coastal barrier processes, discusses relevant legislation, reviews CBRA's legislative history, and describes similar case studies. Next, the case study analyzes three attributes of NTB's CBRS unit to evaluate CBRA's effectiveness. The first section in Chapter 3, Population and Development, describes past and current growth patterns of NTB. The second section, Federal, State and Local assistance, lists ways in which federal, state and local financial assistance influences growth on NTB. The third part discusses environmental impacts from land uses on NTB. After each section, an evaluation provides insight into what may happen in the CBRS unit at NTB based on current trends. A critique of CBRA in Chapter 5 reveals its strengths and weaknesses. This chapter provides policy and legislative recommendations to federal, state, and local governments. The last chapter contains the final conclusions of this case study: growth is occurring in the CBRS unit, governmental funding is promoting growth in the CBRS unit, and there are environmental implications of developing in the CBRS of coastal barriers.

A Goal of the North Topsail Beach Study

The conclusions of this study should be useful to environmental lobbyists, conservationists, developers, and coastal planners. All of these professionals must understand coastal management problems to make sound environmental policy

decisions. These decisions will manifest themselves in the ability to maintain the quality of an environmentally sensitive system with sustainable development.

CHAPTER 2

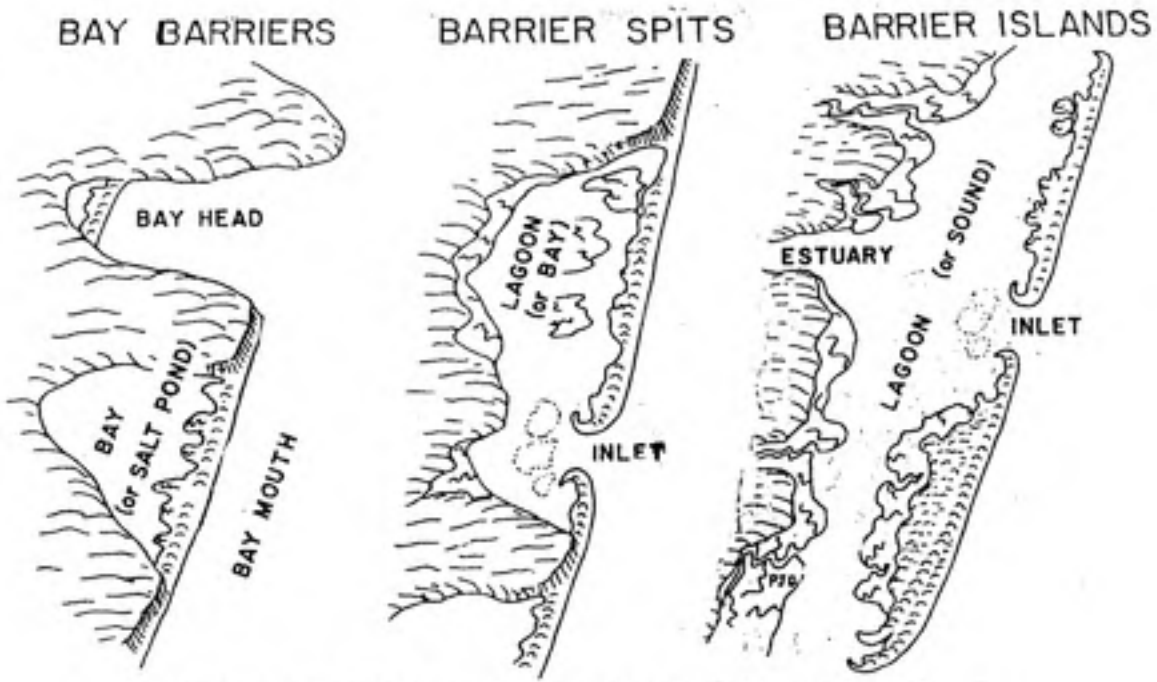
BACKGROUND

Coastal Processes

Coastal Barriers

To comprehend the efficacy of the Coastal Barrier Resource Act (CBRA), it is imperative to have a working knowledge of coastal processes. This chapter discusses beach changes, sand dunes, overwash and inlet formation, sea level rise, and erosion control. All of these factors contribute to a basic understanding of how coastal barriers subsist.

Coastal barriers are not static; they change their form, migrate, and sometimes become submerged. These land forms act as a buffer for the mainland making them highly susceptible to natural hazards such as storms, flooding, sea level rise, and erosion. Basically parallel to the mainland, coastal barriers comprise a long, narrow, low-lying offshore chain of land forms. They include islands, spits, tombolos, and bay mouth barriers. See Figure 6. Partially or entirely surrounded by ocean or sound waters, they protect the mainland and important aquatic habitats like salt marshes, wetlands, and lagoons from the full force of wave attacks. Barrier islands are formed in three ways: storms disconnect spits from the mainland, rising sea level pushes flood waters behind primary sand dunes washing them out to sea, and



TYPES OF BARRIER BEACHES: Models showing the three basic ways that sand, gravel, or other wave transported sediments are deposited to form barrier beaches which protect a lagoon and/or marsh system from direct ocean wave attack. Bay barriers are connected at each end to the mainland; barrier spits are attached at one end with an inlet at the opposite end, or grow across open water; barrier islands are separated from the mainland and each other by inlets at both ends.

(From: Godfrey, P.J. 1978. Management guidelines for parks on barrier beaches. Parks 2(4):5-10)

Figure 6 **Types of Barrier Beaches**
Source: *P. Godfrey, Management Guidelines for Parks on Barrier Beaches, 1978, p433.*

underwater sand bars build up to the point vegetation takes hold. Sea and land processes constantly work together to shape these dynamic land forms.

Beach Changes

Beaches encircle coastal barriers. The factors that determine the shape of a beach are the size of the waves, the rate of sea-level rise, the amount and type of sand, and the beach configuration (Doyle, 14). When one of these factors changes, the others must adjust accordingly to maintain balance. See Figure 7. Storms disrupt this balance. Beaches and dunes erode as wave energy increases. The sand moves from the upper beach and gets stored in offshore bars. Offshore sand bars reduce the wave energy reaching the shoreline. After a storm, a beach tends to look wide and flat. See Figures 8 & 9. Gradually, more gentle waves push sand from the offshore sand bar onto the beach. Some deposited sand comes from the inner continental shelf and some settles out of lateral currents.

Dunes

Natural cycles allow sand to move back and forth along the beach unimpeded. As the wind shifts sand along beaches, it forms the dunes that will defend against the next storm. Even though dunes grow slowly, they are crucial parts of the coastal barrier system. Not only do they protect inlands, but they store sand to feed the beach during the next storm event. Ocean penetration of dunes is common.

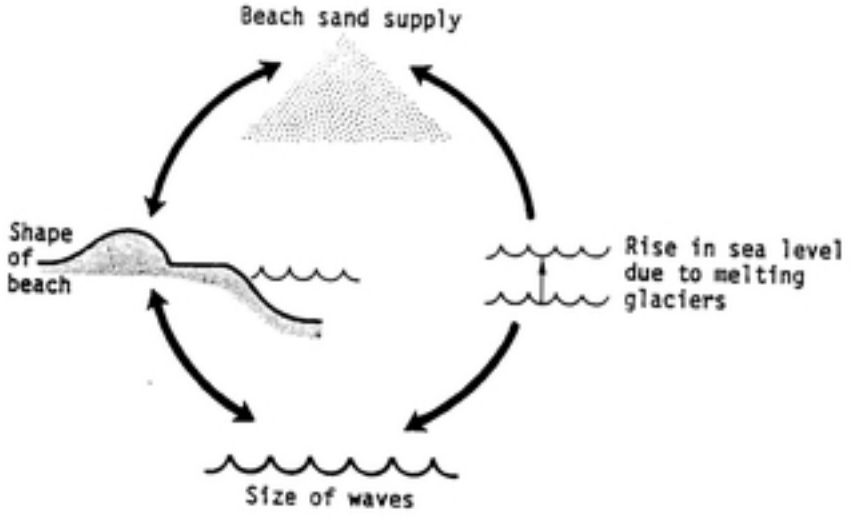
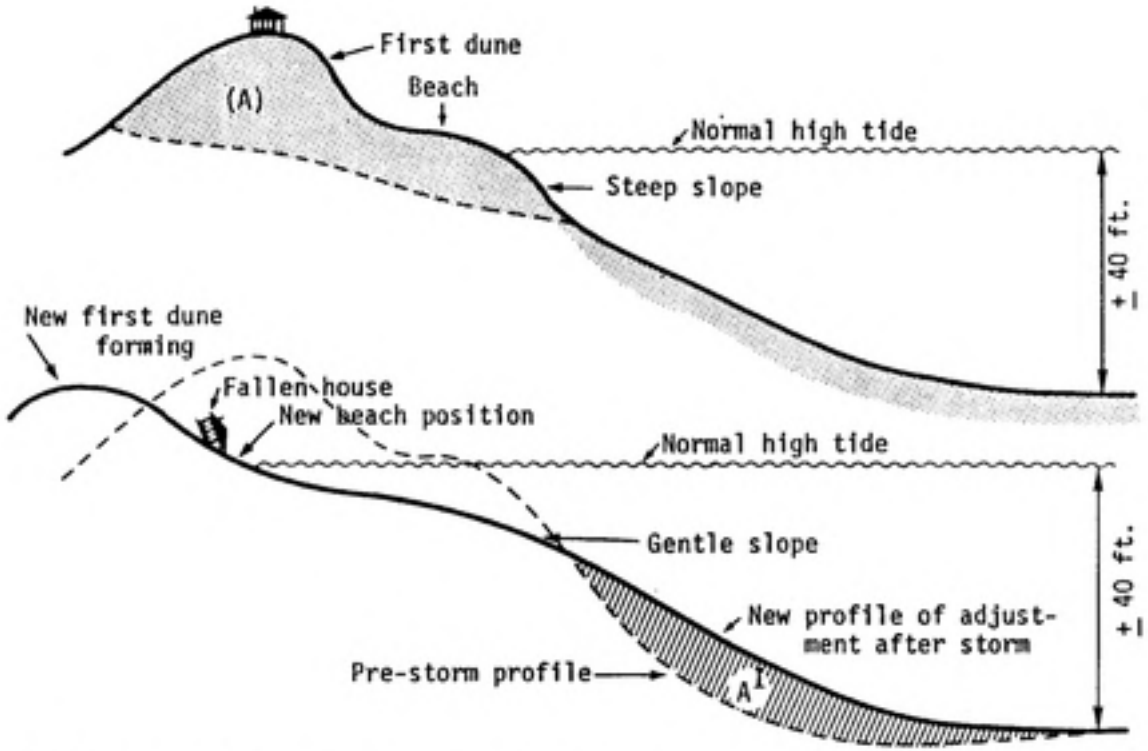
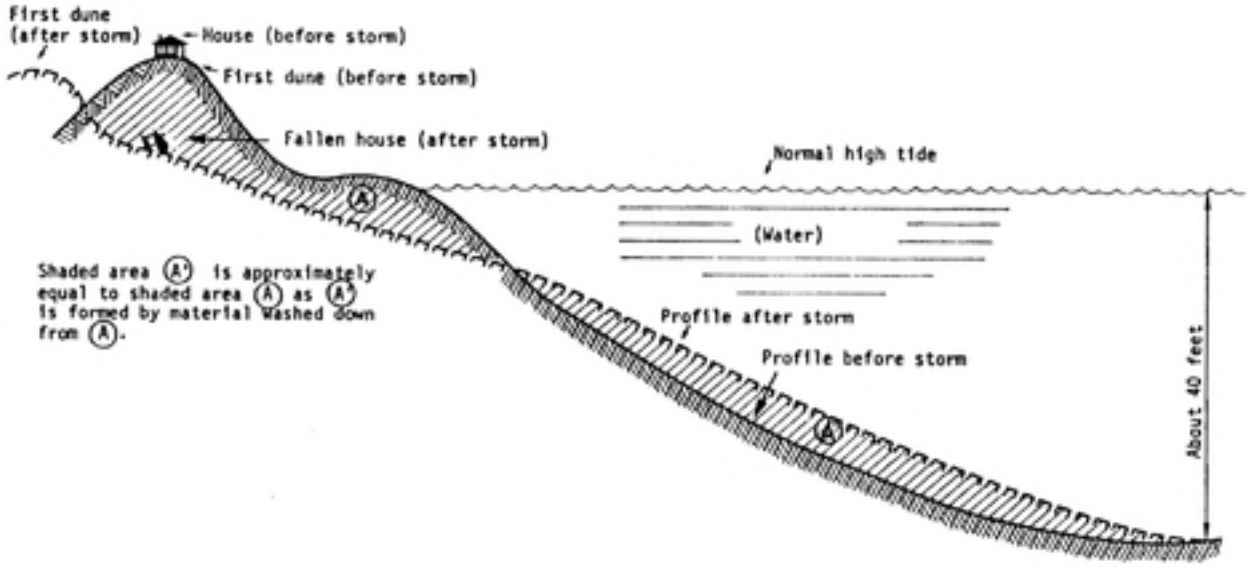


Figure 7 **The Dynamic Equilibrium Model**
Source: *O. Pilkey, From Currituck to Calabash: Living with North Carolina's Barrier Islands, 1980, p30.*



(Shaded area A' is approximately equal to shaded area A.)

Figure 8 **Beach Flattening in Response to a Storm**
Source: *O. Pilkey, From Currituck to Calabash: Living with North Carolina's Barrier Islands, 1978, p32.*



Storm response of a sand beach - why the dunes must be preserved, and why you should not build on the beach.

Figure 9 **Storm Response of Sand Beach**
Source: *O. Pilkey, How to Live with an Island, 1975, p11.*

Overwash and Inlets

Overwash occurs when waves breach depressions in dunes. When the water recedes, a fan of sediment covers the low-lying area. Continual overwash patterns result in new inlet formation. Inlets are openings that separate one barrier from another. Over time, inlets get choked with sand while tidal action works to plow open another inlet elsewhere. Sea level rise has a great impact on overwash and inlet formation.

Sea Level

Worldwide, sea level is rising at an estimated one foot per century and will keep rising in the near future (Pilkey, 12). The result is more shoreline retreat, flooding, erosion, and potential inlet formation. As sea level rises, the barriers move inland or they disappear into the sea. Migration is essential for the survival of a barrier island. The rate of migration of a barrier island will depend on how fast the sea is rising and how gently the land slopes. Ocean-side erosion can facilitate lagoon-side growth. Sand exchange and overwash processes aid the barriers in changing positions by allowing them to rollover themselves. They share sand from the seaward side to the landward side (Wells, 4.) As marsh habitats on the landward side are being buried, they are also continually recreated. Without sand-sharing processes, coastal barriers will disappear beneath sea level. See Figures 10 & 11.

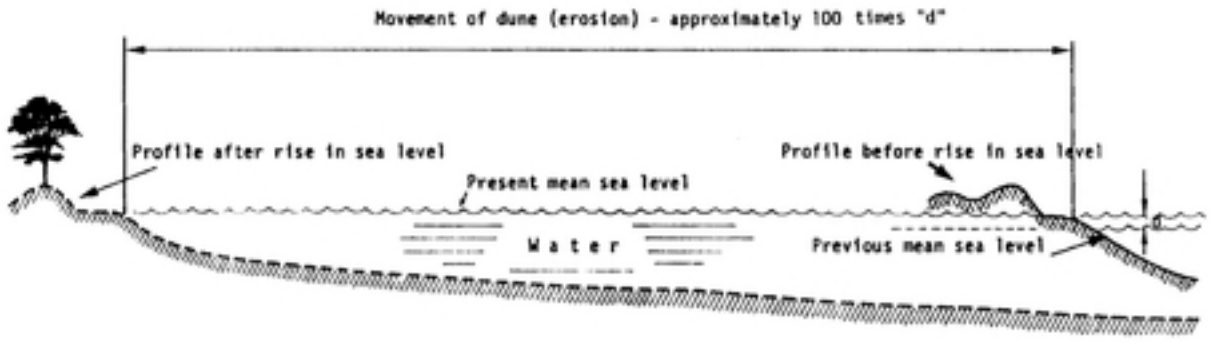


Figure 10 **Response of Sand Dune to Rise in Sea Level**
Source: *O. Pilkey, How to Live with an Island, 1975, p13.*

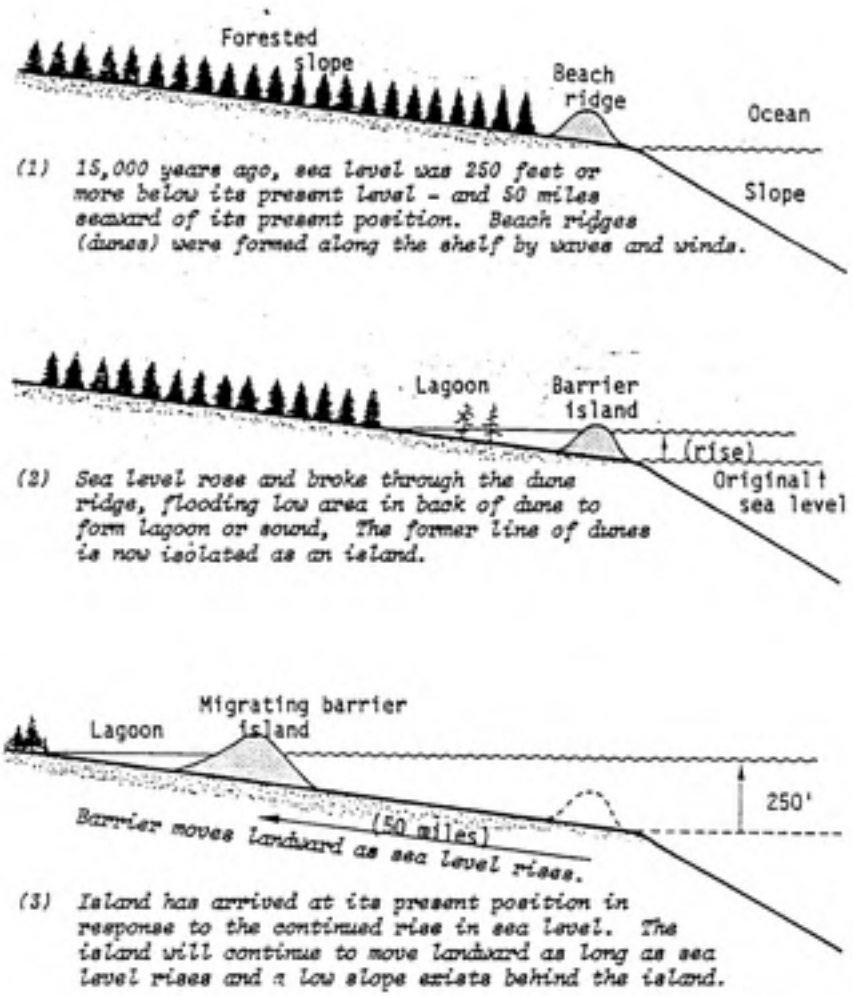


Figure 11 **Barrier Island Formation and Migration Across the Continental Shelf**

Source: *O. Pilkey, From Currituck to Calabash: Living with North Carolina's Barrier Islands, 1978, p20.*

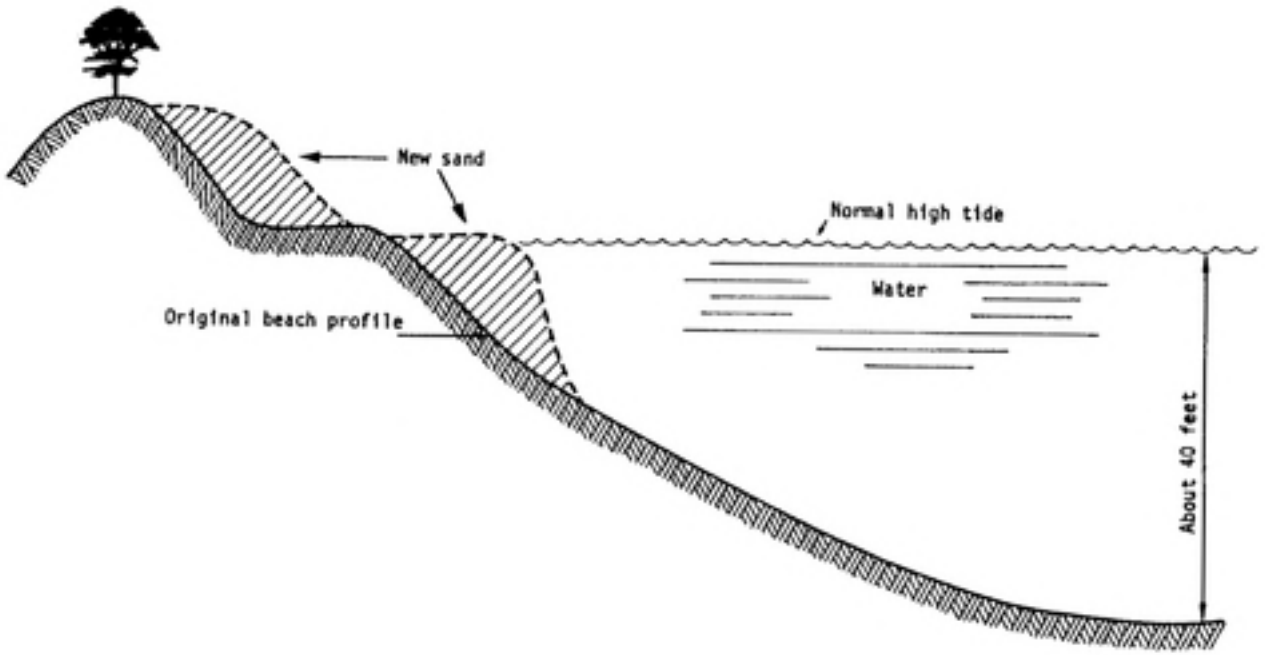
Erosion

Human intervention attempts to alter the natural system of sand exchange by using shoreline engineering. Shoreline engineering refers to methods that change or alter the natural shoreline. Shore stabilization projects will not stop erosion, although they will delay the effects temporarily (Ward, 53). Shoreline engineering includes beach nourishment, jetties, groins, and seawalls.

Beach replenishment by dredging and infilling resupplies the beach with sand. Several disadvantages to beach nourishment exist: sand sources may not be available, the sand might be too fine and wash away quickly, renourishment actually steepens the intertidal and near-shore beach profile, and erosion increases as the beach attempts to return to its natural shape (Wells, 10). See Figure 12. In addition, pumping sand from offshore rigs is very costly. North Carolina beaches that have been artificially replenished generally disappear at a rate ten times that of a natural beach (Hearings, 107).

Beach erosion is a natural phenomenon. Erosion-control methods do not prevent erosion over long periods of time. Coastal barriers are always being reshaped. Beaches frequently retreat after storms or in response to rises in sea-level. The term beach erosion only applies where construction has occurred too close to the shore. Buildings can inhibit the proper transfer of sand by natural processes.

Jetties are long walls built perpendicular to the shore. They keep sand from filling channels. Groins, smaller walls that extend into the sea, trap sand flowing in the longshore current. These erosion control measures also cause difficulties. If sand



Replenishment Effects

Why replacing sand on an eroded beach is only a temporary measure. Note that beach is steepened after new sand is placed, thereby increasing ultimate erosion rate. Slope of beach tends to return to original slope by washing material from the newly deposited sand.

Figure 12 **Replenishment Effects**

Source: *O. Pilkey, How to Live with an Island, 1975, p15.*

is trapped in one area, then another area is "starved". See Figures 13 & 14. Subsequently, stopping erosion in one area only makes the problem worse in a nearby area.

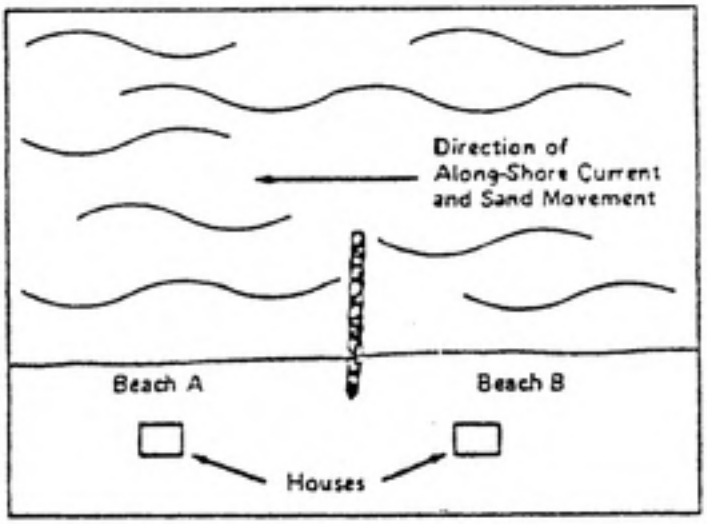
Bulkheads, riprap, or revetments are different types of seawalls. Seawalls are the most drastic measures taken to avoid erosion, and they are the most harmful to the environment (Doyle, 37). Seawalls will fail or will need to be replaced by bigger ones. Upkeep of any erosion control measures tends to be continuous and thus very expensive. Figures 15, 16, & 17 illustrate the problem with sea walls. Orrin Pilkey, a renown geologist at Duke University and activist for the preservation of coastal resources, states:

> "1. There is no erosion problem until a structure is built on a shoreline.
>
> 2. Construction by man on the shoreline causes shoreline changes.
>
> 3. Shoreline engineering protects property on the beach, not the beach itself.
>
> 4. Shoreline engineering destroys the beach it was intended to save.
>
> 5. The cost of saving beach property through shoreline engineering can often be greater than the value of the property to be saved.
>
> 6. Once you begin shoreline engineering, you can not stop it (Pilkey, 48)."

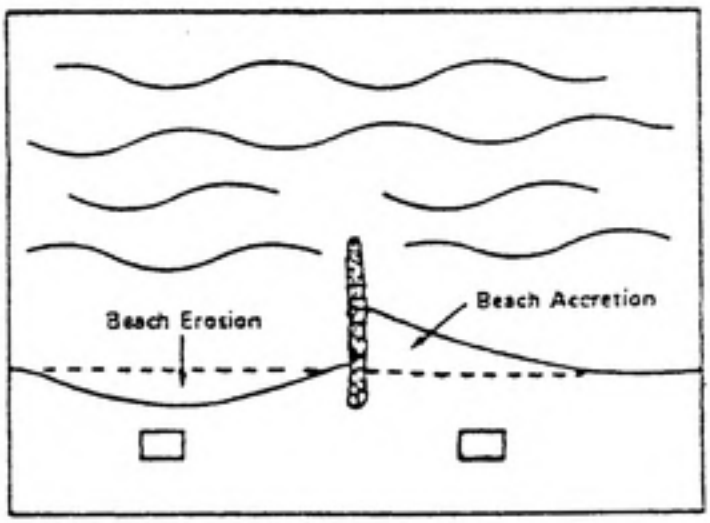
National and State Coastal Legislation

Applicable Coastal Statutes

Over the years different national and state laws and policies have focused on coastal barrier development. Relevant federal legislation includes the Coastal Zone



A. Groin Newly Constructed to Protect Beach B



B. Trapped Sand Accretes Beach B at Expense of Eroded Beach A

Figure 13 **Effect of Seawall on Beach**

Source: *Heritage Conservation and Recreation Service, Alternative Policies for Protecting Barrier Islands Along the Atlantic and Gulf Coasts of the United States and Draft Environmental Statement, 1979, p94.*

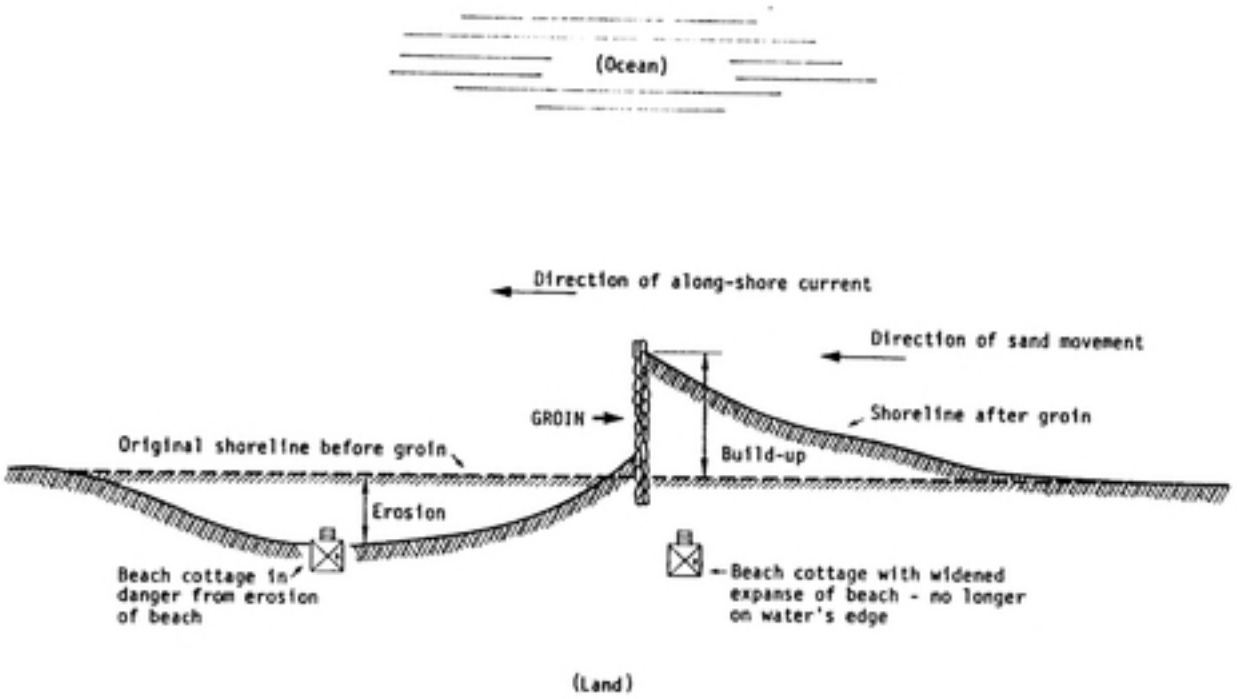
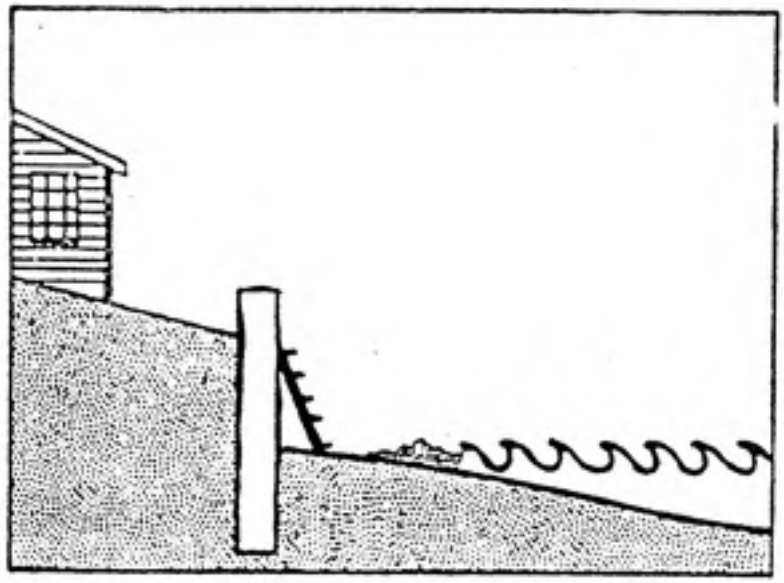
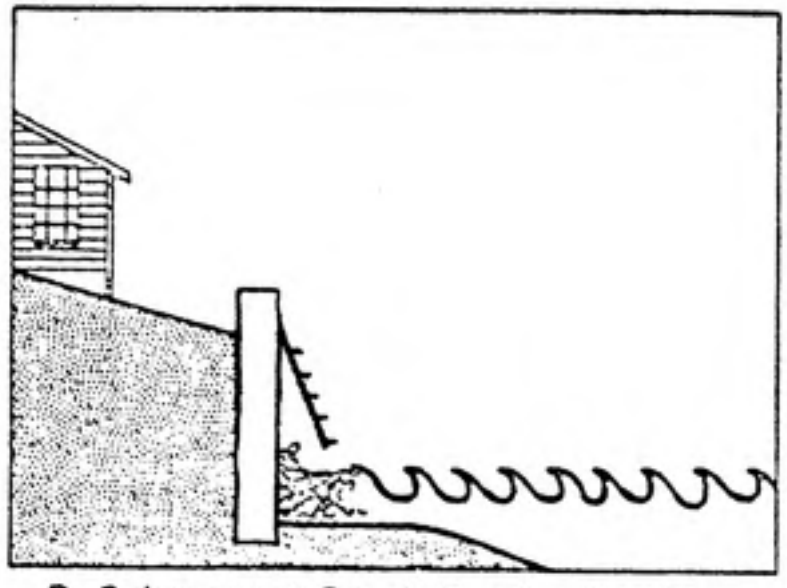


Figure 14 **Shoreline Before and After Groin**
Source: *O. Pilkey, How to Live with an Island, 1975, p16.*



A. Seawall Built to Protect Beach Front Property



B. Subsequent Beach Erosion Due to Deflected Wave Energy

Figure 15 **Wave Energy Undermines Seawalls**

Source: *Heritage Conservation and Recreation Service, Alternative Policies for Protecting Barrier Islands Along the Atlantic and Gulf Coasts of the United States and Draft Environmental Statement, 1979, p95.*

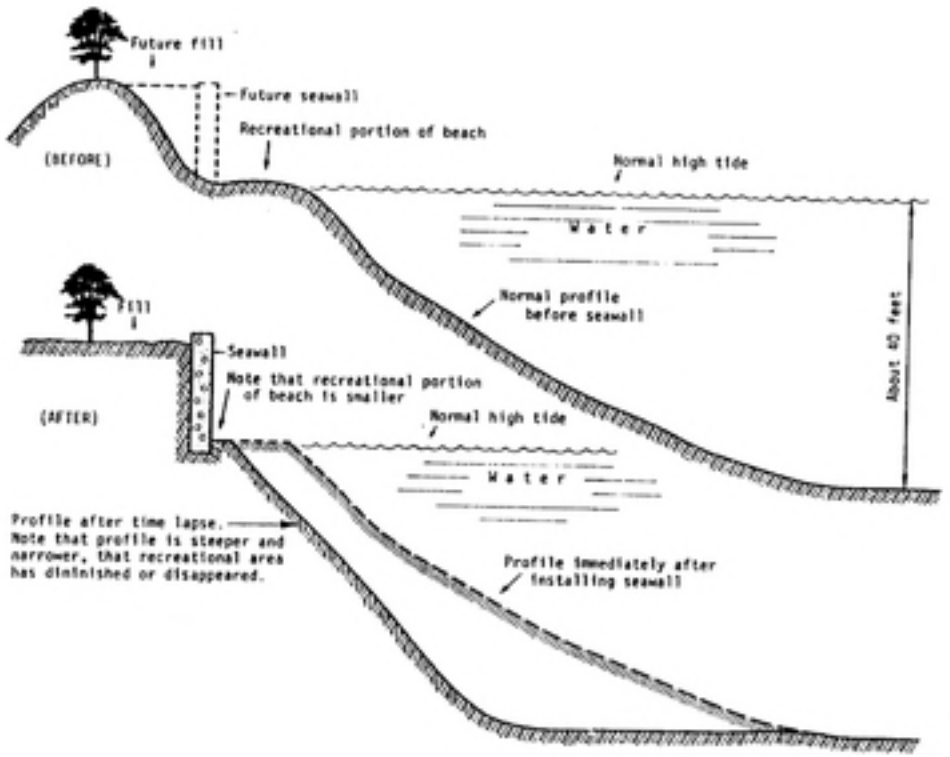


Figure 16 **Effect of Seawall on Profile of Beach**
Source: *O. Pilkey, How to Live with an Island, 1975, p18.*

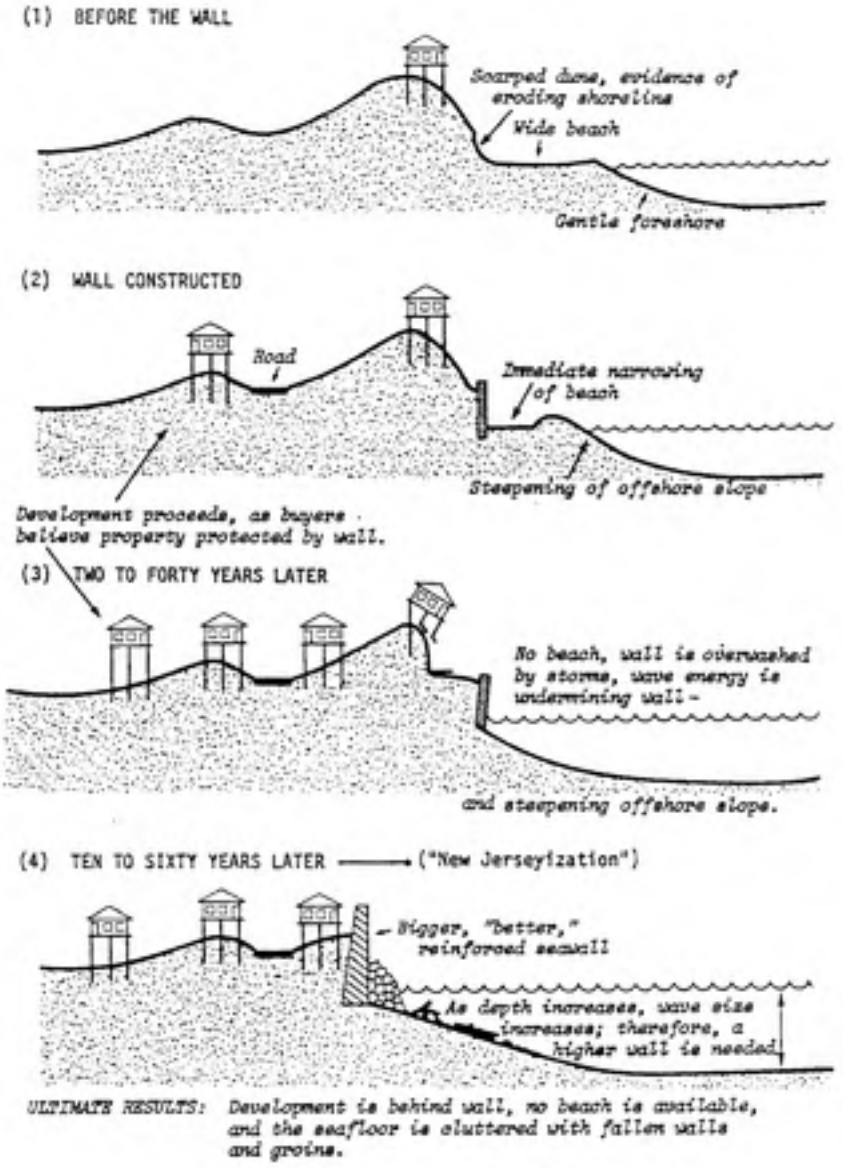


Figure 17 **Saga of a Seawall**

Source: *O. Pilkey, From Currituck to Calabash: Living with North Carolina's Barrier Islands, 1978, p44.*

Management Act of 1972 (CZMA), the National Flood Insurance Act of 1968 (NFIA), the Disaster Relief Act of 1974 (DRA), the Presidential Executive Order 11988, and the Omnibus Budget Reconciliation Act of 1981 (OBRA). The Coastal Area Management Act, otherwise known as CAMA, is North Carolina's coastal management program (Coastal Barrier Study Group, 2). Two states, Florida and Massachusetts, have state laws similar to CBRA. A review of CBRA's legislative history and other germane legislation illustrates the progressive changes in national coastal policy.

Coastal Zone Management Act of 1972

The Coastal Zone Management Act of 1972 passed in recognition of the potential adverse effects resulting from intensive development in coastal zones. In Section 303 of the Act

> "The Congress finds and declares that it is the national policy (a) to preserve, protect, develop, and where possible, to restore or enhance, the resources of the nation's coastal zone for this and succeeding generations; (b) to encourage and assist the states to exercise effectively their responsibilities in the coastal zone through the development and implementation of management programs to achieve wise use of the land and water resources of the coastal zone... (Cunningham, 577)."

This federal law established a voluntary program of financial assistance to states that wrote management plans for their coastal zones. It placed the prime responsibility for achieving effective coastal management upon the state. State management programs had to emphasize important ecological, cultural, historic, and aesthetic values and

sufficient enforceable policies to ensure implementation. Permitting responsibilities also became a state function.

National Flood Insurance Program of 1968

The National Flood Insurance Program (NFIP) began under the National Flood Insurance Act of 1968 as amended by the Flood Disaster Protection Act of 1973 (Doyle, 173). It comes within the purview of the Federal Emergency Management Agency (FEMA) and is administered by the Federal Insurance Administration. The NFIP encourages state and local governments to regulate land uses in flood zones. The goal was to reduce flood losses from development in flood zones and provide affordable insurance for high risk homeowners. It gave local authorities the power to enforce more stringent zoning and building codes inside flood-prone areas. It was thought these planning efforts would steer development away from flood-prone areas. Many coastal home owners in flood plains also became insured.

Disaster Relief Act of 1974

Under the Disaster Relief Act of 1974, the Federal Emergency Management Agency (FEMA), Disaster Assistance Program Division acts as an advisory agency for the reduction of impacts due to natural hazards and has some regulatory authority to reduce future property damage (Ward, 156). It attempts to evaluate methods for mitigating the effects of natural hazards like flooding.

Executive Order 11988 of 1977

National concern became evident in 1977 when President Carter signed Executive Order 11988 on Flood Plain Management (Kuehn, 593). The President ordered the Secretary of the Department of Interior (DOI) to render expertise in developing an effective plan for protecting coastal barriers from unwise development. Previously, a DOI work group found contradicting policies among agencies on coastal management.

Omnibus Budget Reconciliation Act of 1981

In August of 1981, Congress passed legislation that ended the issuance of federal flood insurance policies for properties inside CBRA's designated "undeveloped" areas. Section 341(d) of the Omnibus Budget Reconciliation Act of 1981 prohibited national flood insurance for new construction on "undeveloped" barrier lands after October 1, 1983. "The Omnibus Budget Reconciliation Act authorized the Secretary of Interior to designate the "undeveloped" coastal barriers based on statutory criteria (Godschalk, 3)." "The Secretary of Interior defined undeveloped coastal barriers as those which, on March 15, 1982, contained less than one walled and roofed building per five acres of fastland or did not have a full compliment of infrastructure (vehicle access, water supply, wastewater disposal and electrical service to each lot or building site) or were not part of a large, 100 or more lots, phased development in which at least one phase had been completed (Godschalk,

3)." Although the Omnibus Budget Reconciliation Act defined the criteria, CBRA was the legislation that specified the actual sites.

State Coastal Management Programs

On the state level, coastal resource management in North Carolina had its beginnings in the passage of the state Coastal Area Management Act in 1974. This legislation has been used as a model for cooperative and innovative coastal land use planning throughout the country. A principal goal of CAMA is,

> "to insure that development or preservation of the land and water resources of the coastal area proceeds in a manner consistent with the capability of the land and water for development, use, or preservation based on ecological considerations (Carter, 28)."

Other states have taken note of North Carolina's progress and have tried to adopt a similar law in their respective states.

The Coastal Area Management Act established the Coastal Resources Commission and the Coastal Resources Advisory Council. These policy-setting bodies comment on development permits, critique local land use plans, review federal projects, administer other coastal programs, and offer income tax credits for individuals or corporations that make qualified donations of interests in real property for conservation purposes. Local governments in all 20 coastal counties must prepare land use plans under guidelines issued by the Coastal Resources Commission. Hurricane damage mitigation and recovery elements are mandatory in the five-year plan updates.

The Coastal Resource Commission has identified Areas of Environmental Concern (AEC). These areas require special land use planning to influence coastal development. Each AEC has unique environmental conditions upon which certain policies apply. Figure 18 designates the ranges of the AEC at North Topsail Beach (NTB). The prime purpose of denoting AEC is to ensure that erosion, flood, storm, and natural resource damage is minimized.

Under CAMA, coastal management programs exist in each of the 20 coastal counties in North Carolina. See Figure 19. "Data analysis suggests that CAMA procedures or regulations have not slowed growth or development in North Carolina's 20 coastal counties (Armingeon, 4)." "The intent of CAMA's permit program is not to stop development, but rather to make sure that development within AEC do not threaten public safety or continued productivity and value of important natural areas (Armingeon, 12)." Overall, most believe CAMA has had the positive effect of guiding growth away from ocean-front and estuaries in North Carolina (Armingeon, 16).

Two states have taken the same policy approach toward coastal barrier development as the federal government. In August 1980, the Governor of Massachusetts issued an executive order that prohibits the use of state funds or federal grants for construction projects that encourage growth and development in hazard-prone barrier beach areas. Similarly, in September 1981, the Governor of Florida issued an executive order forbidding the use of state funds to subsidize growth or aid post-disaster redevelopment in barrier areas (Kuehn, 633). Exemptions in the Florida

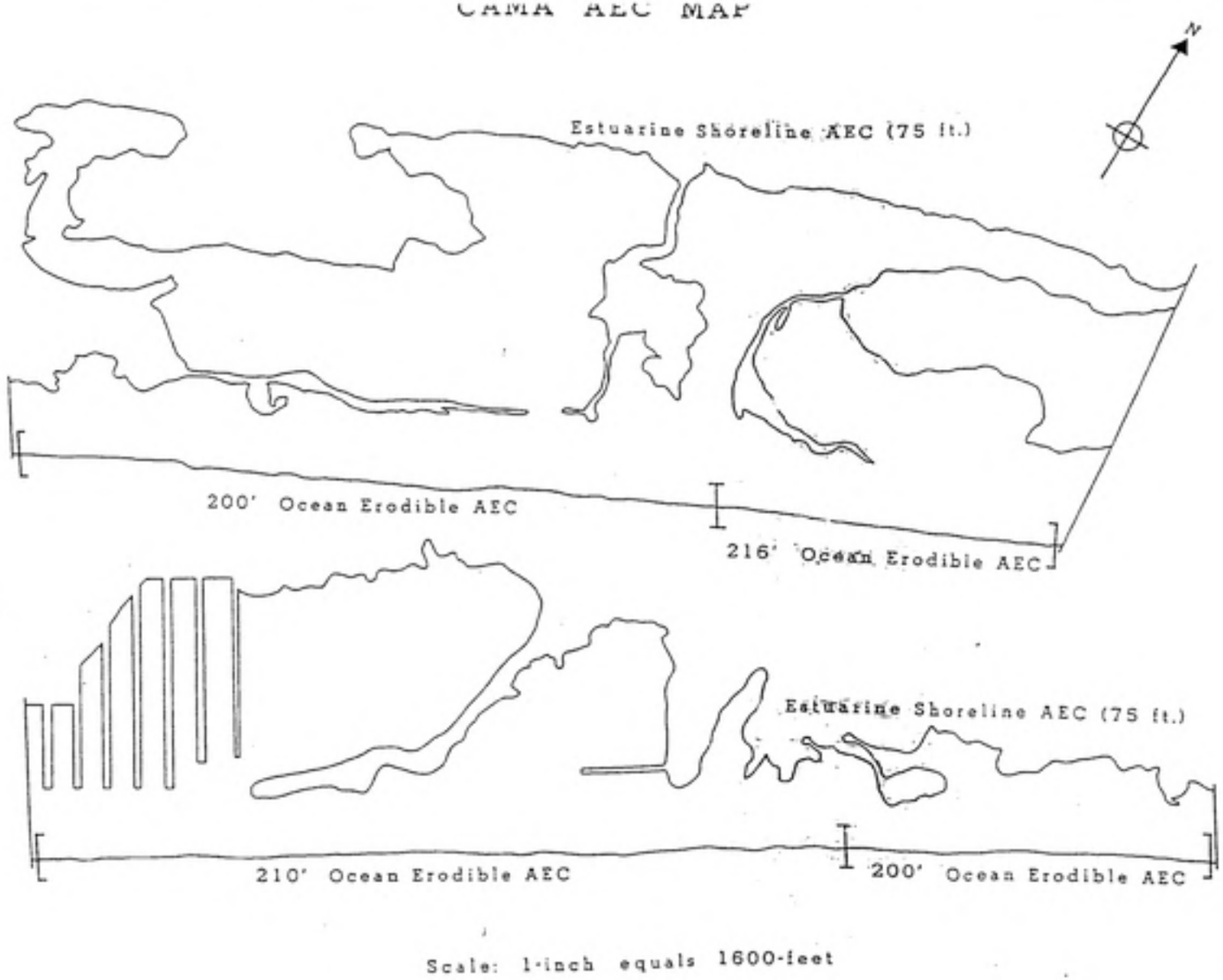


Figure 18a **Coastal Area Management: Areas of Environmental Concern Map, 1982**

Source: *W. McElyea, Before the Storm: Managing Development to Reduce Hurricane Damages, 1982, p6-7.*

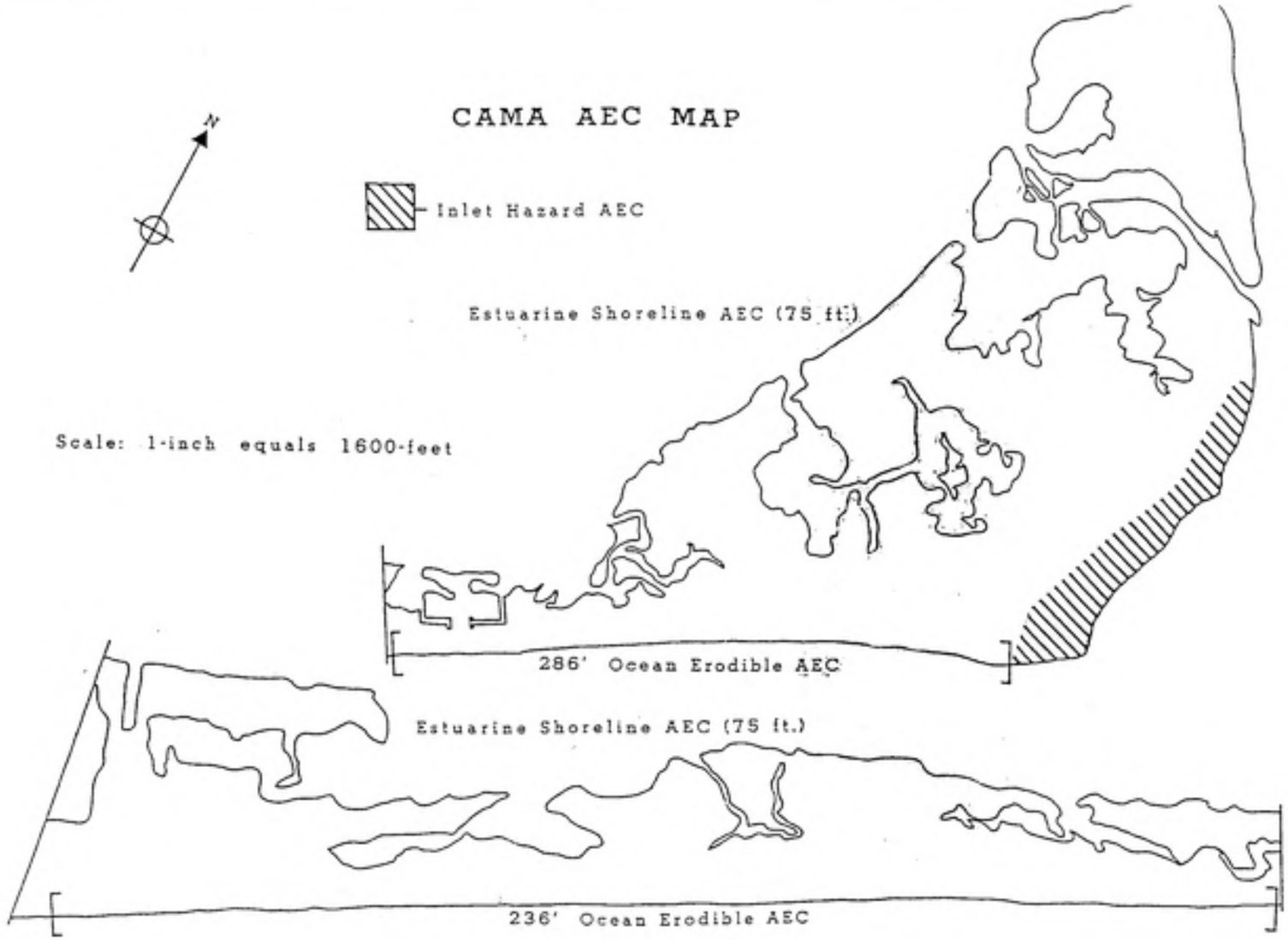


Figure 18b **Coastal Area Management: Areas of Environmental Concern Map, 1982**

Source: *W. McElyea, Before the Storm: Managing Development to Reduce Hurricane Damages, 1982, p6-7.*

Figure 19 **North Carolina's 20 Coastal Counties Covered by the Coastal Area Management Act**

Source: *Division of Coastal Management, A Handbook for Development in North Carolina's Coastal Area, 1985, p2.*

legislation include: the physical impact of human activity to an area while it is in the process of being developed, area's with a full complement of infrastructure and undeveloped area's part of larger phased developments. Unfortunately, these executive orders fail to specify the scope of the term "state funds" or define projects or activities included under the prohibition. Agencies or courts make the judgements. State and national laws established precedents for the passage of CBRA.

Description of Coastal Barrier Resources Law

Legislative History of Coastal Barrier Resources Act

There were several reasons for the passage of CBRA. Congress recognized federal monies were contributing to the degradation and destruction of natural resources and increasing risk to human life. They decided to alter the subsidization of the "build and rebuild" cycle on coastal property. It was time for some of the financial cost to be shifted from the taxpayer to the consumer of coastal property. Nationally, CBRA won favor on the basis of urban growth, costs, and environmental concerns.

The DOI began studies of coastal barrier protection and cost reduction issues in 1977. It produced an Environmental Impact Statement in 1980. Congress did not pass the 1981 Environmental Impact Statement based bills into law. Proponents and opponents argued over several new bills in 1982. Eventually, Congressional debate led to the passage of CBRA. Republicans Rep. Thomas Evans-Del and Sen. John Chafee-Rhode Island proposed House Bill 3252 and Senate Bill 1018 (Kuehn, 599).

Under a Republican administration, legislation advocating acquisition or restricting the rights of private landowners probably would not have gained much support. Thus, this Act requires no governmental regulation or intervention. Most of the testimony presented before Congress favored the bills.

Proponents of coastal barrier protection had hoped for the inclusion of such things as acquisition authority, federal licensing and permitting procedures, inclusion of undeveloped areas after storms, immediate denial of flood insurance, expansion to include developed areas, expansion to cover more United States coastal barriers, and the exclusion of general revenue sharing grants and tax incentives. The opponents, primarily realtors and builders, contended each of these coastal barriers had varying degrees of fastland. Therefore, in their opinion, a total elimination of funding to all undeveloped barriers was unwarranted.

President Reagan signed the bill into law October 18, 1982, praising it as "a great step forward in the conservation of our magnificent coastal resources... precisely the sort of imaginative environmental legislation this administration encourages-- legislation that solves real problems in the stewardship of our natural resources." The president pledged to take immediate steps to implement the act (Kuehn, 612).

Coastal Barrier Resources Act of 1982

The Coastal Barrier Resources Act of 1982 terminates funding for federal flood insurance, infrastructure, and other projects that encourage development on "undeveloped" coastal barrier lands.

> "The purpose of CBRA is to minimize loss of human life, wasteful expenditures of federal funds, and damage to natural resources by
> (1). restricting future federal expenditures and financial assistance that encourage coastal barrier development;
> (2). establishing a Coastal Barrier Resource System; and
> (3). considering means for long-term conservation of fish, wildlife, and other natural resources (Godschalk, 1)."

It shifts the costs and risk from the federal government to private investors. The policy decision not to subsidize future development in undeveloped coastal barrier areas was manifested in law.

In the general purpose statement of this Act, Congress found coastal barriers and adjacent associated areas offer habitats essential to spawn, nurture, nest, and feed commercially and recreationally important species of fish, other aquatic organisms, migratory birds, and other wildlife. Second, it acknowledges that coastal barrier resources of extraordinary scenic and economic importance were being damaged by development. Third, the Act declares that coastal barriers serve as natural buffers to the mainland. This characteristic makes them generally unsuitable for development due to their vulnerability to hurricanes, other storm damage, and because shoreline recession and the movement of unstable sediments undermine manmade structures. Congress also identified a need for coordinated local, state, and federal coastal management.

Basically, CBRA uses the same definition of "undeveloped" barrier as the Omnibus Budget Reconciliation Act. "An "undeveloped" coastal barrier is a depositional geologic feature consisting of unconsolidated sedimentary materials subject to wave, tidal and wind energies, and protective to landward aquatic habitats from direct waves attack; along with all their associated aquatic habitats; including the adjacent wetlands, marshes, estuaries, inlets and near-shore waters (Public Law 97-348, 1654)." The minimum portion of a coastal barrier considered as undeveloped has to have a quarter mile of ocean-facing shoreline and extend through the barrier from the beach to the bay or other landward aquatic habitat. "Exceptions are made where 'otherwise protected' land is adjacent (Godschalk, 3)." "Undeveloped coastal barriers are to have few man-made structures with no significant man-made structural or human activity impediments to geomorphic and ecological processes (Godschalk, 3)." The density threshold is generally one structure per five acres of fastland. It is based on the level of human activity that tends to interfere with the geological and ecological processes and change the essential nature of the coastal barrier (Kuehn, 638).

With certain exceptions, CBRA prohibits federal agencies from providing financial assistance that would encourage development. "Financial assistance is broadly defined as any form of loan, grant, guaranty, insurance, payment, rebate, subsidy, or any other form of direct or indirect federal assistance (Kuehn, 620)." Specific items prohibited from federal funding include: construction or purchase of structure, appurtenances, facilities, or related infrastructure; any project to prevent the

erosion of or to otherwise stabilize any inlet, shoreline, or inshore area, with certain exceptions; and construction or purchase of any roads, airports, boat landing facilities, or other facilities on, or bridges or causeways to, any Coastal Barrier Resource System (CBRS) unit (GAO, 11). Another major provision is the denial of federal flood insurance for any new or substantially improved structure in the designated areas after October 1, 1983 (Jones, 1033). "The CBRA's prohibitions include further assistance for flood insurance, bridges, road, utilities, new access channels, erosion control, storm protection, community development, and post-storm redevelopment and disaster relief except to alleviate emergencies (Godschalk, 2)."

Certain exemptions are made. "The CBRA does not deny general revenue grants; deposit or account insurance for customers of financial institutions; the purchase of mortgages or loans by federal associations or corporations such as the Federal National Mortgage Association, Government National Mortgage Association, or the Federal Home Loan Mortgage Corporation; assistance for environmental studies, planning, and other assessments related to issuance or permits or other authorizations under federal law; and assistance for programs entirely unrelated to development (GAO, 11)." The CBRA does not deny federal loans and mortgages from other well known institutions such as: the Federal Housing Administration, Veteran's Administration, Small Business Administration, and Federal Home Loan Administration (Jones, 1033).

"Additionally, CBRA allows federal assistance for facilities necessary for the exploration, extraction, or transportation of energy resources that require access to the

coastal water body; the maintenance or improvement of existing federal navigation channels, including the disposal of dredged materials related to such maintenance or improvements; the maintenance, replacement, reconstruction, or repair, but not the expansion, of publicly owned or operated roads, structure, or facilities that are essential links in a larger network or system; military activities essential to national security; and the construction, operation, maintenance, or rehabilitation of United States Coast Guard facilities (GAO, 12)." The federal programs that support development also include the United States Environmental Protection Agency and the Army Corps of Engineers. The Act requires the Office of Management and Budget to report to Congress annually to certify the compliance of each federal agency.

The CBRA allows expenditures on certain projects, such as ones that will promote fish and wildlife resources and habitats, enhance certain scientific research and development, offer emergency assistance essential to human health and safety and the protection of property, and some kinds of nonstructural shoreline stabilization (GAO, 12). The exemption allows grants for stabilization and erosion control projects in cases where an emergency threatens life, land, and property immediately adjacent to that unit (Kuehn, 619). "There are limited exemptions for emergency actions essential to the saving of lives and for protection of property and the public health and safety, but only if such actions are performed under Section 305 or 306 or the Disaster Relief Act of 1974 or section 1362 or the NFIA (Kuehn, 624)." All other activities must be consistent with the purposes of CBRA.

The law delegates many tasks to the DOI. The Secretary of DOI has the authority to delineate the undeveloped areas on coastal barriers. Actually, DOI delegates the United States Fish & Wildlife Service to map each CBRA unit. The agency established the Coastal Barrier Resource System, a system of 186 "undeveloped" coastal barriers extending from Maine to Texas along the Atlantic Ocean and Gulf of Mexico coasts.

A "system unit" refers to closely related undeveloped coastal barriers under the CBRS. These maps are extremely important because they determine the properties ineligible for federal flood insurance. Dissemination of CBRS maps to all local and state governments is mandatory.

Coverage of Coastal Barrier Resource System

More than 400 barrier islands lie off the East and Gulf coasts (Kuehn, 585). Figure 20 shows North Carolina ranks third in miles of barrier length (324 miles). In 1982, the Senate Environment and Public Works Committee estimated 1.4 million acres of coastal barriers; 751,713 acres of fastland and 682,044 acres of wetlands. This group reported about 40% developed or in the process of being developed coastal barrier land; about 47% undeveloped and protected; and the remaining 13% undeveloped and unprotected (Senate Report, 3213). The actual designated undeveloped coastal barriers comprise about one-quarter of the 2,686 miles of Atlantic and Gulf shoreline (Godschalk, 9). These system units cover 666.4 miles of shoreline and 452,834 acres from Maine to Texas (Jones, 1037). Massachusetts and

Hundreds of coastal barriers (——— line) protect the Atlantic and gulf coasts.

STATE	BARRIER LENGTH (in miles)
MAINE	28
NEW HAMPSHIRE	8
MASSACHUSETTS	216
RHODE ISLAND	37
CONNECTICUT	21
NEW YORK	173
NEW JERSEY	106
DELAWARE	249
MARYLAND	31
VIRGINIA	111
NORTH CAROLINA	324
SOUTH CAROLINA	153
GEORGIA	105
FLORIDA	731
ALABAMA	59
MISSISSIPPI	37
LOUISIANA	147
TEXAS	350
TOTAL	2686

Figure 20 **Coastal Barrier Length by State Along the Atlantic and Gulf Coast, 1987**

Source: *Wells & Peterson, Ribbons of Sand: Atlantic and Gulf Coastal Barriers, 1987, p1.*

Florida contain the greatest number of units and Texas has the greatest unit acreage in the system.

After a three-year period (1985), the Secretary of DOI must report to Congress on recommendations for additions or deletions to clarify designated CBRS boundaries. Furthermore, the report must include a summary of comments from the public, agencies, and state and local government officials; an analysis of the effects of the general revenue sharing grants (Section 102 of State and Local Fiscal Assistance Amendments of 1972) on undeveloped coastal barriers; and recommendations for the conservation of CBRS natural resources (Public Law 97-348, 1658). The entire report must conform with the purposes of the law i.e. for the conservation of fish, wildlife, and other natural resources. Moreover, CBRA instructs the Secretary of DOI to update map boundaries every five years to reflect changes caused by natural physical processes such as erosion and accretion on the units.

Lastly, CBRA establishes the Coastal Barriers Study Group, a task force representing the National Park Service, Fish & Wildlife Service, United States Geological Survey, and other departmental offices to deal with the longer term issues. Longer term issues include the way other agencies promote development on coast and beach accesses, and ecological concerns.

1990 Amendments to the Coastal Barrier Resources Act

The CBRA was reauthorized as the Coastal Barrier Improvement Act of 1990 (CBIA) (GAO, 18). See Appendix C. The amendments establish detailed procedures

and requirements for revising map boundaries for areas covered by the CBRS. These amendments expand the CBRS by 374 units to a total of 560 units (GAO, 2). An amended list of CBRS units is represented in Appendix D. This addition comprised 1.3 million acres and about 1,200 miles of shoreline (GAO, 11). Almost 50% of the added acreage was wetlands and adjacent aquatic habitat (GAO, 11). Units along the coasts of the United States Virgin Islands, Great Lakes, and Puerto Rico increased the geographical scope of the law. The Coastal Barrier Improvement Act directs the DOI to map the undeveloped coastal barriers of the Pacific Coast (Jones, 1051).

Second, the new provisions established an interagency task force to study the effects of federal regulatory activities within the CBRS and the effects of tax policies on development. The goal was to develop recommendations for the legislative actions needed to promote the protection of coastal barriers and to minimize federal government activities that would contribute to their destruction and degradation.

Third, annual certification processes were changed. Now, federal agencies are required to report to the Secretary of DOI and Congressional committees about compliance. Agencies must certify that their regulations comply with the provisions of the Act. Lastly, some of the revisions gave limited opportunities for the federal government to acquire land.

A Legal Challenge

Only one legal challenge has tested CBRA (Jones, 1040). In September 1983, two developers of West Onslow Beach supported a case to sue the Secretary of the

Department of Interior (DOI) and the Director of the Federal Emergency Management Agency (FEMA) (581 F. Supp. 254) The plaintiffs sought to prove that their land did not meet CBRA's definition of an undeveloped coastal barrier in the North Topsail Beach (NTB) CBRS unit. Since the land had sewer and water hook ups, the developers thought the loss would be a violation of their substantive and procedural due process. The injunction was not granted.

In 1984, North Carolina's Supreme Court held that the Congressional adoption of CBRS maps as a part of CBRA precluded judicial review. Subsequently, a court could not substitute its judgment for an Act of Congress (581 F. Supp. 254). The plaintiffs also lost upon appeal in 1985 (753 F. 2d. 1293). This case adds significant clout to the legality of the Act.

Literature on Coastal Barrier Resource System Unit Development

Relevant Case Studies

Two studies, Coastal Barriers: Development Occurring Despite Prohibitions Against Federal Assistance written by the United States General Accounting Office (GAO) in 1992 and Impacts of the Coastal Barrier Resources Act written by Dr. Godschalk of the University of North Carolina at Chapel Hill in 1984, have identified aberrations in coastal barrier land uses that seem to conflict with CBRA's objectives. These authors strive to determine the factors that contribute to the development of coastal barriers. Once these factors are identified through research, they can be applied to other areas. Ultimately, the impacts of development in one area may be

used to predict what will happen in another area. Together, the studies begin to show how development continues in federally designated "undeveloped" areas.

General Accounting Office Report

In the early 1980's there was concern that not all federal agencies were complying with the prohibitions under CBRA. The Senate Committee on Environment and Public Works requested that General Accounting Office (GAO), among other things, determine the extent of development in certain CBRS units. Also, the committee wanted the GAO to report on the degree to which new federal financial assistance had been prohibited within the CBRS.

The GAO report reveals that CBRA has slowed, delayed, stopped, or in general, discouraged development in some CBRS units (GAO, 17). Places with small or no bridges, with planned large projects, or with little developable land are experiencing the impacts of CBRA (GAO, 17). GAO concludes inaccessible areas and/or areas with a lack of undevelopable land are not likely to have significant development in the near future. However, many attractive sites have undergone extensive development since 1982 and much more construction is planned for units where good accessibility exists. Out of the 34 CBRS units under review by the GAO, 9 units have experienced significant new development since 1982.

Most federal agencies did not provide new financial assistance in CBRS units. However, GAO found two exceptions. First, the NFIP erroneously underwrote some federal flood insurance policies. The GAO estimated from a sample of residents in

five developing units that FEMA underwrote flood insurance for 9% (+-3%) percent of the homeowners with policies valued at $12.2 million (+/-4.1 million) (GAO, 4). Secondly, the United States Air Force granted an easement to a quasi-state agency for a bridge to be built from the mainland to a CBRS unit (GAO, 29). The United States Coast Guard issued the permit to construct the bridge. The GAO believes the bridge encourages development in the CBRS unit thereby violating CBRA (GAO, 29).

About half of the areas covered by the CBRS was wetlands and open water in 1992 (GAO, 35). Activities in CBRS units may require permits from three federal agencies: Environmental Protection Agency, Army Corps of Engineers, and United States Coast Guard. For example, Coast Guard officials can issue permits for bridge construction across or over navigable United States waters under the Bridge Act of 1906. The Army Corps of Engineers, under Section 404 of the Clean Water Act of 1977, can permit activities such as filling wetlands. The potentially cumulative impacts of filling could be significant because the additional 1990 coastal units largely consist of wetlands and adjacent aquatic habitat. "Historically, the United States Corps of Engineers has permitted 97% of all project applications (GAO, 35)." The Rivers and Harbor Appropriation Act of 1899 prohibits the obstruction or alteration of any navigable water of the United States. This law also requires permission from the Army Corps of Engineers. The Environmental Protection Agency or individual states can have an effect on coastal barrier resources when they authorize the National Pollution Discharge Elimination System permits under Section 402 Clean Water Act

for the discharge of wastes into navigable waters. This entire list exemplifies ways the government can affect the outcome of CBRS units.

In addition, this study found federal agencies did not meet the annual reporting requirement on CBRA compliance. Some agencies claimed to be unaware that some of their activities were subject to CBRA or unaware of the 1990 changes to CBRA. "Out of 11 agencies whose programs could effect CBRS units, fewer than half of the required certification statements were submitted to the Office of Management & Budget during fiscal years 1983 through 1990 (GAO, 30)." The GAO believes this action reflects the low priority placed on the implementation of CBRA by federal agencies.

The 1990 amendments changed the certification process, yet the responses remain very low. None of the regulations to revise agency certification processes has been issued as required by the amendments by the due date of November 1991 (GAO, 30). Furthermore, the task force created in the 1990 Amendments had not convened as of June 1992. Subsequently, it did not meet its November 1992 reporting deadline (GAO, 35). When asked to explain, the DOI commented that Fish & Wildlife Service will conduct the study in Fiscal Year 1994 if funding is appropriated for this activity. They agreed that the Coastal Barriers Task Force study must be done.

Overall, this study concludes development is taking place in certain CBRS units and that the federal government has supplemented some of the growth. These results are contrary to CBRA's goals. The GAO recommends FEMA should not underwrite invalid insurance policies, federal agencies should impose penalties for

lack of annual reporting and prevent any actions that facilitate development, and the DOI should ensure regular meetings of the Task Force.

Godschalk's Investigation

Godschalk's report studied the initial impacts of CBRA, compared actual with expected impacts, examined the responses of major groups involved in development and management, and assessed the implications for state coastal zone management programs. His results came from a mail survey to coastal government officials, developers, and conservationists in three states where large impacts from CBRA were anticipated. He also interviewed many insurance agents, businessmen, and related government agencies.

Godschalk thought the effect of CBRA would depend on, among other things, whether private flood insurance would be available, whether states and localities would enforce the goals of CBRA, and whether banks would provide future loans and mortgages without federal flood insurance. He chose two case study areas in the CBRS where development pressure was great; Topsail Island, North Carolina, and Hutchinson Island, Florida.

Federal planners expected CBRA to have a great impact on North Carolina because 15% of North Carolina's ocean-facing shoreline was designated undeveloped (48.6 miles) (Godschalk, 10). The withdrawal of federal flood insurance from NTB was also a prominent issue (Godschalk, 9). Godschalk predicted changes in the type, quality, and amount of development in undeveloped areas at Topsail Island. He

suggested developers may shift from single-family toward multi-family or condominium projects because it may be easier to get private insurance. If private insurance was unavailable, less sturdy structures may be built such that in the event of a catastrophic storm investors could absorb the losses.

Even though development was not prohibited, certain conditions may have led to higher densities in undeveloped areas. According to Godschalk, bridge access and utility availability were factors that encouraged higher densities and less conservation on Topsail Island. With access to utilities and an active developers' market, Topsail Island will probably continue to develop in the CBRS (Godschalk, 16).

The other case study area was Hutchinson Island, Florida. This town had outgrown the carrying capacity of the bridges which caused a very serious problem in terms of hurricane evacuation. When funds were not available to finance the needed bridge improvements, the county imposed a moratorium on development and inserted density reductions in the local land use plans. Even though the developers sued the county for demanding a moratorium, they may have to pay for the needed infrastructure improvements (Godschalk, 20). Nonetheless, the developers thought they could get private insurance and continue to build in the CBRS unit later.

In summary, most survey respondents concluded it was too early to determine the influence of CBRA. The 1984 Godschalk study was conducted only a few months after the full provisions of CBRA had taken effect. The preliminary findings did suggest evidence of some impact, however the effects of the prohibitions in CBRA were not clear. A majority of the respondents felt the withdrawal of federal flood

insurance and the withdrawal of federal assistance for infrastructure had not yet affected development in CBRS (Godschalk, 22).

Each group had different ideas on what infrastructure was the most critical element limiting future development. Developers thought it was sewage treatment facilities, conservationist marked water supply facilities, and government officials noted bridges as the primary factor greatly affecting development in the CBRS (Godschalk, 23). The survey demarcated the first possible source of revenue for infrastructure financing in the CBRS to be from private developers. The second source was local government bond issues and local taxes (Godschalk, 23).

The survey results indicated the overall impact of CBRA would be minor or neutral (Godschalk, 24). Godschalk said CBRA did shift the risks of loss away from the Federal Treasury, but it was too early to tell if the conservation goal would be achieved.

Chapter 3

A CASE STUDY OF NORTH TOPSAIL BEACH, NORTH CAROLINA

Population & Development

Population

Population and development estimates are very important for planning future coastal management strategies. A more detailed examination of North Topsail Beach's (NTB's) past and current population data, building permit dispensation, zoning, and planning initiatives identifies the future growth trends for the town.

Figure 21 compares the percentage increase in population from 1960 to 1990 in North Carolina, Onslow County, Stump Sound Township, and NTB. North Carolina's population growth fluctuated from 11.6% in 1970, to 15.7% in 1980, and down to 12.7% in 1990. "During 1970-1980 Onslow County grew at a rate below that of the state, however, it is now experiencing growth above statewide levels (Armingeon, 26)." The county grew most from 1980 to 1990, 32.9 percent. Note: county population figures may be directly affected by the military population associated with Camp LeJeune.

With only a 1.1 percent increase in 1970, the Stump Sound Township population jumped 35.3% during the 1980's. Population data from 1960 to 1980 was not available for NTB. "An assessment of 1980 United States Census Reports indicated the West Onslow Beach (WOB) community's year-round population stood at

Percent Increase in Population

Year	North Carolina		Onslow County		Stump Sound Township		North Topsail Beach	
	Population	Increase	Population	Increase	Population	Increase	Population	Increase
1960	4,556,155	--	86,208	--	5,486	--	--	--
1970	5,084,411	11.6%	103,126	19.6%	5,545	1.1%	--	--
1980	5,882,095	15.7%	112,784	9.4%	7,500	35.3%	301	--
1990	6,628,637	12.7%	149,838	32.9%	9,372	25.0%	752	149.8%

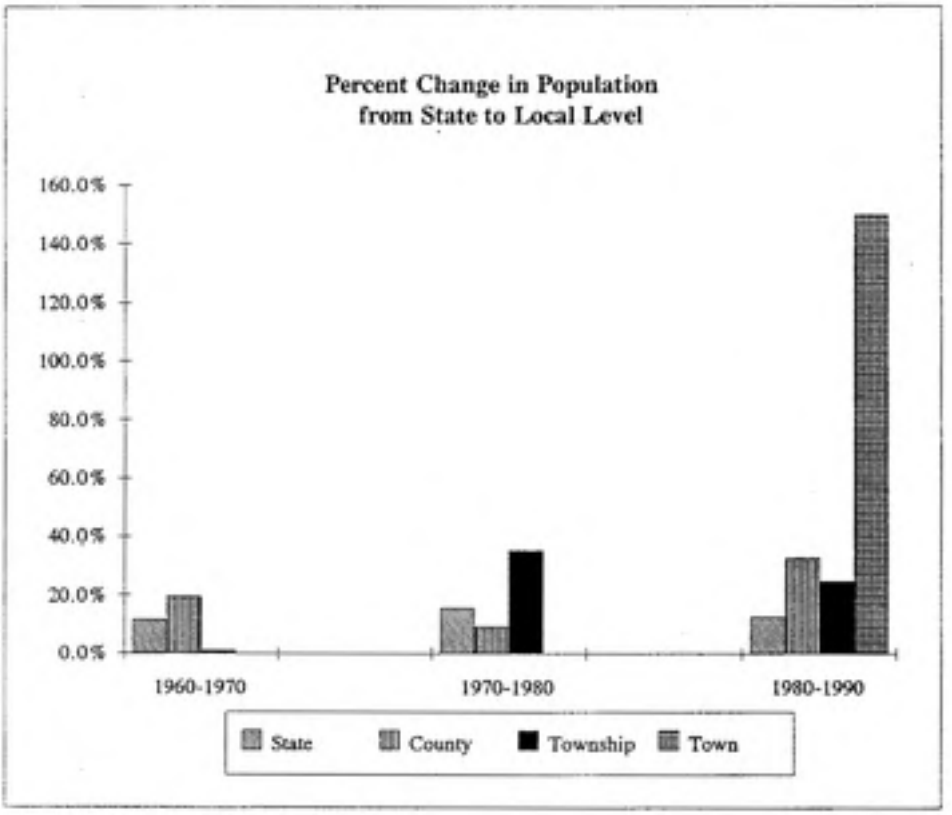


Figure 21 **Percent Increase in Population from State to Local Level, 1960-1990**
Source: *United States Census Data*
Land Use Plan of 1991 Update for Onslow County, North Carolina, 1992, p45.
Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, p3.

301 persons (NTB 1991 LUP, 3)." More people became permanent residents during the 1980's. "Year-round population in 1990 was 752; representing a 150% increase from the 1980 estimate (NTB 1991 LUP, 3)."

Figure 22 projects the estimated residential and seasonal population assuming every dwelling unit is fully occupied. An estimated 2.08 people live in each permanent household (NTB LUP, 3). Of the 2,173 total dwelling units on NTB, permanent residents occupy 361 or 16.6%. Seasonal population varies between Easter and Labor Day, mostly along the beach front. These visitors usually fall into one of three groups: property-owning summer residents; overnight visitors who rent beach cottages, condominiums, motels or campground sites; and the day visitors (NTB 1991 LUP, 4). Summer occupancies per household can be up to 6.0 persons per dwelling (NTB 1991 LUP, 4). The remaining 1,812 seasonal dwellings consist of condominiums, duplexes, quadraplexes, single-family units, and mobile homes (NTB 1991 LUP, 4).

People living in motels and campgrounds make up another component of the seasonal population. The only motel in NTB has 24 units and has an average group size of 3 per unit (NTB 1991 LUP, 4). Therefore, 72 overnight visitors can be accommodated. The three local campgrounds comprise a total of 600 campsites (NTB 1991 LUP, 4). The average occupancy per site assessed is 4.2 persons per campsite. Subsequently, 2,520 overnight visitors can fill the campsites during the peak season. Assuming complete seasonal unit occupancy, the population could reach 14,215 persons (NTB 1991 LUP, 4).

Type	Dwelling Units, Campsites, & Parking Spaces	Persons per Unit	Peak Population Estimate
Permanent Residents			
Year-Round	361	2.08	**751**
Seasonal Population			
Seasonal-Housing	1,812	6.00	10,872
Motel	24	3.00	72
Campsites	600	4.20	2,520
Subtotal	2,797		**14,215**
Estimated Day Visitor Parking	686	3.50	2,401
Estimate of Peak Seasonal Population			**16,616**

Figure 22 **Residential and Seasonal Population of North Topsail Beach, North Carolina 1991**

Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, p5.*

The day visitors have an impact on a short-term basis. For instance, they increase traffic and limit parking. Parking spaces are available at four regional beach access sites. (NTB 1991 LUP, 5). Daily population increases by 2,401 people, if it is assumed beach access parking facilities reach full capacity with an estimated 3.5 persons per vehicle. Keep in mind that this is a conservative estimate because people can park close to the beach in other places, yet liberal in that it assumes full capacity. For planning purposes, the peak seasonal population reaches 16,616 persons.

Development

"Development pressure is a critical issue in unit (L06) Topsail Island (CBRS Draft, K-3)." Figure 23 illustrates the development expansion on NTB in the mid-1980's to accommodate the influx of people. In terms of sheer magnitude, the northern end of the island experienced the most development pressure. Building permits must be obtained for each proposed project. Consequently, denial of some building permits is probable. In southern NTB, mobile homes and single-family dwelling development was predominant. In northern NTB, most development projects consisted of condominiums, townhouses, multi-family units, or hotels (Nofzinger, 2).

Before 1986, Onslow County did not keep detailed records of building permits (NTB 1991 LUP, 10). From 1986 to 1990, 643 residential building permits were issued for NTB; averaging 126 residential permits per year (NTB 1991 LUP, 11). See Figure 24. "Another indication of the residential building trend in NTB is the number of subdivision, condominium developments, etc., and the related lots and/or

	Existing	& Proposed	Development on NTB
South	2068	337	
North	865	1118	}——— Dec. 31, 1986
Total	2933	1455	
South	2183	268	
North	1001	1221	}——— Jan. 1 - Sept. 30, 1987
Total	3184	1489	

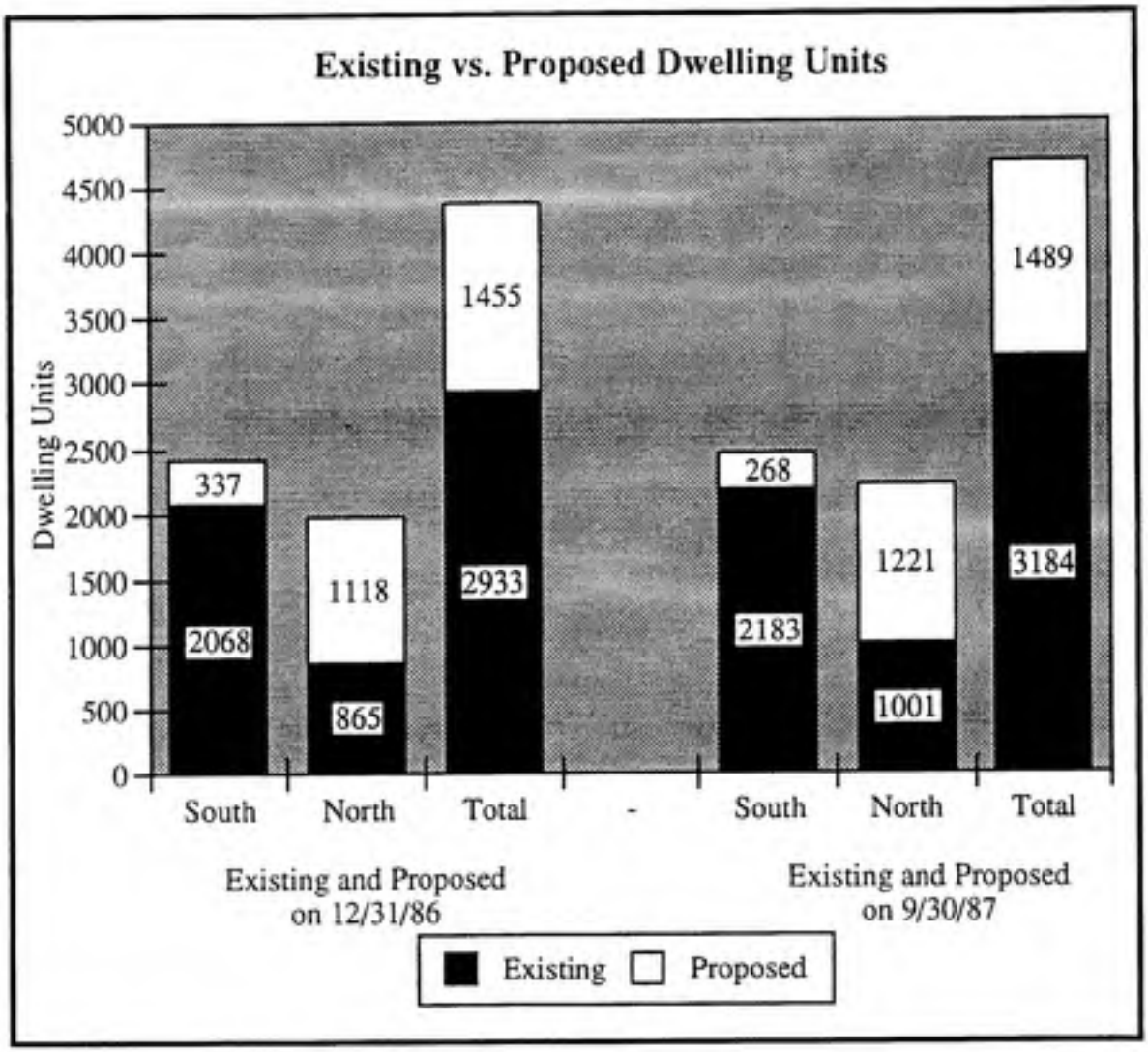


Figure 23 **Existing and Proposed Dwelling Units on North Topsail Beach, North Carolina, December 1986 & January to September 1987**

Source: *West Onslow Beach Land Use Study and Updates in 1987.*

Year	No. Residential Permits
1986	142
1987	119
1988	175
1989	72
1990	135
Total	**643**

Figure 24 **North Topsail Beach Building Permits, 1986-1990**
Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, p11.*

units considered as approved, final recorded plats (NTB 1991 LUP, 11)." Figure 25 reveals 371 development plats were approved during the five-year period. The greatest amount of development in Onslow County took place in the Stump Sound Township during this period (51%) (1991 LUP, 40). West Onslow Beach accounted for 25% of the total number of subdivision lots recorded for the Stump Sound Township (NTB 1991 LUP, 12).

Two investors controlled about 1,200 acres, including more than one mile of ocean frontage, a large part their land was within the Coastal Barrier Resource System (CBRS) (Godschalk, 13). In 1978, these developers installed a water line connecting their development to the Onslow County water system and relocated a 5,500 foot section of State Road (SR) #1568 (Godschalk, 13). Then, they built a one million-gallon-per-day lagoon type, central sewage treatment plant on a 459 acre mainland site. The plant was capable of expanding to three million-gallons-per-day. It connected to their development through 8 miles of 12 inch force main (Godschalk, 13). Topsail Dunes and Topsail Reef were two of their large projects. By 1985, $5.3 million had been invested in Topsail Dunes alone (CBRS Draft, K-6).

Zoning Districts

Upon review of the current NTB zoning map, the existing land uses of NTB are revealed. Figure 26 shows the boundaries of conservation, residential and commercial districts. Generally, single-family dwellings predominate from the county

Name of Development	No. Lots/Unit
Beach Club Villas	4
Bermuda Landing	64
Ocean Breeze	7
*Ocean Cay	9
*Ocean Ridge I, II, III	88
Permuda Dunes	6
Portofino & Duplexes	46
*Sea Ranches	9
*St. Moritz Condos	32
*Summertyme	53
*Hampton Colony	25
*Topsail Villas	28
Total	**371**

*Inside CBRS

Figure 25 **North Topsail Beach Approved Development Plats, 1986-1990**
Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, p11.*

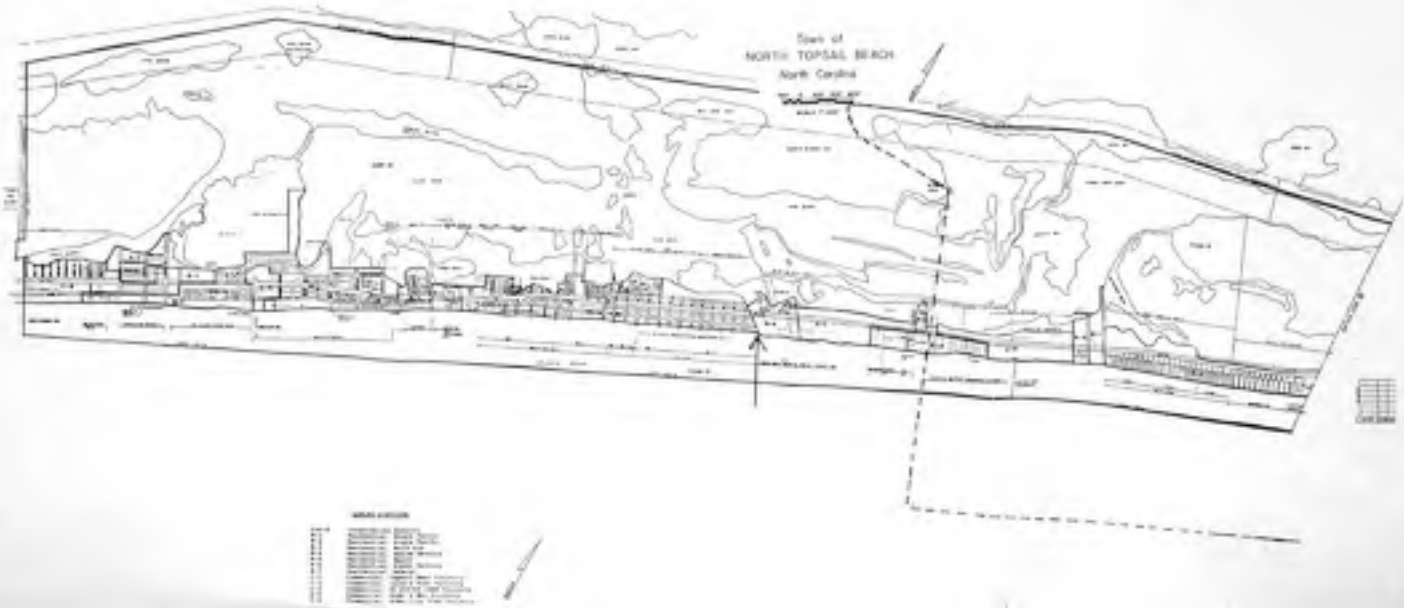
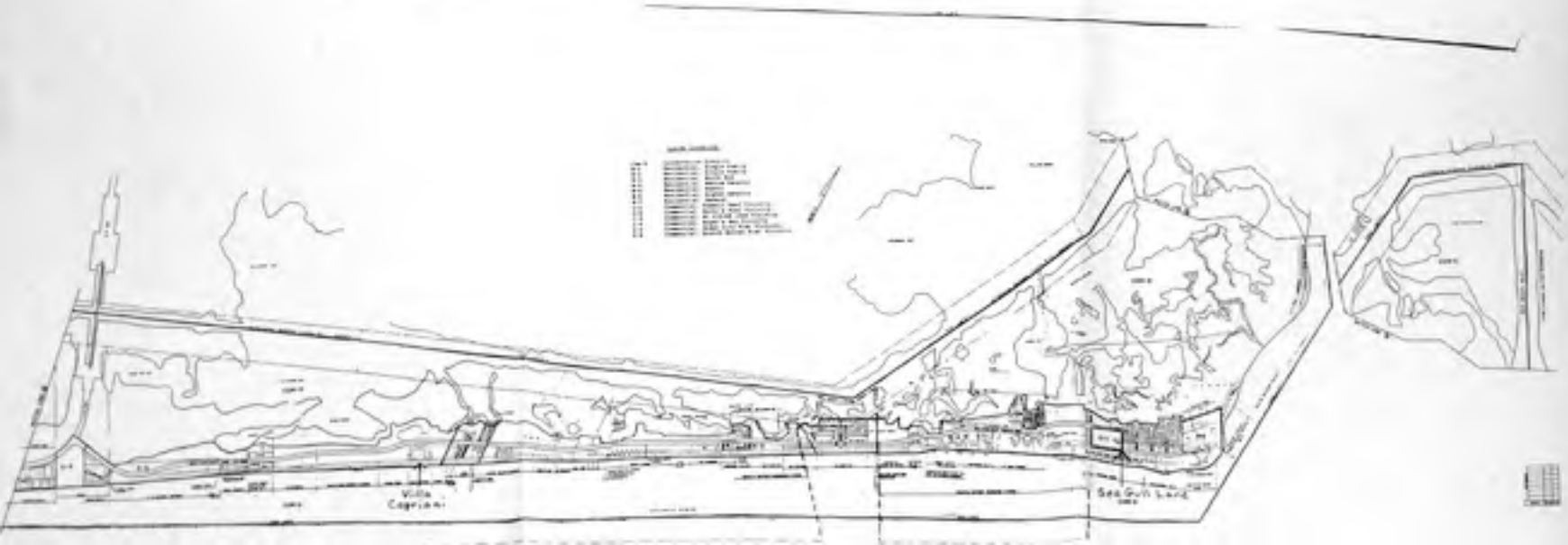


Figure 26 Zoning District Boundaries of North Topsail Beach, 1991
Source: *North Topsail Beach Planning Office.*



line to the first arrow. Higher densities such as residential resort and residential high-density are prevalent to the New River Inlet.

The CBRS unit on NTB begins after the Sea Oaks high-density development to Sea Dragons resort. (Follow the dotted lines in Figure 26). It then skips the older subdivision, Galleon Bay. It ends before the Topsail Reef resort development. The designated conservation land behind the developed land at the inlet became part of the CBRS system in the 1990 Amendments.

Six commercial zones lie intermittently throughout the town. Three commercial zones are at piers; Scotch Bonnet Pier, Ocean City Pier, and Salty's Pier. Roger's Bay Campground and the NTB ingress by Highway 210 falls in commercially zoned plats. The sixth commercial tract exists behind the large development of Topsail Reef near the New River Inlet.

The oceanfronts and soundward marshes are classified as conservation zones. According to the Coastal Area Management Act (CAMA), the conservation class allows low density building and provides effective long term management of significant, limited, or irreplaceable resources (NTB 1991 LUP, 81). This classification of land protects flood plains, coastal waters, and areas of environmental concern (AEC). "Each proposal for development in these areas will be reviewed on a case by case basis (NTB 1991 LUP, 81)." "Water, sewer, and utility services will not be extended to low density residential areas in a conservation class merely to stimulate additional growth and development (NTB 1991 LUP, 82)." Local land use plans make zoning issues more definitive.

Figure 27 classifies the land into three basic divisions; developed, limited transition, and urban transition. The zones labelled Developed (D) or Urban Transition (UT) will experience future intensive development. The density in these zones may approach three dwellings per acre and public services will be available (NTB 1991 LUP, 79). Limited Transition zones are areas that will have some development, but that necessitate lower densities and fewer municipal services. "These lands often are composed of soil unsuitable for high intensity development, have physical limitations, or are areas near valuable estuarine waters or other fragile natural systems (NTB 1991 LUP, 79)." Some land remains dormant in the Limited Transition section.

Planning Initiatives

The CAMA requires land use plans (LUP's) to be updated every five years in all coastal counties. Onslow County produced LUP's in 1975, 1981, 1986, and 1991, respectively. These land use plans were used to gather data on WOB. The town of NTB became the legal authority for planning in 1991 when it adopted its own town land use plan. An overview of past planning decisions provides insight into the historical attitudes toward development on North Topsail Beach.

In 1975, WOB stretched 12 miles along the oceanfront and 13 miles along the intracoastal waterway (1975 LUP, 23). It covered 5.12 square miles and 3,282.6 acres of fastland. Nearly one-quarter of the 5.12 square miles had growth potential (1975 LUP, 24). Wetlands made up a majority of the land on WOB (54.4%). The

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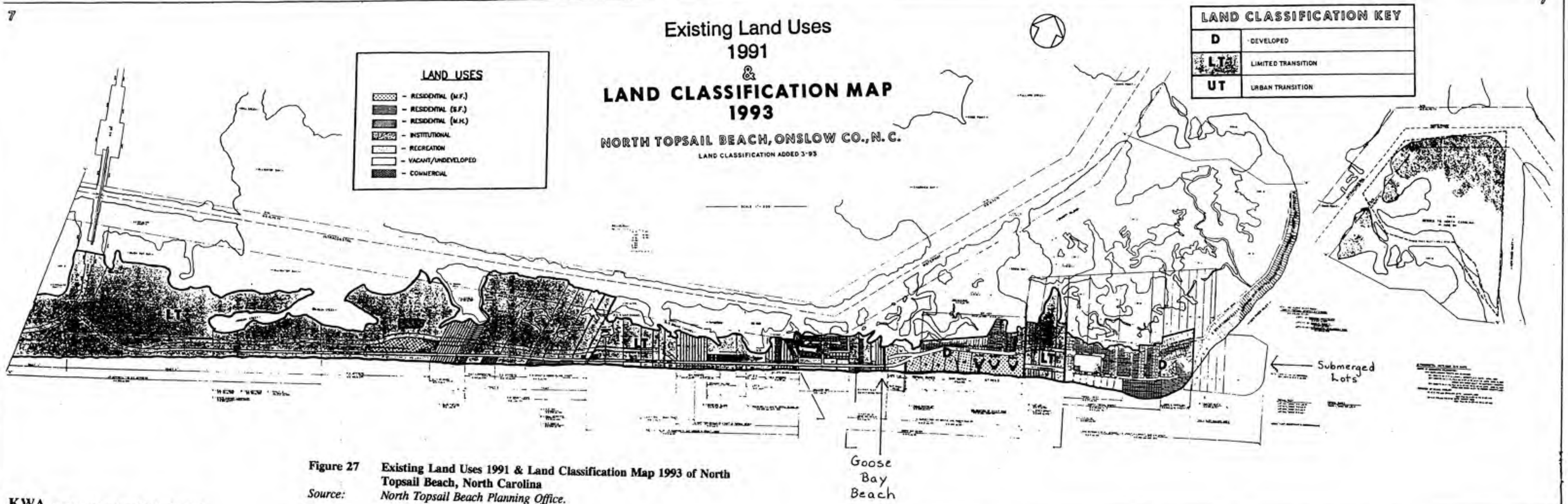


Figure 27 **Existing Land Uses 1991 & Land Classification Map 1993 of North Topsail Beach, North Carolina**

Source: *North Topsail Beach Planning Office.*

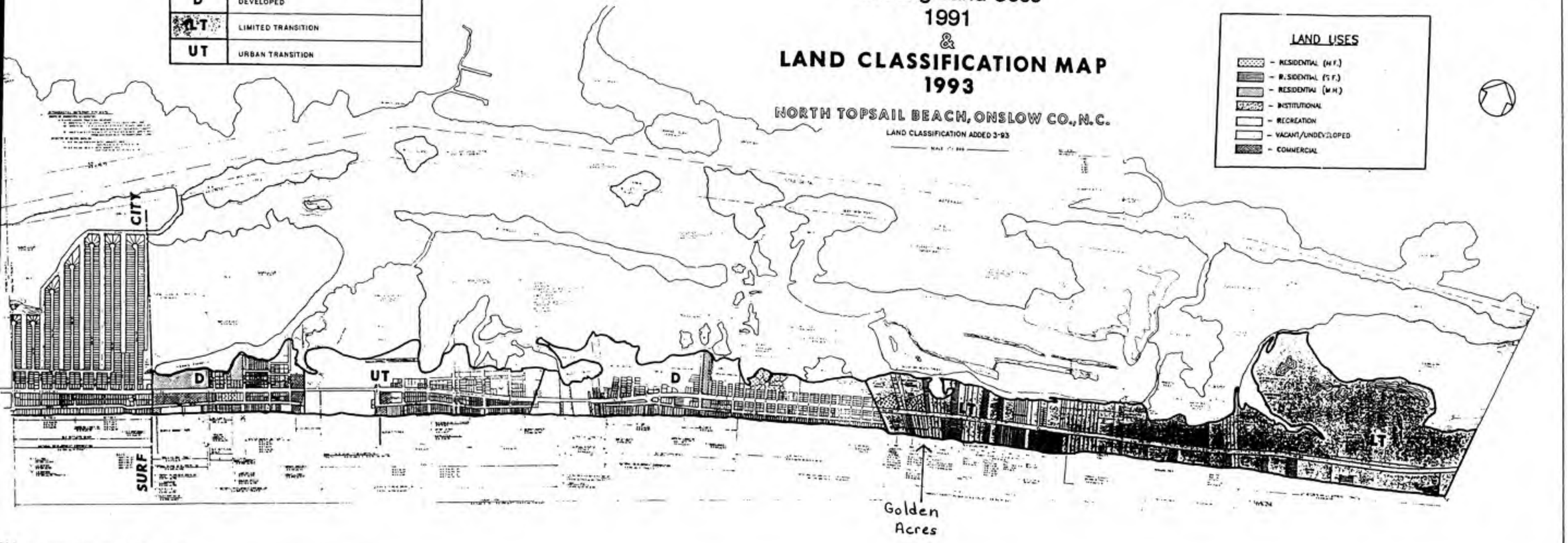
Existing Land Uses 1991 & LAND CLASSIFICATION MAP 1993

NORTH TOPSAIL BEACH, ONSLOW CO., N.C.

LAND CLASSIFICATION ADDED 3-93

LAND CLASSIFICATION KEY	
D	DEVELOPED
LT	LIMITED TRANSITION
UT	URBAN TRANSITION

LAND USES
- RESIDENTIAL (M.F.)
- RESIDENTIAL (S.F.)
- RESIDENTIAL (M.H.)
- INSTITUTIONAL
- RECREATION
- VACANT/UNDEVELOPED
- COMMERCIAL



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second highest existing land use was Undeveloped Land with 22.8% and Beaches came in third at 17.1% (1975 LUP, 23).

Many believed it would require extensive filling to develop this land. Marshlands were considered protected public trust lands (ie. lands covered by mean high water) (1975 LUP, 24). Local officials thought state laws would deny development on the marshlands; therefore, these areas would be logically excluded from consideration for future development (1975 LUP, 24). In 1975, local officials believed state laws would adequately protect the natural resources of NTB and restrict development. Federal, state, and local laws would "effectively prohibit development in marshlands and surrounding waters, on beaches or sand dunes and in those areas where septic tanks may not be approved (1975 LUP, 59)." See Figure 28.

County officials were beginning to struggle with how to regulate and control land uses on WOB. The intensities, types, and location of development were a concern. (1975 LUP, 59). They thought development patterns would arise from properly zoned suitable sites. Citizen surveys found single-family dwellings and mobile homes to be acceptable land uses. However, local officials were uncertain about allowing mobile home development due to the inevitable destructiveness of severe storms.

Local authorities knew higher densities would arise when sewer became available (1975 LUP, 59). Upon recognition that water and sewer systems could drastically alter the existing land use at WOB, local decision makers knew they had to decide whether intense development was desirable (1975 LUP, 59). This statement

Type of Unit	Number	% of Total
Single	283	24.1
Multiple	81	6.9
Motels	34	2.8
Mobile Homes	776	66.1
TOTALS	**1,173**	**100.0%**

Use	Acres	% of Total
Residential	155.20	4.7
Commercial	26.11	0.7
Undeveloped	749.00	22.8
Wetlands	1,788.50	54.4
Beaches	564.30	17.1
TOTALS	**3,282.6 or (5.12 sq. mi)**	**100%**

Figure 28 **Existing Land Uses - West Onslow Beach 1975**
Source: *Onslow County Land Use Plan of 1975. Onslow County Planning Department. p24.*

came from the 1975 LUP: "While more intense development would raise land values and public taxes and revenues, the loss to all citizens of a valuable resource may offset the gain (1975 LUP, 59)."

In the 1981 County Land Use Plan, WOB's undeveloped land stood out as the most likely to experience change in predominant land use (1981 LUP, 30). The planned single-family homes, duplexes, trailer parks, condominiums, hotels, and highway oriented businesses would add to the seasonal population. Due to zoning setbacks or CAMA requirements, some property owners could not build on their land (1981 LUP, 33). The variances filed with Onslow County were judged on a case-by-case basis (1981 LUP, 33). The County recognized and admitted development pressures on WOB would continue to be great (1981 LUP, 29).

The federal government was in the process of reviewing a plan for a central sewage system for WOB. Planners thought it would take more than five years to get a treatment plant on-line (1981 LUP, 56). Even if WOB did not get a central sewage system, continued growth was expected (1981 LUP, 77).

With the construction of a new water line to serve a large development on the northern end of the island, North Topsail Shores; the Onslow County water system would be extended to serve all of WOB (1981 LUP, 38). This water system would encourage more beach development and its effect would especially be seen on several large tracts that have remained undeveloped because of the lack of community facilities provided by the county (1981 LUP, 77).

"With a great deal of growth projected for WOB, the degradation of ground and surface water will continue (1981 LUP, 30)." Again, the county acknowledged WOB as an irreplaceable resource and stated the development pressures would have to be handled by local ordinances and state laws (1981 LUP, 77).

Land use patterns on WOB were still changing in 1986. "The seasonal population and related business will continue to expand with the extensive development taking place or being planned for the WOB area in 1986 (1986 LUP, 2)." "Onslow County will encourage development as long as the market justifies it while trying to keep the future development sensitive to the area's environment by applicable federal and state regulations (1986 LUP, 2)." In 1982, WOB became one of two zoned areas in the county covered by the Onslow County Zoning Ordinance (1986 LUP, 21).

"Between Highway 210 and the northern portion of the island remains a large undeveloped portion of the beach in which many development plans are being discussed or implemented (1986 LUP, 15)." "WOB is continuing to experience rapid growth with many new low-rise and high-rise condominiums being located at the northern tip of the beach (1986 LUP, 15)." "The undeveloped land of WOB will most likely continue to change from undeveloped to higher density resort development on the sound-side (1986 LUP, 18)." Local officials wanted to encourage higher density development on the beach front and less density on the sound-side.

"County water and sewer systems will add additional incentive for land use changes in this area (1986 LUP, 18)." The new private sewer will extend further on

WOB (1986 LUP, 44). "County policy shall be to encourage urban development in or near other growth areas including WOB, and specifically in areas that are or could be served by urban services, such as water and sewer (1986 LUP, 61)."

Due to WOB's incorporation in 1990, the county had no planning regulatory authority over NTB in its 1991 County Land Use Plan. Nonetheless, comments about WOB are made. This plan stated: "A primary concern in the 1986 plan was the control of development on WOB. More recently, the development pressure on the NTB has lessened (1991 LUP, 38)." County policy in 1991, to encourage urban development in or near WOB, and other growth areas, specifically in areas that are or could be served by urban services, such as water and sewer, was identical to 1986 (1991 LUP, 24). The 1991 County LUP indicated the growth in residential development was affecting the county water supply. Being at or near capacity, there was a need to find alternative water sources to meet projected population demands.

The land use policy would be to maintain the existing low intensity residential pattern areas at the southern end of the beach. "Onslow County beach development policy will encourage higher density development on the Atlantic Ocean side of the beach road in areas that are either vacant or in existing higher density developments (1991 LUP, 33)." Again, "Lower density development would be encouraged on the sound-side of the beach road in an effort to protect adjacent waters in this more environmentally sensitive area (1991 LUP, 33)."

In the event of a catastrophic storm, Onslow County's policy is to permit reconstruction meeting all local, state, and federal regulations (1991 LUP, 36).

Although, the town of NTB reserves the power to control recovery efforts through written post disaster reconstruction plans and policies.

As another environmental issue, Onslow County supported the construction of package treatment systems while planning future wastewater treatment sites. "The limitations of septic tank use and their inclination for failure is well documented in Onslow County (1991 LUP, 164)." "However, only 13% of all septic tank permits are denied by the Onslow County Health Department; based upon consistency with state rules and regulations for determining septic tank suitability (1991 LUP, 164)." "Mandatory connection in areas with older septic tanks and in areas with significant failure rates must be given priority as County policies are developed (1991 LUP, 165)."

"It is very probable that within the 5 to 10 year planning period there will evolve housing market demands that will induce renewed development that will need wastewater treatment facilities for the County (1991 LUP, 198)." "In some areas development will be stymied by the lack of an acceptable wastewater system (1991 LUP, 198)." "The implementation of a sewer system feasibility study and master plan would alleviate that restriction (1991 LUP, 198)."

The policies in the 1991 land use plan for NTB recapitulate previous outlooks on growth and the environment. The preface of the NTB CAMA Land Use Plan 1991 states: "This plan attempts to balance the need to preserve the exceptional quality of natural resources and the desire to and need to develop (NTB 1991 LUP, i)." "The primary objective of any CAMA land use plan is the preservation of land

and water resources, with all development being consistent with this objective (NTB 1991 LUP, 1)."

"Land use development policies should be based on an analysis of existing conditions and projected trends and serve as general guides for producing future desired development patterns (NTB 1991 LUP, 46)." "Local planners admit sole reliance on state and local regulations does not adequately prevent the deterioration of the coast's precious natural resources (NTB 1991 LUP, 2)." "Development which would adversely affect NTB's natural resources, of course, is not encouraged (NTB 1991 LUP, 1)."

"As a resort, recreational, oceanfront community, the town of NTB is not opposed to growth (NTB 1991 LUP, 66)." "In fact, the town anticipates continual population growth during the next 10 years both seasonally and year-round (NTB 1991 LUP, 66)." "Generally, the town supports continued residential development and growth according to the availability of necessary basic services to sustain that development (NTB 1991 LUP, 66)."

Furthermore, the town's policy is to support new development only according to the capacity to accommodate water and sewer needs. There is also a policy to guide new development away from hazardous areas where there is a tendency toward excessive erosion, septic tank problems, flooding, and washover (NTB 1991 LUP, 62)." "Generally, NTB believes in managing and directing the town's growth and development in balance with environmental protection and enhancement and the availability of adequate, safe municipal services (NTB 1991 LUP, 62)."

"At the same time, however, NTB recognizes improperly managed growth can actually harm or destroy the very "appeal" which attracts new residents and tourists in the first place (NTB 1991 LUP, 62)." "Generally, the town wishes to preserve and promote the quiet, peaceful, low-density atmosphere and reputation of the town (NTB 1991 LUP, 63)."

Evaluation of Population and Development in the Coastal Barrier Resource System

Population Growth

Previous events occurring in the town may be predictors of what will happen in the Topsail CBRS unit. The report now analyzes the results and implications of this coastal planning. Population estimates are useful in evaluating public health and safety in terms of environmental quality for NTB.

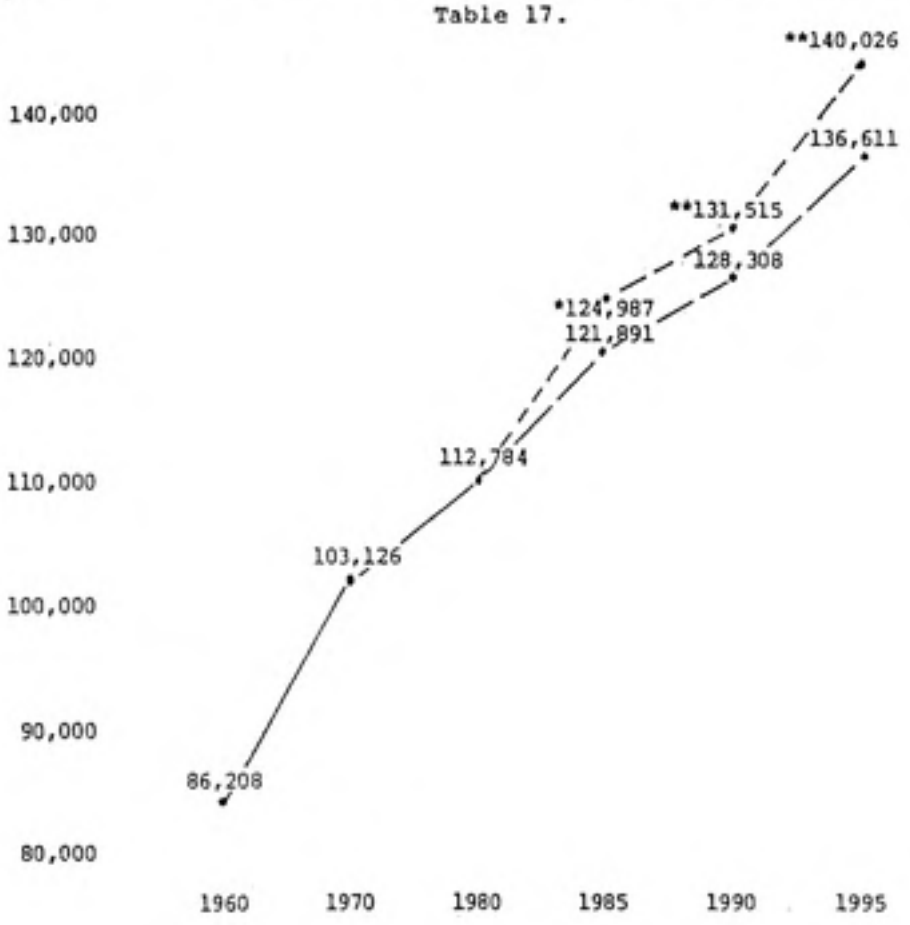
Although no population data exists before 1980 for WOB, past population data for the county suggests faster growth than expected. Notice the projected population in 1986 for Onslow County in Figure 29. The 1995 projection had already been exceeded by about 9,000 in 1990. The following conclusions draw upon 1990 population data.

From 1980-1990, the population of NTB grew nearly 12 times faster than the state, four times faster than the county, and six times faster than the township. Refer to Figure 21. A 15% average annual growth rate is quite significant (NTB 1991 LUP, 3). At a 15% average permanent population growth rate, NTB could have 3,042 permanent residents by the year 2000 (NTB 1991 LUP, 3). Being

FUTURE POPULATION OF ONSLOW COUNTY

Based on the North Carolina Office of State Budget and Management projections, Onslow County can anticipate continued population growth during the planning period, as shown on Table 17.

Table 17.



This growth projection by the State is based on Camp Lejeune personnel expanding, or at least staying constant, and continued expansion of the total local economy.

* Advanced Population Estimates for July 1, 1985 based on April 1986 Estimates.

** Note: 1990 and 1995 higher population figures based on April 1986 Estimates for July 1, 1985 of 124,987 population. Used 2.5% increase in State Management and Budget Projections for 1990 and 1995.

Figure 29 **Future Population Projection of Onslow County - 1986**
Source: *Onslow County Land Use Plan of 1986, 1987, p47.*

conservative, if the permanent population increased by half of the current average annual growth rate (7.5%); the town's population would be 1,440 by the year 2000. If we assume only two persons per home, the number of homes would total 720.

The peak seasonal population of 16,617 is 22 times greater than the permanent population. Refer to Figure 22. Even at half the peak population, the total summer population is 8,308. If the peak seasonal population increases by as little as 2% per year, it will be 19,859 by year 2000. As the population enlarges, the development pressures become greater and the demand for public services increases.

Development Surge

Building permit data documents the construction boom of the 1980's. Although the data on existing versus proposed development does not conclusively prove that more development occurred in the North rather than the South end of the town, other information from zoning maps and LUP's confirms this hypothesis. Refer to Figure 21. Most of the CBRS is situated in the northern part of the town; therefore, the graph suggests increased development pressure in the CBRS. Refer to Figure 23. From aerial photographs, Figure 30 portrays the progression of development (1969 to 1984) for the northernmost 3.1 miles of the town. In 1981, planners knew the primarily vacant CBRS land would develop because of the water line running through it to get to the northern end of the island that is outside of the CBRS.

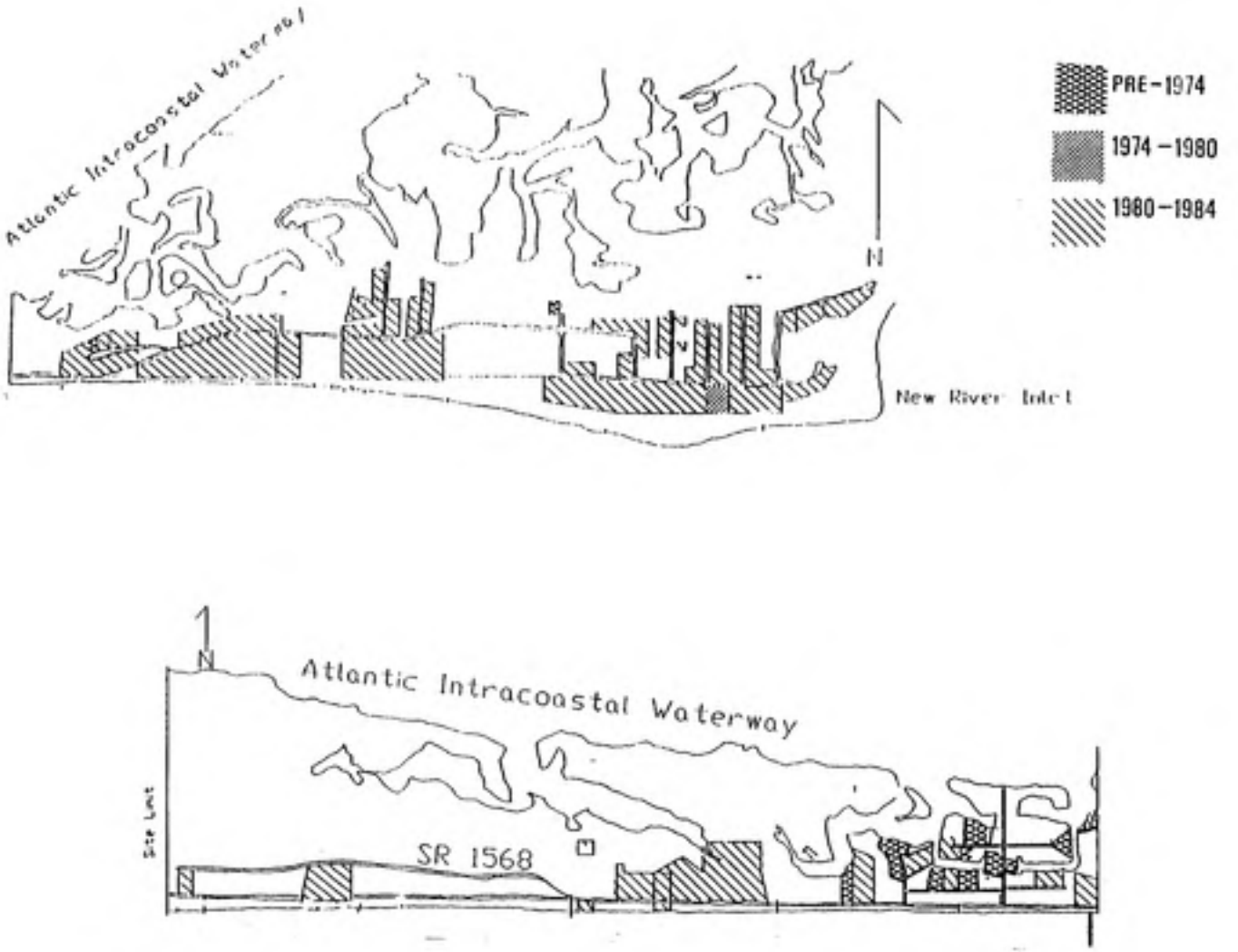


Figure 30 **Robertson's Interpretation of the Developmental History of Northernmost North Topsail Beach, 1969-1984**

Source: *Robertson, A Field Study of Shoreline Dynamics of North Topsail Beach, North Carolina, with Special Reference to Coastal Management, 1994, Figure 4.*

From 1986 to 1990, seven of the 12 approved development plats, 66% or 244 of the lots, were in the CBRS (NTB 1991 LUP, 11). Refer to Figure 25. Of course, some construction occurred before 1986. Specific examples in the CBRS include Bayview subdivision with 69 lots (15 triplex and 54 duplex), and Shipwatch Villas with 35 townhouse units (Godschalk, 13). Figures 31 and 32 visually illustrate the new development on NTB from 1984 to 1991. This information suggests resort investment will continue into the 1990's in the CBRS.

According to the Town Manager, the market for high rise development and real estate growth has slowed in recent years at NTB. Residential development on WOB has been declining since 1988 when a peak of 175 lots/units were approved (1991 LUP, 41). There seems to be a trend towards larger lots with single-family homes (Personal Communication, Town Manager). In the 1991 LUP, future growth in the area was projected to be considerably less than development experienced during the last 10 years, primarily due to the more stringent density controls and reduced market demand.

Another reason for large-scale condominium projects on NTB may have been the investments of two major landholders. They overcame the economic disincentives presented by the Coastal Barrier Resources Act (CBRA) and financed high-density development in the CBRS. Topsail Dunes is a 156 unit condominium development inside the "undeveloped" area with a planned expansion to 586 units (Godschalk, 13). Further north toward the inlet, Topsail Reef is a 240 unit condominium complex.

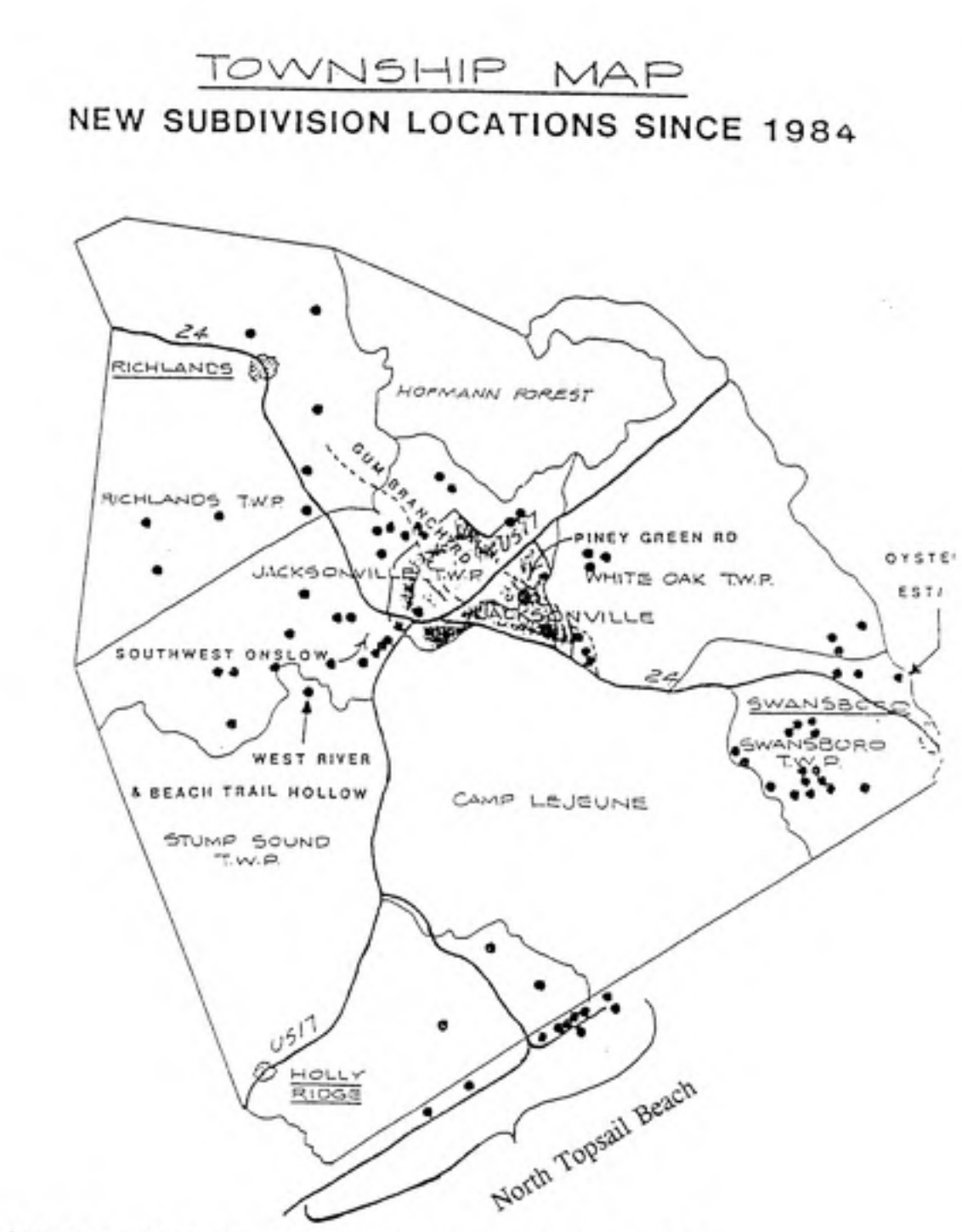


Figure 31 **New Subdivision Locations Since 1984**
Source: *Onslow County Land Use Plan of 1986, 1987, p16.*

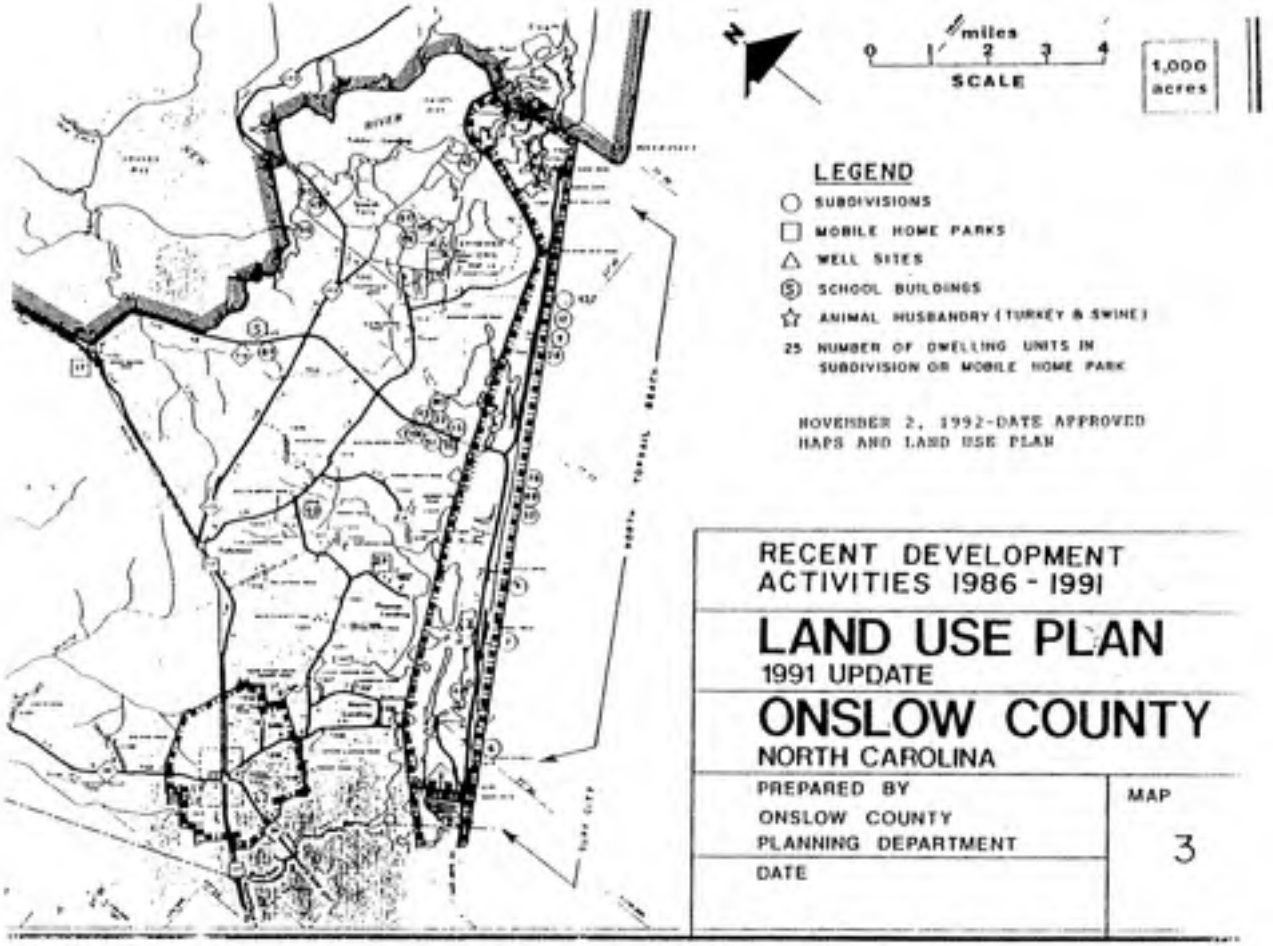


Figure 32 **Recent Development Activities on North Topsail Beach, 1986 to 1991**

Source: *Land Use Plan of 1991 Update for Onslow County, 1992, Map 3.*

The investors laid both water and sewer lines through the CBRS unit to reach their real estate.

Zones

Most of the NTB CBRS unit falls between the Golden Acres plat and the Goose Bay Beach plat, which is considered to be in a Limited Transition (LT) zone. Refer to Figure 27. The only designated "developed" zone in the CBRS includes Topsail Dunes, Shipwatch Villas, and St. Regis Resorts. More construction may occur on the vacant land in the CBRS. Half of the commercial zones are in the CBRS and all three have ocean frontage (NTB Zoning Ordinance, 47). Future commercial development could occur in the Topsail CBRS unit, too. The land at the northern end, close to the inlet, from Topsail Reef to New River Beach Club, is developed and excluded from the CBRS. This area has been evaluated as dangerous for future development (Robertson, 22).

Land Use Plans

In 1975, local officials projected intense development in the future. Local and state laws did not preclude sensitive or federally designated areas. The land use policies have promoted growth in vacant or existing high-density areas, even the one at the inlet, since 1981. Throughout the late 1980's, the northern end continued to develop; regardless of the fact it was in an Ocean Erodible AEC. Additionally, it has an Inlet Hazard Zone AEC that is highly susceptible to flooding and erosion.

The town adopts good policies however, they must be followed. For instance, allowing more development in the inlet area does not improve the safety of the citizens moving there. The "analysis of existing conditions.... for producing future desired development patterns" does not seem to be occurring (NTB 1991 LUP, 66). The CBRS at NTB needs special consideration. The local planners assert development will be supported until it cannot be adequately accommodated by public services but they do not express what the limit might be.

Under Onslow County's policy to promote high-density development, more people flocked to the beach. The county knew as long as water and sewer was or could be installed, development would be encouraged at NTB regardless of CBRA. The present beach development policy may not be beneficial in the long run. Continued development at NTB will cause higher local taxes, reduced local services, more stringent controls of land use and development, as well as severe economic disruption in the event of a major storm.

Information about previous land use management strategies partially explains how and why the CBRS at the NTB unit continues to develop. In spite of the fact that WOB has received a large degree of attention in previous LUP's, local and state governments have not always heeded the purposes of CBRA. None of the LUP's have identified CBRA. The plans only discuss the absence of flood insurance in certain areas. There is no indication local government is guiding development away from the CBRS unit using CBRA as a precedent.

Population growth stimulates a demand for NTB properties. The increased development pressure overrides the disincentives in CBRA for development of the CBRS. The planning tool of zoning regulates the development, but ultimately it is the guiding planning policies that determine the outcome of the town.

Federal, State, and Local Financial Assistance

Governmental Monetary Support

The following section discusses how government funding facilitates development at North Topsail Beach. On the federal level, aid in terms of federal flood insurance and agency disaster relief programs affect development. State funds finance road repairs and other activities. Local funding subsidizes public services, including a water system. The consequential development of the CBRS brings greater tax revenues to Onslow County. Each level of government influences growth inside the CBRS.

Federal Aid

To qualify for the National Flood Insurance Program (NFIP), local communities must adopt Flood Prevention Ordinances (Pilkey, 25). This ordinance identifies construction materials and building techniques that reduce future flood risks. For example, it requires elevation of structures. It also establishes a program for issuing development permits for proposed construction within flood zones. This program aspires to reduce actions that augment erosion and flood damage to protect the public interest. Figure 33 describes the purpose of the Regular Phase, Flood Damage Prevention Ordinance as written for Onslow County.

Once in the NFIP, the Federal Emergency Management Agency (FEMA) provides Flood Insurance Rate Maps indicating flood elevations and flood hazard

National Flood Insurance, Flood Damage Prevention Ordinance, Regular Phase was adopted on April 2, 1990. The ordinance has the following purposes; restrict or prohibit uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities. It requires that vulnerable to floods, including facilities which serve such uses, be protected against flood damage at the time of initial construction. The ordinance controls the alteration of natural floodplains, stream channels, and natural protective barriers which are involved in the accommodation of flood waters. It controls filling, grading, dredging, and other development which may increase erosion of flood damage, and prevents or regulates the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards to other lands.

Enforcement of the Flood Damage Prevention Ordinance is through the Onslow County Planning Department and the County Inspections Department.

Figure 33 **Description of Onslow County's National Flood Insurance, Flood Damage Prevention Ordinance, Regular Phase, 1992**

Source: *Land Use Plan of 1991 Update for Onslow County, 1992, p149.*

zones. These maps record the formal CBRS boundaries. Insurance agents scrutinize the information presented on these maps when writing flood insurance policies.

"About 40,400 federal flood insurance policies are held by North Carolina property owners (Rives, J1)." "Federal flood insurance policies cover up to $185,000 in damages to a structure and $60,000 for its contents lost to floodwaters (Rives, J1)." The barrier island property owner, such as those at North Topsail Beach, pay an average annual premium of $470 (Rives, J1).

Another form of federal government funding comes from disaster assistance programs, administered by the Federal Emergency Management Agency, the Small Business Administration, the Farmer's Home Administration, and the Army Corps of Engineers (Kuehn, 591). These agencies provide assistance for reconstruction, cleanup efforts, and temporary food and shelter. Disaster relief efforts from the Small Business Administration and FEMA averaged $82 million annually for coastal barriers between 1972 and 1979 (Kuehn, 591). Figure 34 lists federal agencies and their programs that can significantly impact barrier island environments. Obviously, the federal government has sustained coastal development and/or post-storm reconstruction.

For three and one-half weeks in January of 1992, the United States Army Corps of Engineers dredged 161,400yd^3 of spoil from the Atlantic Intercoastal Waterway and piped it to a 1.1 mile stretch of beachfront (Robertson, 46). Graders and bulldozers evened the pumped sand over the area shown in Figure 35.

- Heritage Conservation and Recreation Service (HCRS)
- National Park Service (NPS)
- Fish and Wildlife Service (FWS)
- Bureau of Land Management (BLM)
- Environmental Protection Agency (EPA)
- Department of Commerce (DOC)
  --Office of Coastal Zone Management (CZM)
  --Economic Development Administration (EDA)
- Corps of Engineers (COE)
- Federal Emergency Management Agency (FEMA)
  --Federal Disaster Assistance Administration (FDAA)
  --Federal Insurance Administration (FIA)
- Council on Environmental Quality
  --Executive Order (EO) 11988
  --Executive Order (EO) 11990
- Department of Transportation (DOT)
  --United States Coast Guard (USCG)
  --Federal Highway Administration (FHWA)
- Housing and Urban Development
- Farmers Home Administration (FmHA)
- Small Business Administration (SBA)
- General Services Administration (GSA)
- Department of Energy (DOE)

Figure 34 **List of Agencies That Facilitate Coastal Barrier Growth**
Source: *Heritage Conservation and Recreation Service, Alternative Policies for Protecting islands along the Atlantic and Gulf Coasts of United States and Draft Environmental Statement, 1979, pA-2.*

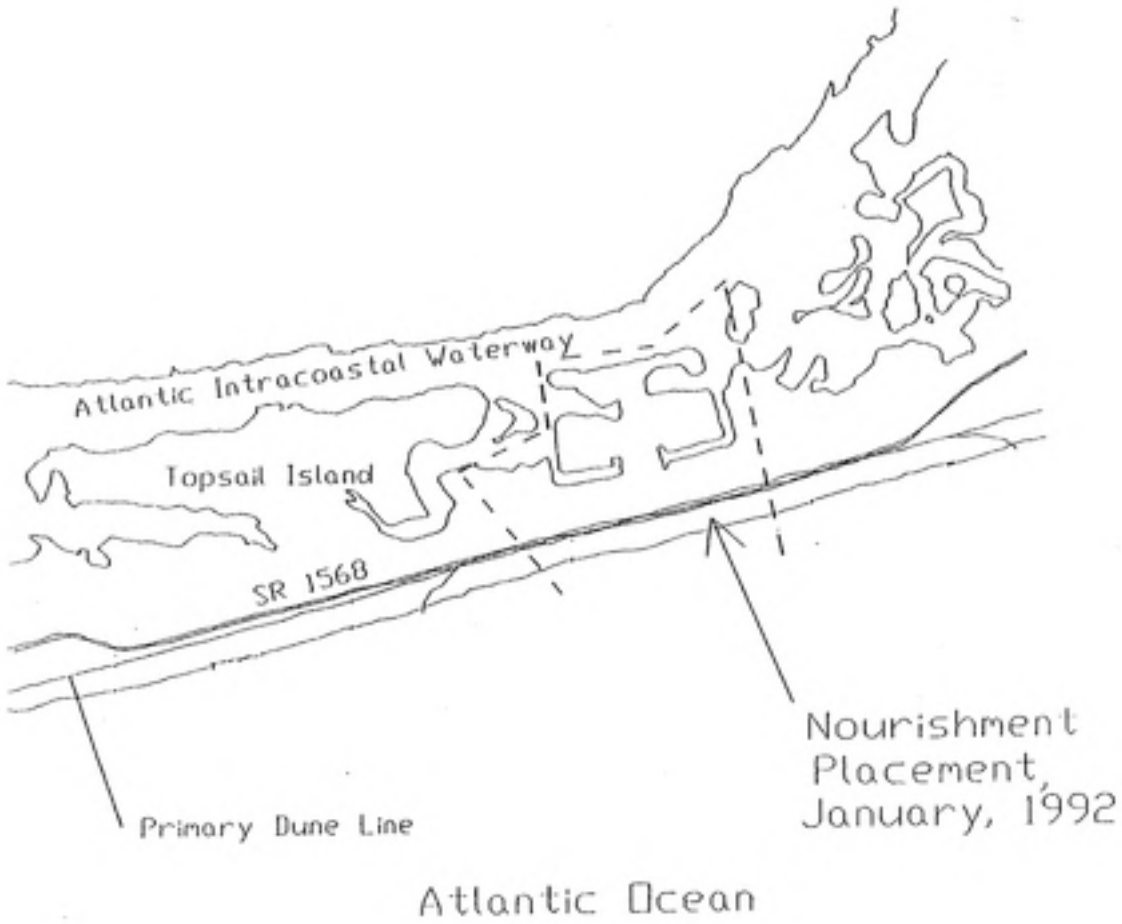


Figure 35 **Location of United States Army Corps of Engineers Sand Disposal Project, 1992**

Source: *Robertson, A Field Study of Shoreline Dynamics of North Topsail Beach, North Carolina, with Special Reference to Coastal Management, 1994, Figure 16.*

State Assistance

State funds flow into NTB through road repairs and construction. The town of NTB has one primary road and 7.64 miles of paved secondary roads. Some roads require private maintenance. Many roads are perpendicular to the ocean instead of at oblique angles. Therefore, these roads have the potential to act as a conduit for storm surge and storm surge ebb (Ache, 9). State Road #1568 has been moved inland twice due to natural coastal barrier migration.

State Road #1568 (New River Inlet Road) branches northward where Highway 210 reaches the island. In the past, this road experienced extensive damage during frequent overwash events. Lying beside the ocean, much of the road had to be swept free from sand almost daily. Truck loads of imported dirt made artificial dunes which were constantly washed away. The continual flooding of the road did not hinder construction along it.

The North Carolina Department of Transportation (NCDOT) constantly replaced stretches of the road destroyed during storms. They partially repaved portions of SR #1568 destroyed by the January 1987, October 1991, and April 1993 Northeaster storms. "To repair the road that overwashes daily at high tide is an exercise in futility", said the town manager in April 1993 (Staff writer, A4). The NCDOT said "As long as the road is a state road, we have to maintain it (Staff writer, A4)."

The Northeaster storm of April 1993, cut off 450 people at the northern end of the island until the flood waters receded from SR #1568 (Allegood, A3). Also, more

than 3,000ft of sewer line buried beside the road was damaged (Allegood, A3). The NCDOT graded a temporary dirt road further inland to serve as an emergency evacuation route. It was also to be the bed of a new road.

A private investor, one of the two major landholders mentioned previously, wanted to move the primary SR #1568 inland. This action would give proper access and allow their oceanfront property to be developed. In 1987, the developer signed an NCDOT agreement to move about four miles of SR #1568 inland (Staff writer, C3). "By handing the building of the road over to a private developer, the NCDOT avoided an environmental study, or impact statement, required of state projects (Associated Press, B3)."

The NCDOT agreed to let the road project be done in two phases. In 1991, the investor completed the first phase (2.7 miles) of the state road to their new resort (Villa Capriani) (Staff writer, C3). The developer did not finish the road declaring the remaining 1.3 miles would cause bankruptcy. Since the rest of the road was not on the developers property, right-of-ways from other land owners would have to be purchased to relocate the rest of the road. In 1991, the NCDOT negotiated a second agreement in which the developer signed a $1.6 million guarantee that he would complete the project (Staff writer, C3). The road was not completed and the developer sued the NCDOT.

In 1991, the NCDOT sued the developer for breach of contract. The lawsuit requests $4.6 million to cover the expected cost of completing the relocation (Staff writer, C3). Meanwhile, the NCDOT accepted responsibility for moving the rest of

the road further inland. The road construction project started in the summer of 1993 and the new road was completed in the summer of 1994 (Personal Communication, NCDOT Engineer).

County water lines, private sewer lines, and utility lines were also moved inland with the new road (Personal Communication, Town Manager). The road construction engineer, who completed the relocation, estimated a state payment of $2 million to the road construction contractor (Personal Communication, NCDOT Engineer). This estimate included the cost of relocating water, sewer, and utility lines, but not the costs of right-of-way acquisitions, engineers plans etc..

Local Government Influence

Local government monies filter into the town by maintaining a county water supply. The Farmer's Home Administration, a federal agency, funded the initial construction of the county water system. Later, Onslow County extended the water system to NTB (NTB 1991 LUP, 36). It serves 2,173 customers at NTB, or nearly 11% of the system's service area population (NTB 1991 LUP, 36). Presently, a 12-inch water main carries water from the tank to the island over the high-rise bridge. At the intersection of Highway 210 and State Road (SR) #1568, the waterline branches north and south into smaller lateral lines (NTB 1991 LUP, 36). Improvements to the Onslow County Water System upgraded the service to NTB when the state road was moved inland (NTB 1991 LUP, 36).

In the past, Onslow County supported development on the only beach available for development within its jurisdiction. "This new development has had a substantial impact on the Onslow County tax base (Godschalk, 13)." A major factor accounting for the $10 million adjusted difference between 1976 and 1984 is the addition of some $5.3 million in improvements constructed by the two major developers (Godschalk and Report to Congress CBRS, 13 & 3v11 respectively). Local government decisions influence beachfront development.

Evaluation of Governmental Financial Aid in the Coastal Barrier Resource System

Federal Funding

The Town of North Topsail Beach flood prevention ordinance, passed in May 1990, began the "regular" phase of the federal flood insurance program (NTB 1991 LUP, 22). By requiring certain building standards, this ordinance can lower federal flood insurance rates for coastal property owners. Although, the potential rate decreases will vary from place to place. Potentially, the lowered federal flood insurance rates could act as an incentive to bring more real estate business to the area. If this development pressure continued, prospectors may try to settle in the vacant land in the CBRS. Not only would they be subject to the usual coastal hazards, but they may face them without flood insurance.

The unavailability of federal flood insurance is an important limitation to the development of the CBRS at NTB. Of the approximate 12 mile length of the town, CBRA denies federal flood insurance to about 6.5 miles (Personal Communication,

Town Manager). Initially, the withdrawal of federal flood insurance had a clear impact on development in the CBRS at NTB (Godschalk, 12). It is difficult to obtain private insurance for property in the CBRS, however, developers have found private insurers willing to accept the risk on construction efforts in the CBRS (Personal Communication, Town Manager and Local CAMA Permit Officer). Private insurance is usually obtainable once the construction is roofed, but not before.

It is not known whether the private insurance policy premiums are outrageously priced or if the policies contain significant limitations such as large deductibles. In summation, the denial of federal flood insurance on NTB just delays development until investors are willing to take the financial risk or find someone to write the policy.

Sometimes insurers misinterpret CBRS map boundaries when they are applied to the actual landscape. Some people claim federal flood insurance policies have been issued for properties in the CBRS at NTB (Personal Communication, Town Manager). If the allegations are true, paying illegitimate federal flood insurance claims represent an additional expense to government entities.

The original goal of the NFIP was to reduce flood losses by discouraging new construction in flood-prone areas such as coastal barriers; widespread participation in the NFIP by flood-prone communities suggests that the NFIP has not been very successful (Kuehn, 602). "As of August 31, 1981, more than 1.918 million insurance policies valued at $97,972 billion had been sold nationwide. Coastal counties had 1.165 million of these policies valued at $64,667 billion (Ward, 156)." Although this

is not substantial evidence of the extent of federal aid issued to NTB, federal flood insurance claims have been filed and federal agency reconstruction assistance has been used outside the CBRS. Critics say the NFIP just reduces the financial risks of development in flood prone areas.

Subsidies, like disaster assistance, act as an incentive for people moving into hazard-prone areas. Disaster relief funds encourage shoreline development since the risks are shifted from the private sector to the public sector. Even if structures are totally destroyed, people can rely on these government emergency services for financial assistance. If the subsidies were unavailable, some people might decide to build elsewhere or fewer structures may be built. Comparatively, mainland sites may look like a better investment. To deny subsidies for coastal reconstruction lessens the economic pressures for owners of undeveloped land on coastal barriers to sell their land for development, especially plots in the CBRS.

With more development in the CBRS, repair costs after a major storm increase greatly. The federal government tries to minimize expenditures by not providing federal assistance for the restoration of damaged structures within CBRS units. Yet, they still incur costs when damage from destructive storms is paid for using federal emergency funds for debris removal and for temporary food and housing assistance for victims. In essence, the federal government provides coastal property owners with compensation for their losses to known coastal hazards, thereby securing private investments. This costly pattern is likely to continue unless the federal government takes an even more active role in coastal protection.

It appears that federal assistance has influenced development in other CBRS units, however, there is little documental evidence that it has played a role at NTB. According to North Carolina's Division of Emergency Management, no federal funds from the Small Business Administration have been spent in the town of North Topsail Beach (Personnel Communication, Division of Emergency Management). Perhaps the Small Business Administration and FEMA do not promote development, but they certainly do sustain it. While the Department of Housing and Urban Development and the Farmers Home Administration offices have not provided federal funds to the resort town, the two agencies have granted federal monies to four mainland towns in Onslow County (Personnel Communication, North Carolina Housing and Urban Development).

The only evidence of federal monies being used in the CBRS of NTB was by the Army Corp of Engineers. They termed their estimated $1 million beach nourishment endeavor as a spoil disposal project (Robertson, 72, 46). Some of the sand was outside the CBRS, in front of the Galleon Bay Subdivision. Refer to Figure 35. The nourishment effects lasted less than four months, but did provide some protection during the winter months (Robertson, i).

State Contributions

Inevitably, many coastal barrier roads will experience wash out. Some roads, like the one at NTB, cross CBRS units. The unelevated new state road is 4 to 6 feet

lower than its previous overwashed location (Ache, 9). This elevation may put the new road in danger of future flooding (Bush, 68).

Adequate road access has been and remains a significant factor in the development of the northern end of the island (1991 NTB LUP, 41). State Road #1568 provides an egress to the high-density development near the inlet at the northern end and to the people living in the CBRS. These residents must use the state road, traversing the CBRS, to reach the bridges during island evacuations. Lives are in jeopardy when evacuation routes are swamped and impassable by flooding and tidal action. The risk increases as lead times decrease.

Topsail Unit L06 is an instance where a state agency, the North Carolina Department of Transportation, has given financial assistance to a project seemingly contrary to CBRA's objectives. "It is estimated that yearly cost to maintain SR #1568 ranged from $20,000 to $40,000 (Personal Communication, NCDOT County Supervisor). Although, CBRA does not prohibit state funds from being used inside the CBRS; by maintaining certain roads on coastal barriers, all state taxpayers are subsidizing infrastructure promoting development in the CBRS.

Currently, the NCDOT case is pending against the developer. Litigation will determine if North Carolina will be reimbursed for moving the state road. The NCDOT expects to collect from the county water system and from the private sewer company.

Local Level Investment

On the local level, repairs and upgrades of water lines in the CBRS have come from county water system funds. In the past, erosion damage destroyed county water lines on NTB. Washed out water lines at the Galleon Bay Subdivision have been replaced several times (Personnel Communication, Town Manager). The submerged water lines at former inlet lots had to be adjusted to terminate further inland. The private sewer lines have received even more damage since they were buried on the ocean side of the state road (Personal Communication, County Director of Utilities). The Galleon Bay Subdivision and inlet water lines are outside the CBRS. Water and sewer line damage, however, occurs on the connecting stretches of land inside the CBRS (Personal Communication, Town Manager).

When SR #1568 was moved, the county replaced a 6-inch water line with a 12-inch water pipe (NTB 1991 LUP, 37). The estimated replacement cost was between $600,000 to $700,000 (1991 NTB LUP, 36). In areas with high erosion rates, the problem of replacing or moving water lines will reoccur. This example illustrates the local public expense of developing the CBRS.

In essence, the inland users of the county water supply could be subsidizing the cost for a few people to live on the beach regardless of the amount of risk. Their water bills may reflect the cost of reoccurring erosion damage to water lines. The County Water System is entirely user-fee based. Onslow County's Director of Utilities says the NTB water line upgrade represents a relatively small amount of repair cost relative to the size of the county-wide water distribution system.

Therefore, the upgrade does not significantly affect the price of the service. Although this scenario of local subsidization of development in the CBRS is only conceptual, a comparable situation could arise with sewer line repair costs and increases in local user fees.

County investment in all public services represents another avenue through which Onslow County supports development in the CBRS. Looking for increased tax revenues, county officials believed the benefits derived from development of NTB were greater than the cost of providing the subsequent public services such as police protection, fire protection, solid waste disposal, water and sewer connections, and beach access facilities. To accommodate the influx of people, the county expenditures for public services may outweigh the benefit from the seasonal population revenues.

Purchasing land for recreational facilities is an example of the rising cost of local public investment. Increasing oceanfront property values present another problem for the county. With rising prices, it becomes difficult to obtain the funds to purchase the land needed to serve seasonal population peaks. Public beach access sites become overburdened with people and cars. The stresses of inadequate parking facilities and dune crosswalks compound the resource demands upon the beach. Two of the four public beach access sites are in the CBRS. The increased tax revenues may not cover the expenses incurred by the government from the development of the CBRS.

A review of the federal involvement through federal flood insurance and a review of state and local funding for infrastructure and public services leads to an

understanding of who actually pays for the public services that encourage coastal barrier development, especially in the CBRS. This evidence suggests that state and local funds spent in the CBRS may be replacing the subsidies denied by the federal government.

Environmental Implications

Environmental Factors

Environmental quality may suffer with coastal barrier development. Storms, flooding, erosion, water quality issues, wastewater discharges, and conservation efforts are important factors in this evaluation. The town land use plan declares that each of these environmental factors is a physical constraint to development. Figure 36 provides a physical description of the environmental factors involved at NTB.

Storm Action

The threat of hurricanes exists on the North Carolina coast. Figure 37 shows the monthly frequency of hurricanes and tropical storms (1950-1992). The "official" Atlantic hurricane season extends from June 1 through November 30. Fifty percent of the storms impacting North Carolina from 1950 to 1992 occurred between August 20 and September 15 (Robertson, 32). In 1954, Hurricane Hazel destroyed 210 of the 230 buildings on Topsail Island (Ache, 10). Water covered the island in this 100-year event. Hurricane Diane in 1955 and Donna in 1960 caused millions of dollars in damage (Ache, 10).

In the winter, Northeaster storms hit the coastline of NTB and property damage is common. Figure 38 recounts Northeaster storm damages to WOB noted in a former land use plan. In 1993, the town condemned approximately five homes due to property and septic tank damage from major storms (Personal Communication, Town Manager). "The town lost 12 to 15ft of oceanfront beach after just the April

Description of Study Areas and Reconnaissance Summary.

Zone	Landmarks	Elevation*	High Ground Width (m)**	Beach Width (m)	Erosion (ft/yr)	Dune Description	Maritime Forest Description	Back-Barrier Description	Development Description	Percent Mobile Homes	Other Notes
1	North Topsail Beach Line to Permuda Island Road	Low	180 - 360	20 - 30	2	<2 m discontinuous	none	1000 m of low elevation marsh	Very high density residential	50	Old West Onslow Beach
2	Permuda Island Road to Onslow Co. Beach Access	Low	180 - 240	20 - 30	2	<2 m discontinuous	sparse forest on sound side	open water, >1000 m	High density residential	0	Green Ave. is an overwash conduit.
3	Onslow Co. Beach Access to 2nd Ave.	Low	180 - 300	20 - 40	2	<2 m discontinuous	sparse forest everywhere	open water, >1000 m	High density resid. 1 large resort hotel	25	none
4	2nd Ave. to NC 210 Bridge	Low	120 - 480	10 - 40	2	<2 m continuous	sparse forest everywhere	Ashe Island and marsh directly behind island	Moderate density resid. 2 large resort hotels	0	CBRA Unit L07 begins here. Rojar's Bay Campgound with many mobile homes.
5	NC 210 Bridge to Villa Capriani	Low	240 - 480	10 - 30	2	1 - 3 m continuous	well developed forest on sound side	open water, >1000 m	none	0	North Topsail Beach airstrip
6	Villa Capriani to McKee's Pier	Low	120 - 420	10 - 40	3 - 4.5	<2 m, artificially maintained	sparse forest everywhere	50 m wide ICW Chadwick Acres Island and marsh behind	Low density resid. 1 large resort hotel	0	A portion of this area is excluded from CBRA Unit L07 Beach scraping occurs here.
7	McKee's Pier to Sea Gull Lane	Low	150 - 360	10 - 40	2	<2 m, artificially maintained	none	open water, >1000 m	Many large resort hotels	0	Beach scraping occurs here. CBRA Unit L07 ends here.
8	Sea Gull Lane to New River Inlet	Low	300 - 400	20 - 120	3 ft/yr accretion	1 - 3 m continuous	none	1000 m of low elevation marsh	Very high density residential	0	Inlet dredging occurs here.

* Low = less than 20 feet NGVD

** Widths are rough approximations derived from areal photographs.

Figure 36 **Physical Description of the Environment at North Topsail Beach in 1993**

Source: *B. Ache, Barrier Island Storm Hazard Assessment: An Intra-Island Scale Assessment of North Topsail Beach, North Carolina, 1993, p16.*

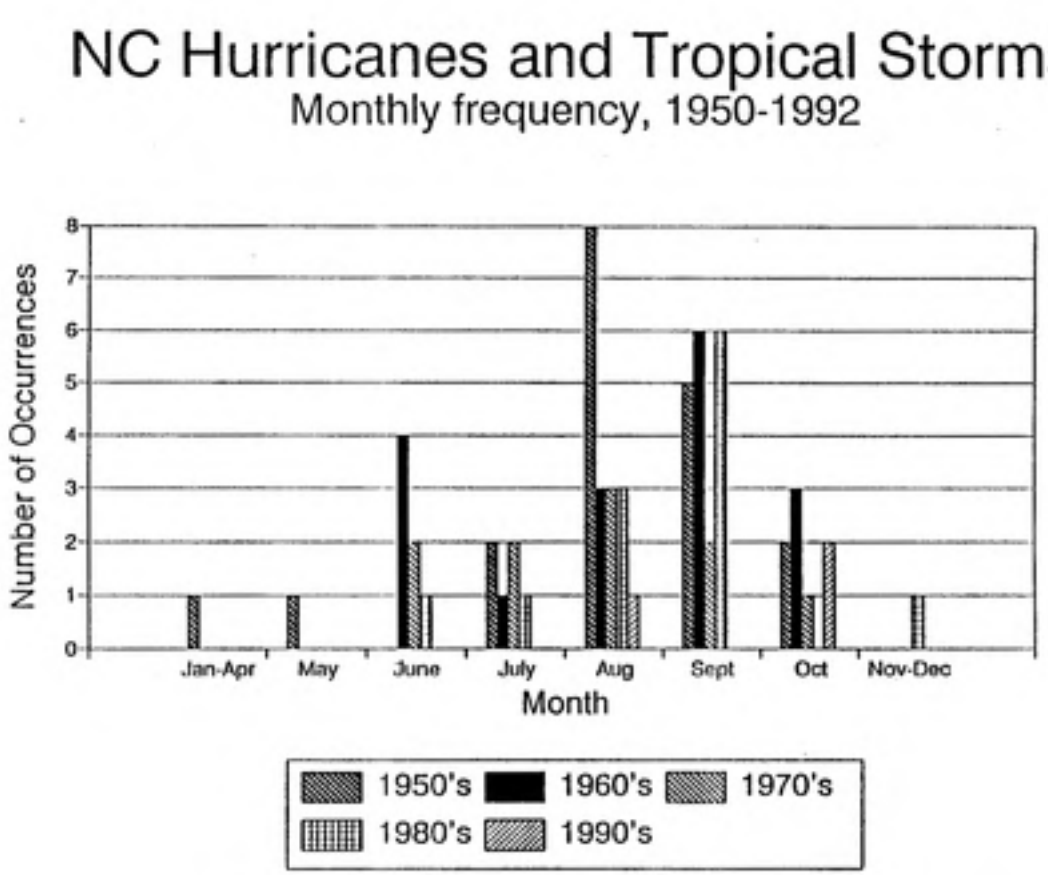


Figure 37 **North Carolina Hurricanes and Tropical Storms, Monthly Frequency, 1950-1992**

Source: *Robertson, A Field Study of Shoreline Dynamics of North Topsail Beach, North Carolina, with Special Reference to Coastal Management, 1994, Figure 8.*

Storm Events Occurring During Planning Period (1986-1991)

On December 2, 1986, a Northeaster storm caused considerable damage to West Onslow Beach and other low-lying coastal areas. Damage at West Onslow Beach amounted to about $390,795.00 and involved the following:

Damage to 2,000 feet of State Road 1568
Water line damage
Telephone cable damage
Power line damage
13 private vehicles damaged (6 totally lost)
101 private dwellings (mostly steps, decks, heat pumps, gazebos, etc.)
19 County beach walkover structures destroyed
2 sailboats destroyed

Thirty days later on New Years Day 1987, another Northeaster in combination with an extremely high tide caused by a rare astronomical alignment caused damage at West Onslow Beach. Damage occurred to 1,000 feet of SR 1568, 300 feet of sewer line and to the beach dune structure. Portions of Old Folkstone Road on the mainland were flooded out. No separate estimate was made of the damage from this event.

At midnight, on September 21, 1989, Hurricane Hugo struck the coast near Charleston, South Carolina. This was a category 4 storm with the highest recorded storm surge height on the east coast this century. Hugo caused the evacuation of 500,000 people in Georgia, South Carolina, and North Carolina, and caused an estimated seven billion dollars in damage. Locally, the effects of the storm were minimal. Increased beach erosion occurred along some County beach areas. In North Carolina, the most severe damage occurred in Brunswick County.

Figure 38 Damage Caused by Former Storm Events at North Topsail Beach, 1986-1991

Source: *Land Use Plan of 1991 Update for Onslow County, 1992, p37.*

1993 Northeaster (Allegood, A3)." Not only do storms cause wind and flood damage, they also hasten erosion.

Flood Hazards

Coastal and inland flooding differ. Riverine flooding is more predictable and its 100-year flood boundaries do not change much with the meandering of the water channel (US Senate 97th Congress, 68). In coastal flooding, the 100-year flood boundary migrates landward due to sea level rise and land submergence (US Senate 97th Congress, 28). Unlike riverine flooding, coastal flooding is not confined to static units and it involves more wind, wave, and tidal exposure.

According to the Flood Insurance Rate Maps for NTB, all developable land on NTB sits within a 100-year flood plain and all oceanfront property is designated in the V-zone (NTB 1991 LUP, 25). Figure 39 illustrates the flood hazard areas and potential erosion areas of NTB. Velocity zones (V-zones) are coastal areas where wave action is an additional hazard during 100-year flooding events. A-Zones designate the areas subject to a 100-year flood.

In 1990, coastal scientists asked North Carolina agencies to cease the development of the north end of Topsail Island, explore the possibility of consumer fraud in previous development sales, and educate or warn consumers about the dangers of certain coastal properties (Allegood, A9). The state authorities claimed they had no authority to stop the development and no reason to investigate real estate practices near the New River Inlet (Allegood, B4).

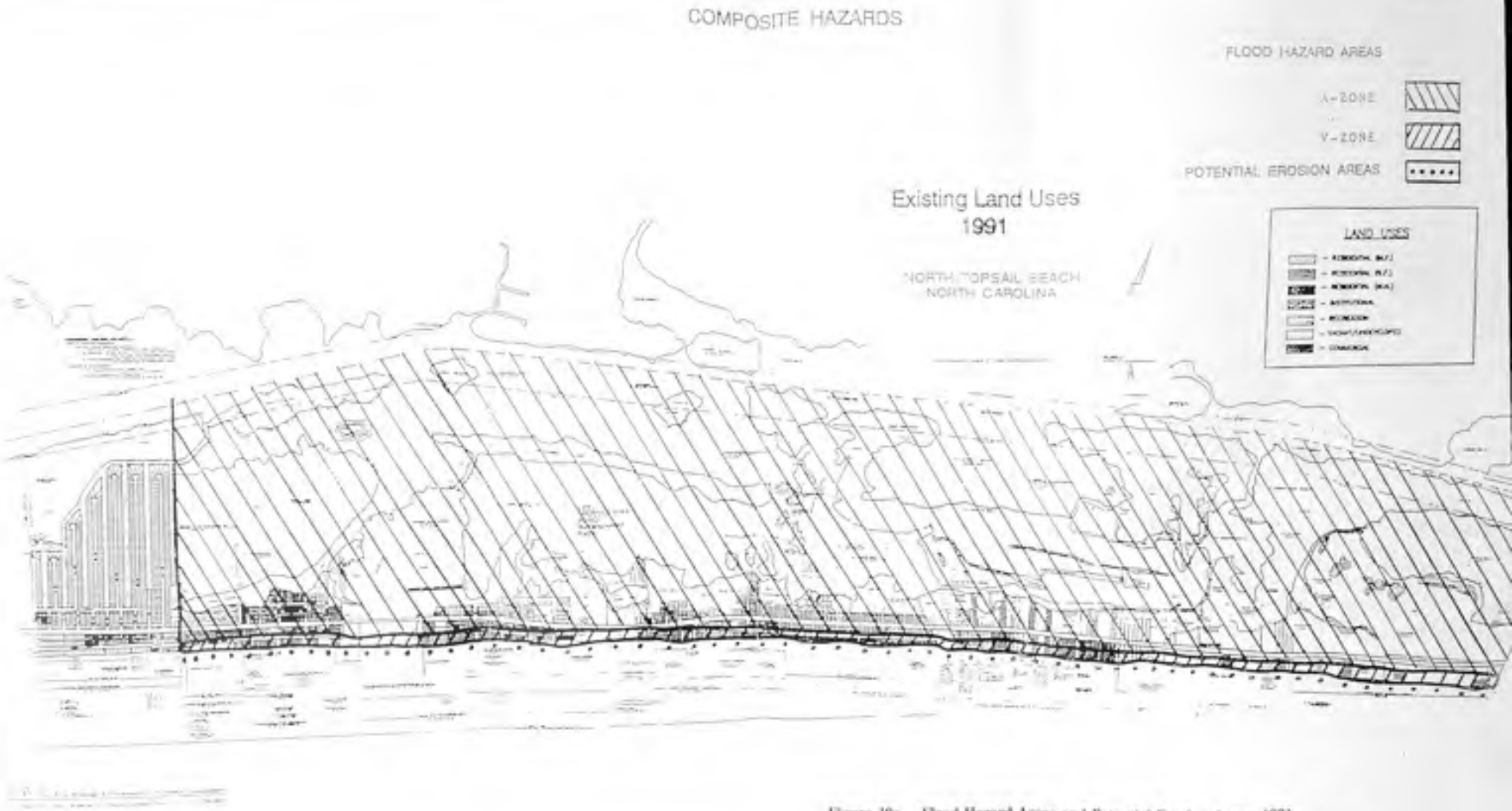
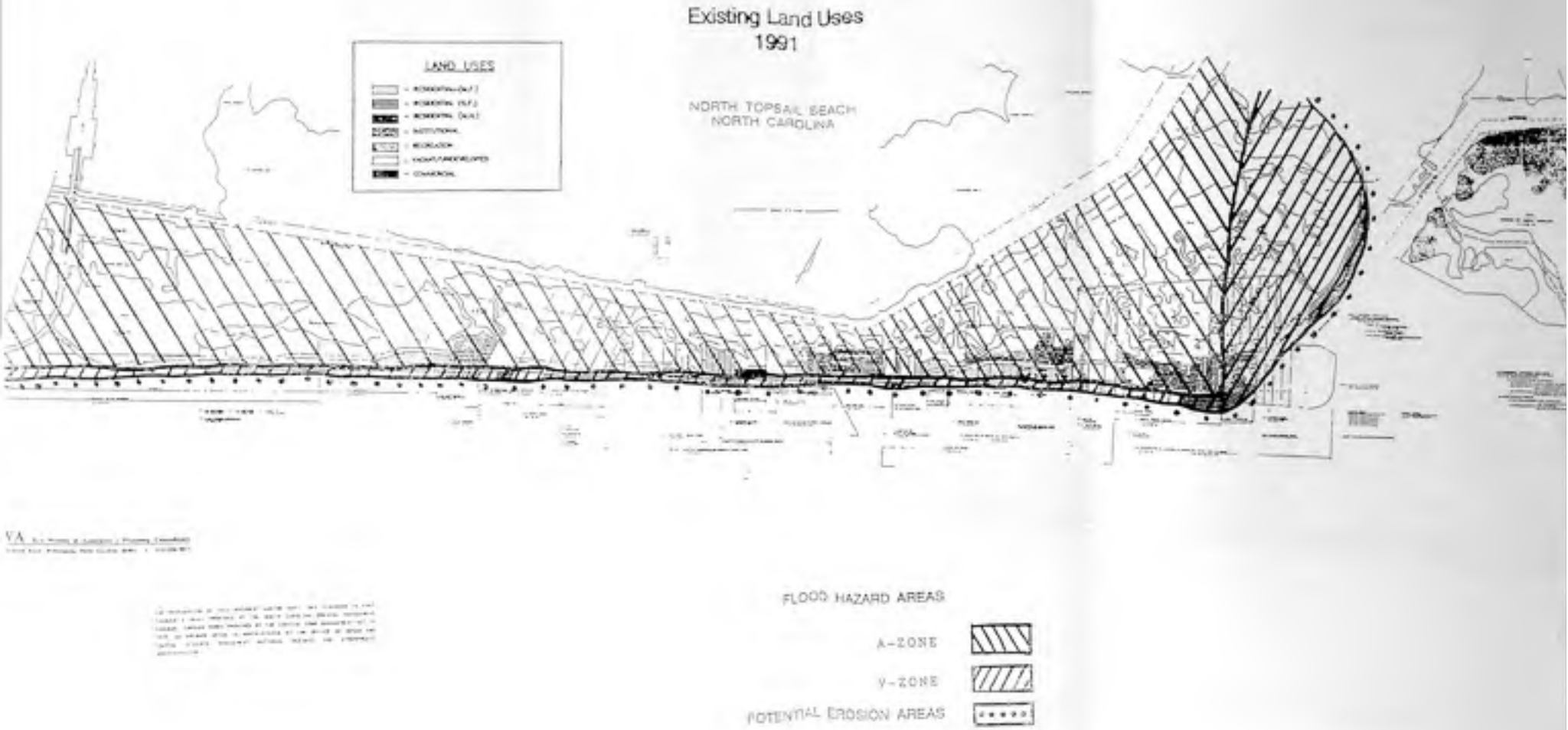


Figure 39a **Flood Hazard Areas and Potential Erosion Areas, 1991**
Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, Map 6.*

Figure 39b **Flood Hazard Areas and Potential Erosion Areas, 1991**
Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, Map 6.*



Erosion

The natural process of erosion, otherwise known as shoreline retreat, is the primary reason for barrier island migration. The migration of the outer banks of North Carolina from 1590 to 1988 can be seen in Figure 40.

North Carolina allows certain protective measures, such as sand bagging, beach nourishment, and beach scraping, along the coast line if there is imminent danger to the property, but only to the extent necessary to protect property for a short period of time or until the effects of a short term erosion event are reversed. Erosion control methods must be compatible with public use and enjoyment of the beach (Robertson, 19). "Bulkheading has been the response to lagoonside erosion (Bush, 68)."

Figure 41 illustrates the long term average annual erosion rates updated through 1986 as determined by the North Carolina Division of Coastal Management. From the map, the following locational description is a best estimate of the erosion on the ocean side of NTB.

There is slight accretion, 2 feet per year, of the shoreline occurring from the Onslow County line to Portofino (Dashed Section #1). The rest of NTB experiences eroding shorelines. The next section of the town, from Onslow County Beach Access #2 to Golden Acres, is eroding 3.5 feet per year (Section #2). The average annual erosion decreases to 2 feet per year from the Golden Acres Second Plat to Onslow County Beach Access 4 (Section #3). The CBRS unit, area without federal flood insurance, begins after Sea Oaks (Section #4).

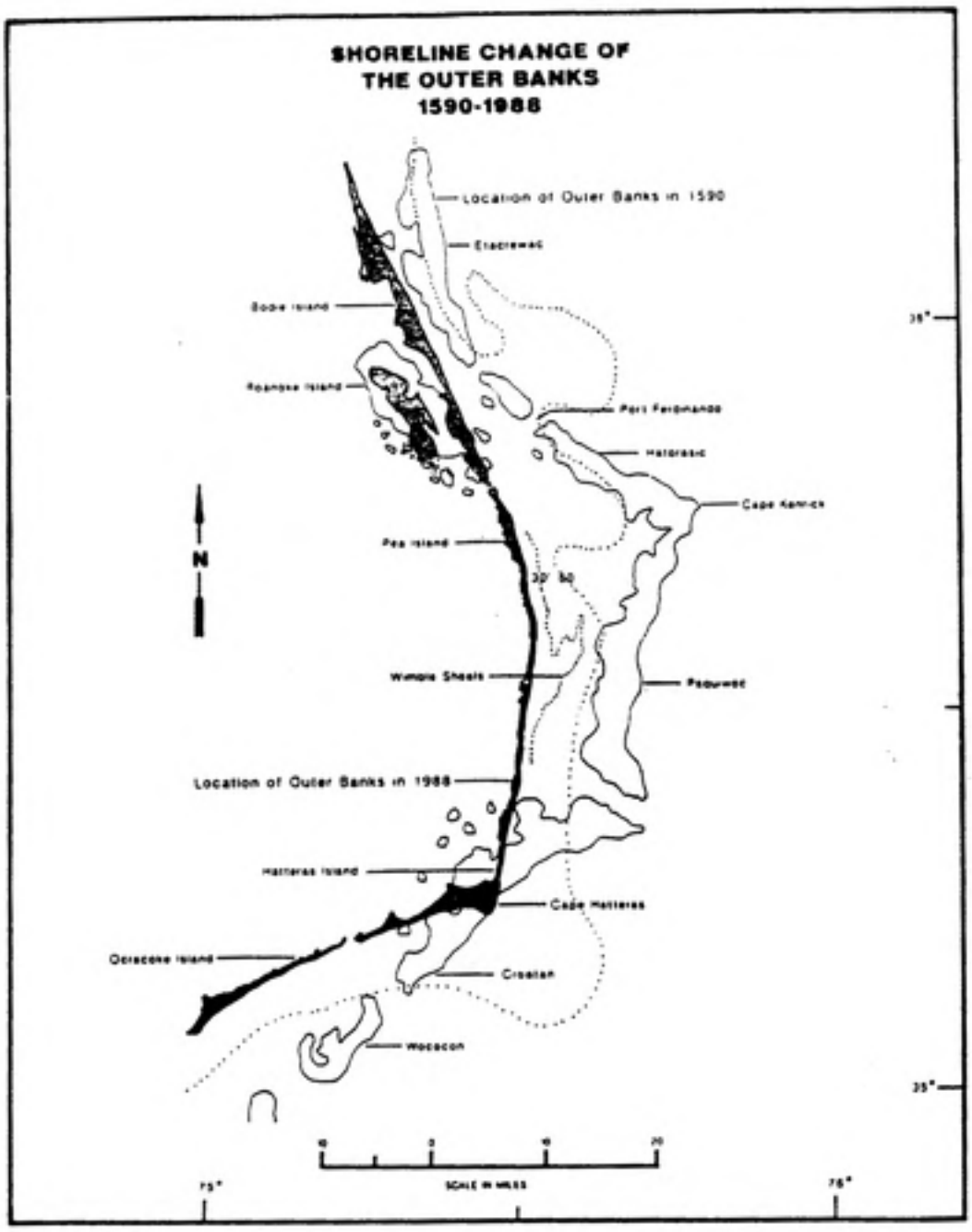
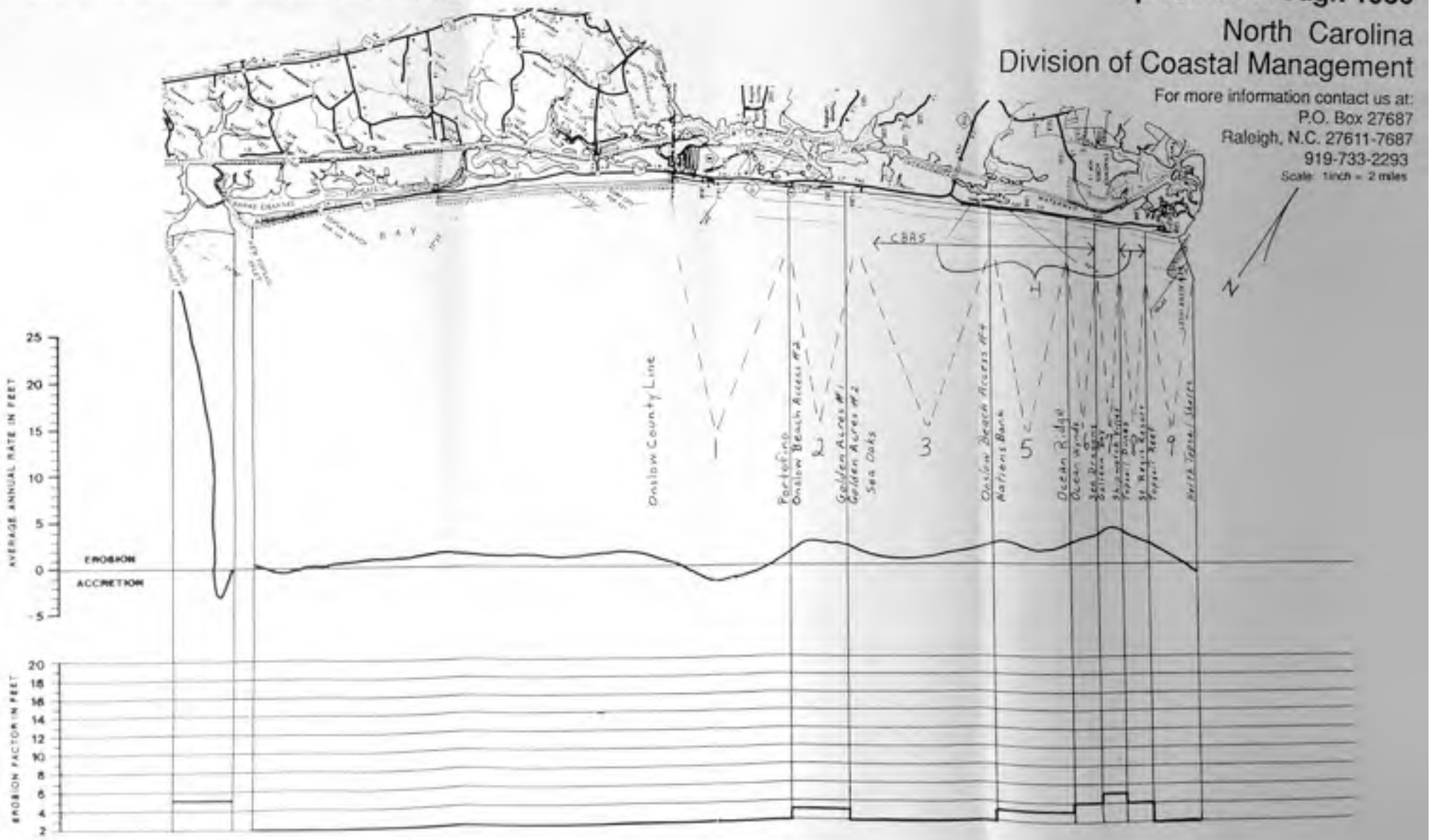


Figure 40 **Shoreline Change of the Outer Banks 1590-1988**
Source: *R. Stephenson, Comparative Cartography and Coastal Processes: 400 Years of Change on the Outer Banks of North Carolina. p30.*

...d Topsail Inlet to New River Inlet

Figure 41 Long Term Average Annual Erosion Rates Updated Through 1986
Source: *North Carolina Division of Coastal Management, 1993.*



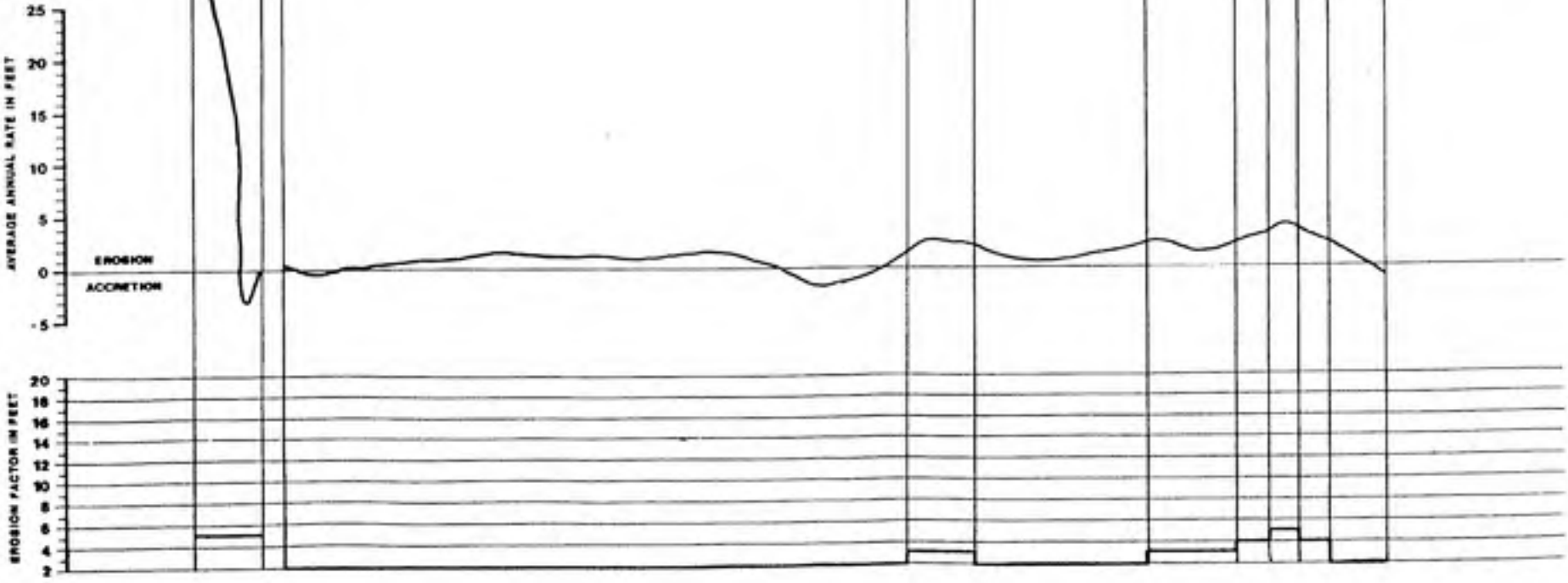
Topsail Inlet to New River Inlet

Long Term Average Annual Erosion Rates
Updated Through 1986

North Carolina
Division of Coastal Management

For more information contact us at:
P.O. Box 27687
Raleigh, N.C. 27611-7687
919-733-2293

Scale: 1inch = 2 miles



On the northern end of the island, the Nations Bank Plat to Ocean Ridge Real Estate washes away at rate of 3.5 feet per year (Section #5). Four feet of sand dissipates annually from the oceanfront between Ocean Wynds and Sea Dragons (Section #6). The CBRS skips the older subdivision, built in mid-1960's, called Galleon Bay. According to the mapped data, the tract of shoreline from the Galleon Bay Subdivision to Shipwatch Villas experiences the greatest amount of erosion, 5 feet per year (Section #7). Shoreline retreat occurs at a rate of 4 feet per year from Topsail Dunes to St. Regis resort (Section #8). On the northern tip of the island, from Topsail Reef to the North Topsail Shores Resort, the average annual rate of erosion decreases to 2 feet per year (Section #9). See Figure 41. This area is omitted from the CBRS and borders New River Inlet.

Historically, New River Inlet has shifted positions. Research in 1982 found the New River Inlet to be moving in a southwestward direction (McElyea, 6-13). Today, to prevent the natural closure of the inlet, the United States Army Corp of Engineers dredges and dumps the spoils on the southern shore of the inlet (Ache, 7).

Water Quality

The town of NTB has substantial surface waters that are affected by land development in terms of water quality (NTB 1991 LUP, 27). One example of how water quality can be affected by development is seen in the finger canals on the southern border of the town (Surf City's - Old Settlers Canals). These canals were built to elevate adjacent land for development. Pollution has led to the closure of the

finger canals to shellfishing. Refer to area with asterisk in Figure 42. Figure 43 provides a physical description of the prohibited shellfish territories.

After a rainfall of 1.5 to 2 inches, fecal coliform counts in the sounds usually increase and often the entire shellfishing area behind NTB closes temporarily to protect public health (Chadwick Bay Survey, 10 Personal Communication, Shellfish Sanitation Office). Figure 42 and Figure 44 indicate these prohibited shellfish areas. Figure 45 presents a list of the temporary closing dates to shellfishing for the Chadwick Bay area alone (1988 to 1991).

Certain pristine waters exist on the sound-side of NTB. They are designated as Outstanding Resource Waters (ORW's). These are "unique and special waters of exceptional state or national recreational or ecological significance which require special protection to maintain existing uses (Environmental Management Commission, 29)." The ORW's at NTB are outlined on Figure 46. These superior waters include all the waters of Stump Sound and Alligator Bay except Roger's Bay, King's Creek, and Mill Creek (Environmental Management Commission, 31).

The remainder of the water behind NTB falls into the SA category. Classification SA waters are deemed suitable and safe for shellfishing for market purposes. Oceanfront waters are of a lower quality in the SB classification and are suitable for swimming and other recreation, but not shellfishing (NTB 1991 LUP, 29). Note the water classifications for NTB and ORW Impact Area shown in Figure 47.

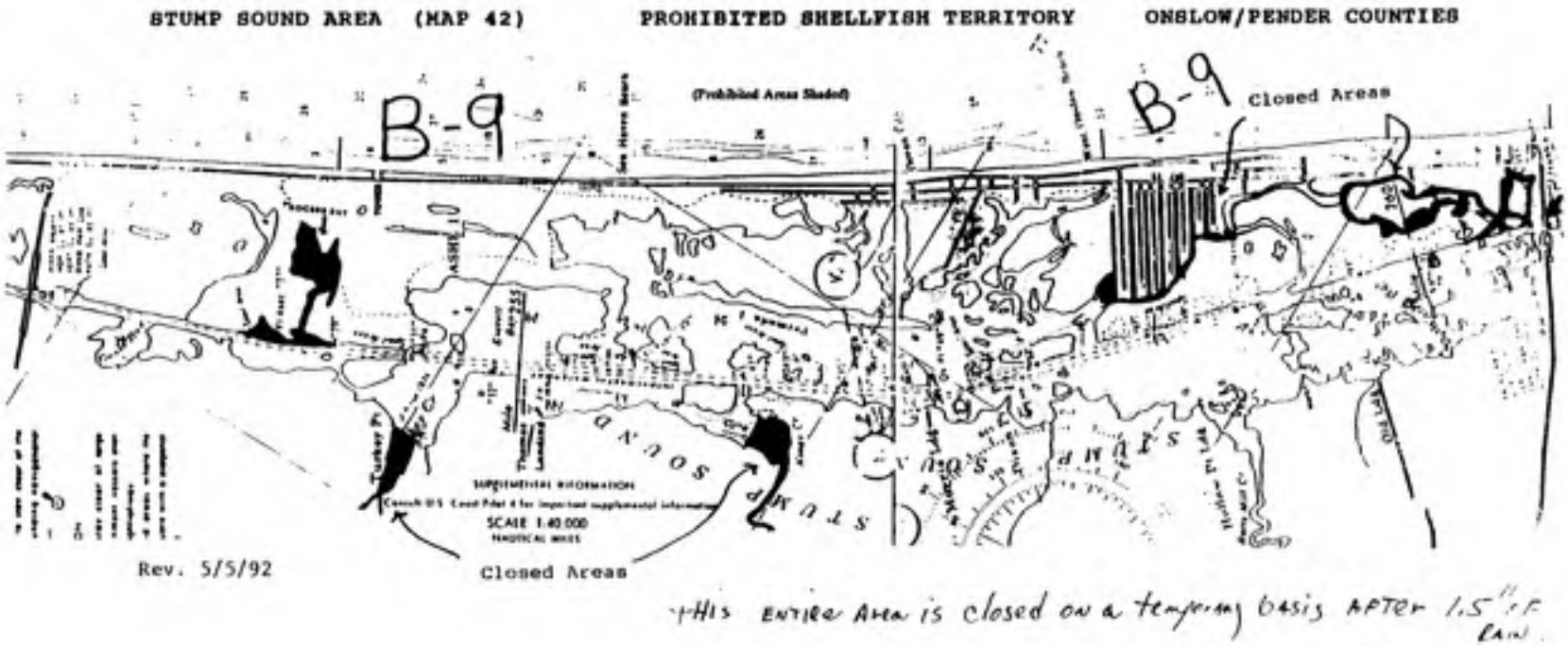


Figure 42 **Stump Sound Survey Area Prohibited Shellfish Territory Onslow/Pender Counties, 1992**

Source: *Shellfish Sanitation Office, Morehead City, North Carolina.*

No person shall take, or attempt to take, any oysters or clams or possess, sell, or offer for sale any oysters or clams taken from the following areas: (See back of sheet for continued descriptions)

Stump Sound Area:

25 (a) All those waters in King Creek upstream of a line drawn from a point on the north shore at 34° 28' 48" N - 77° 29' 45" W; thence in a straight line to a point on the south shore at 34° 28' 38" N - 77° 29' 44" W.

(b)(i) - Surf City - all those waters bounded on the north by straight line beginning at a point on shore near Beacon "69" at 34° 26' 08" N - 77° 32' 38" W; thence westerly along the shore to a point at 34° 25' 51" N - 77° 32' 58" W at the Highway 210 Bridge and bounded on the northeast by a straight line beginning at a point on the south shore of creek at 34° 26' 16" N - 77° 31' 53" W; thence across the creek to the north shore at 34° 26' 18" N - 77° 31' 55" W.

(ii) - Old Settlers Canals - all those waters bounded on the east by a straight line beginning at a point on the south shore of creek at 34° 27' 14" N - 77° 30' 58" W; thence across the creek to the north shore at 34° 27' 18" N - 77° 31' 05" W; and bounded on the west by a straight line beginning at a point on the south shore at 34° 26' 43" N - 77° 31' 25" W; thence across the creek to a point at 34° 26' 45" N - 77° 31' 27" W to include all Old Settlers Canals.

(c) All waters upstream of a line beginning at a point on shore at 34° 25' 45" N - 77° 32' 58" W, near Hwy 210 Bridge at Surf City, thence across Bay to a point at 34° 25' 45" N - 77° 33' 07" W.

(d) All those waters beginning at point on shore west of Rogers Bay at 34° 29' 23" N - 77° 27' 24" W; thence in a straight line through ICWW Beacon "29" to a point on the north side of the ICWW channel at 34° 29' 26" N - 77° 27' 25" W; thence in an easterly direction to a point on the north shore of the mainland at 34° 29' 38" N - 77° 26' 55" W; thence in a straight line across the ICWW to a point on the shore east of Rogers Bay at 34° 29' 37" N - 77° 26' 53" W, to include all of Rogers Bay.

(e) Turkey Creek - all those waters upstream of a straight line beginning at a point on the east shore at 34° 29' 37" N - 77° 27' 57" W; thence across the creek to the west shore at 34° 29' 36" N - 77° 28' 07" W.

Figure 43 **Physical Description of Prohibited Shellfish Territory in Stump Sound Survey Area, 1992**

Source: *Shellfish Sanitation Office, Morehead City, North Carolina.*

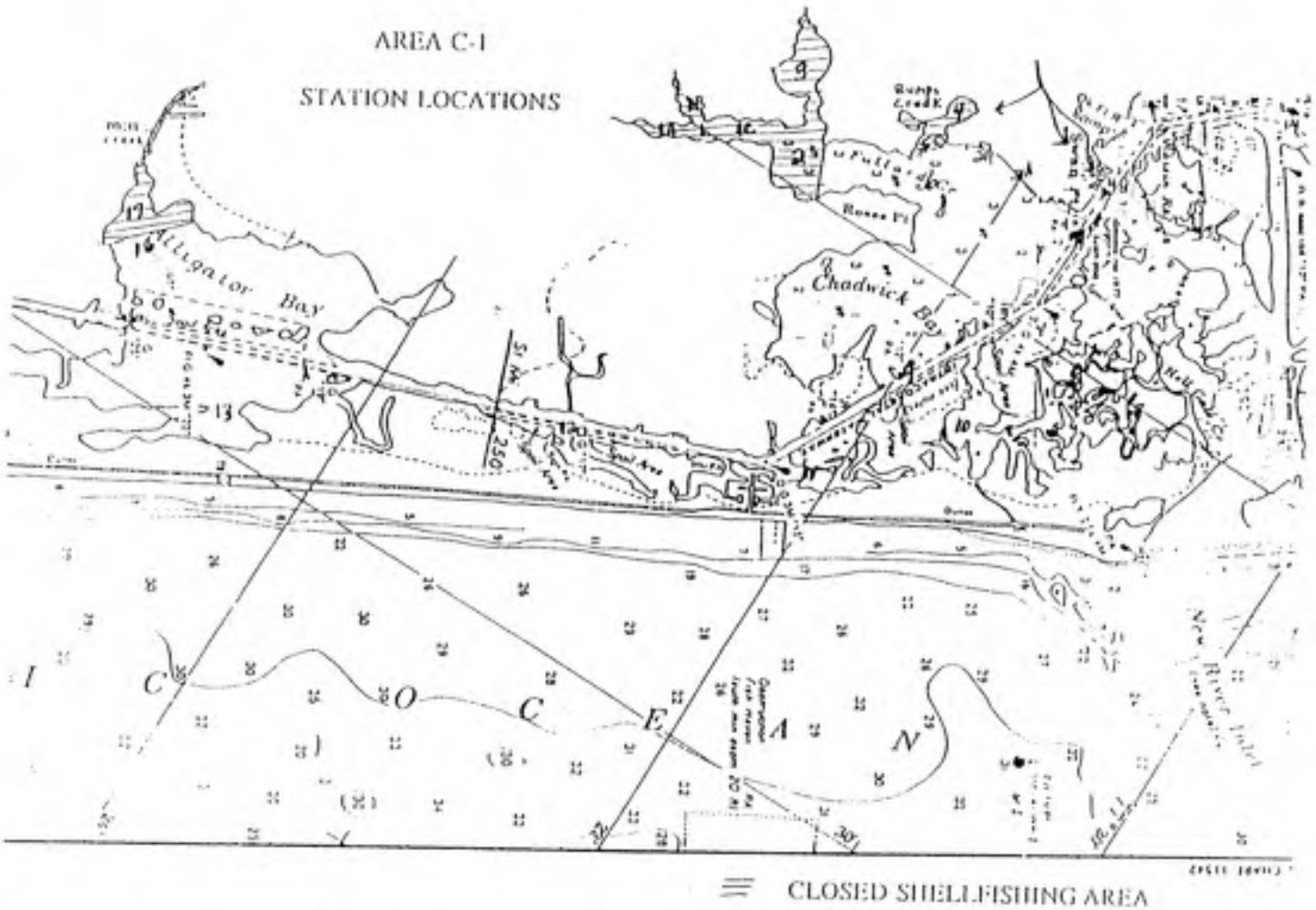


Figure 44 **Closed Shellfish Areas in Chadwick Bay Survey Area, 1991**
Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Chadwick Bay Area, 1991, Exhibit I.*

TEMPORARY CLOSURES
CHADWICK BAY AREA
AREA C-1

CLOSURE DATE	AREA CLOSED	REOPENING DATE
8-10-88	Hatch Pt. to Snows Cut	8-20-88
8-26-88	Hatch Pt. to Surf City Br.	9-13-88
8-31-88	Hatch Pt. to Snows Cut	9-13-88
4-11-89	ICWW to Mainland btwn. Atlantic Beach Br. to Snows Cut	5-10-89
4-17-89	All waters btwn Swan Pt. to ICWW Channel Marker #86	5-10-89
5-16-89	Swan Pt. to Snows Cut	5-24-89
7-20-89	ICWW Channel Marker #17 to Surf City Br.	7-25-89
9-22-89	Swan Pt. to South Carolina state line (Hurricane Hugo)	10-7-89
12-12-89	Atlantic Beach Br. to Snows Cut	12-18-89 1-12-90
4-3-90	Swan Pt. to Snows Cut	4-7-90
4-11-90	Swan Pt. to Surf City Br.	4-16-90
5-23-90	Emerald Isle Br. to Snows Cut	5-26-90
5-30-90	Swan Pt. to West Onslow Bch. Br.	6-2-90
8-9-90	Swan Pt. to Snows Cut	8-14-90
10-25-90	Swan Pt. to Surf City Br.	10-31-90
1-22-91	Swan Pt. to Surf City Br.	2-6-91
3-4-91	Swan Pt. to Snows Cut	3-13-91
3-30-91	Swan Pt. to Surf City Br.	4-6-91

Figure 45 **Temporary Closures to Shellfishing in the Chadwick Bay Survey Area, 1988-1991**

Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Chadwick Bay Area, 1991, Exhibit IV.*

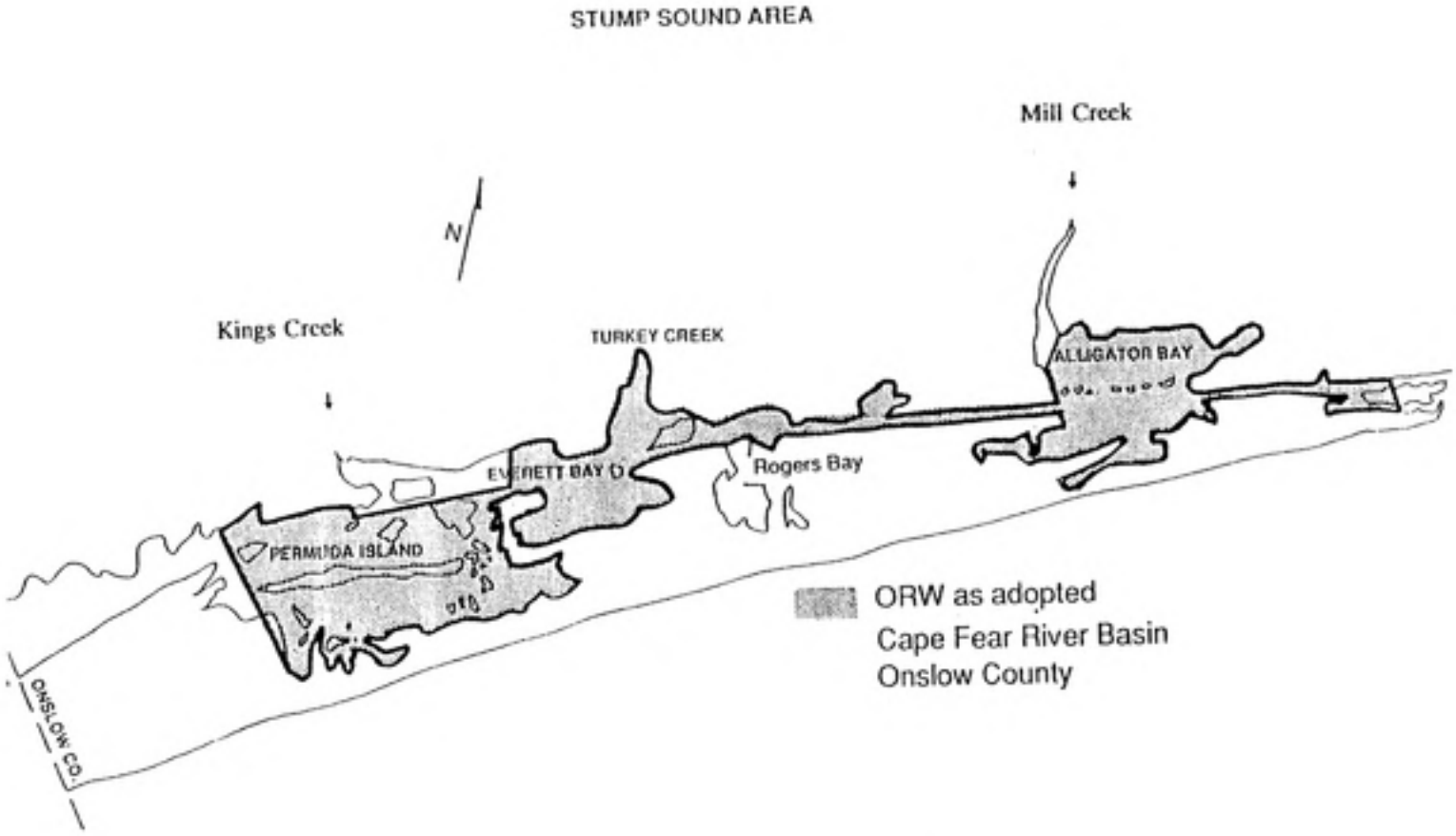


Figure 46 **Outstanding Resource Waters at North Topsail Beach, 1993**
Source: *Wastewater Treatment Plant Consultant, Coastal Water Quality, Division of Environmental Health and Natural Resources, Wilmington, North Carolina, 1993.*

Water Classifications
for North Topsail Beach,
and ORW Impact Area

Existing Land Uses
1991

NORTH TOPSAIL BEACH
NORTH CAROLINA

Figure 47a Water Classifications for North Topsail Beach and Outstanding Resources Waters Impact Area, 1991

Source: *C. Hedgepeth, Town Manager of North Topsail Beach, North Carolina*

Figure 47b **Water Classifications for North Topsail Beach and Outstanding Resources Waters Impact Area, 1991**

Source: *C. Hedgepeth, Town Manager of North Topsail Beach, North Carolina.*

The ORW impact area requires special development controls up to 575ft inland. Among other things, these controls determine how close development can be to surface waters and regulate storm water run-off from development (Environmental Management Commission, 29).

Wastewater Treatment

Coastal barriers tend to have high water tables and this places groundwater within proximity to septic systems (CBRS Draft, 44). The soils on coastal barriers are usually highly permeable and do not contribute to the rapid break down of organic materials. Septic tanks are dependent on suitable soils to function properly. Wastewater treatment systems have contributed to water and soil contamination at NTB (Personal Communication, Town Manager). Other coastal communities have similar wastewater problems (Armingeon, 56).

Officials believe that the southern end, the older development, has more subsurface wastewater treatment than the northern end (Stump Sound Survey, 8). The early mobile home developments on the southern end were not subject to strict septic tank or zoning laws. New rules were passed in 1978 and 1982. (1991 LUP, 165).

Many neglected and densely spaced septic tank systems are found in the Scotch Bonnett area of Old Settlers Beach on Highway 210. A Stump Sound Sanitary Survey found examples of up to four mobile homes being connected to a single septic tank (Stump Sound Survey, 8). Based on the Chadwick Bay and Stump Sound Sanitary Surveys, at least 48 other sites are still using septic tanks at NTB (Chadwick Bay

Survey, 4). The frequently flooded Old Galleon Bay subdivision also has 19 homes connected to septic tanks (Chadwick Bay Survey, 4).

"There are 17 existing septic tanks at Roger's Bay Family Campground that were installed in the 1960's (Stump Sound Survey, 7)." Due to the age of the septic tanks at Roger's Bay Campground, it is questionable if any are functioning properly. The Stump Sound Survey concluded that the threat to groundwater was strong, but the threat to shellfish water was not (Stump Sound Survey, 7). As of March 1992, the campground owners had no plans to tap into North Topsail Water & Sewer because of the expense involved (Stump Sound Survey, 7).

Currently, all the residents have the option of connecting to North Topsail Water & Sewer (Personal Communication, Town Manager). North Topsail Water and Sewer, Inc. (NTW&S), a private wastewater treatment facility, was built in the early 1980's to serve NTB as well as other areas. Sewer lines run from the Village of Stump Sound (southern end) to the New River Inlet (northern end) of NTB. A force main over Highway 210 transfers the wastewater to a land application site. The treatment system consists of a pre-treatment facility, lagoon area, and spray-effluent field (NTB 1991 LUP, 37). Three lagoons, with a design capacity of 1.2 million gallons, sit on a 60-acre plot. The irrigation fields, with a design capacity of 878,000 gallons per day (gpd), cover 185 acres (Chadwick Bay Survey, 3). Mill Creek crosses the drainage basin of NTW&S.

North Topsail Water & Sewer has 22 lift stations on NTB. A lift station is a wastewater pumping station that lifts wastewater to a higher elevation. It pumps the

wastewater up to the downstream gravity sewer (California State University, glossary). Flooding and overflow has occurred at lift station sites on NTB.

In April of 1989, the North Carolina Division of Environmental Management issued NTW&S a notice of violation for failure to operate and maintain the plant in compliance with their permit (Chadwick Bay Survey, 3). The wastewater spraying was exceeding its boundaries and inadequate vegetation on the field was creating increased run-off and standing water (Chadwick Bay Survey, 3). From the Spring of 1989 to Fall of 1992, the moratorium prevented new sewer connections. This action forced developers to seek septic tank permits (Personal Communication, Wastewater Treatment Plant Consultant).

In 1983, the sediment from the excavation for the wastewater treatment site was draining into Mill Creek which contains primary nursery areas. Penalties in the amount of $2,500 were charged to the owners for excavation and alteration of the tributary without a CAMA permit. In 1989, NTW&S was found guilty of unlawful filling of estuarine waters and willful violation of the Coastal Area Management Act (386 S.E.2d 92, 1989) The civil penalties amounted to $19,000. Other environmental violation notices from the North Carolina Division of Coastal Management and United States Environmental Protection Agency have been served on the two primary developers, co-owners of the wastewater treatment plant.

Conservation Efforts

The frontal dunes at NTB are small and discontinuous. No interior dunes protect the flat, sandy landscape behind the frontal dune line. Many gaps exist in the frontal dunes due to beach front development. "A small frontal dune line from Villa Capriani to Sea Gull Lane is artificially maintained by beach scraping (Ache, 7)." The area is labelled on Figure 26. In North Carolina, it is legal to scrape the first foot of sand from the low tide line of a beach to above the high tide line (Ache, 9).

The CAMA places restrictions on setbacks for coastal habitations; however, CAMA allows construction of walkways, decks, swimming pools, sheds, and gazebos on top of primary dunes (Personal Communication, Local CAMA Permit Officer). People and construction activities affect the sand dunes.

Much of the sparse natural vegetation has been removed by development. Some maritime forest exists along the back barrier shoreline. Planting vegetation and building snow fences on dunes are two ways natural resources are protected at NTB. The synergy of sand dunes and coastal vegetation stabilizes the coastal environment.

Evaluation of Environmental Factors in Relation to the Coastal Barrier Resource System

Turmoil of Major Storms

Hurricane Hugo's devastation to Charleston, South Carolina, in 1989, and Hurricane Andrew's destruction to Miami, Florida, in 1991, are recent examples of these powerful forces of nature. Hurricane Hugo's 135mph winds and 12-20ft waves hit a developed coastal barrier area in South Carolina, destroying 20% of the beach

front structures (GAO, 22). "A Category 3 hurricane storm surge would completely cover Topsail Island (111-130mph wind, 9-12ft storm surge) (Bush, 68)." According to a technical report co-written by the National Hurricane Center, the last two decades have been blessed with a paucity of hurricanes (Jones, 1025). The striped areas in Figure 48 show the stair-step decrease in hurricanes since 1950. Coastal communities such as NTB have thrived during this relatively calm period but meteorologists predict more hazardous storms in the next decade (1990-2000) (Jones, 1026).

"Over eighty percent of the people currently living in hurricane-prone locations have never experienced a major hurricane and are hence likely to underestimate the danger associated with these events and the need for early evacuation (Jones, 1026)." In the case of NTB, some coastal immigrants are from inland northern areas and may be complacent toward hurricane mitigation efforts.

As in coastal regions nationally, the retirement community has also grown. Data from Onslow County indicates that the percent change in population by age group from 1970-1980 in the 65 and over category was +97.4% and +49.8% from 1980-1990. The 55-64 age range showed the second largest percent growth, +57.8% from 1970-1980 and +40.6% from 1980-1990 (1991 LUP, 52, 1986 LUP, 5). The older group was expected to settle close to the beach areas (1986 LUP, 6). The retirement community may be more susceptible to danger from hurricanes. Less mobility due to advanced age may slow evacuation efforts and may not allow them to properly secure their property for such an event. Consequently, more damage to homes and life may occur from major storms.

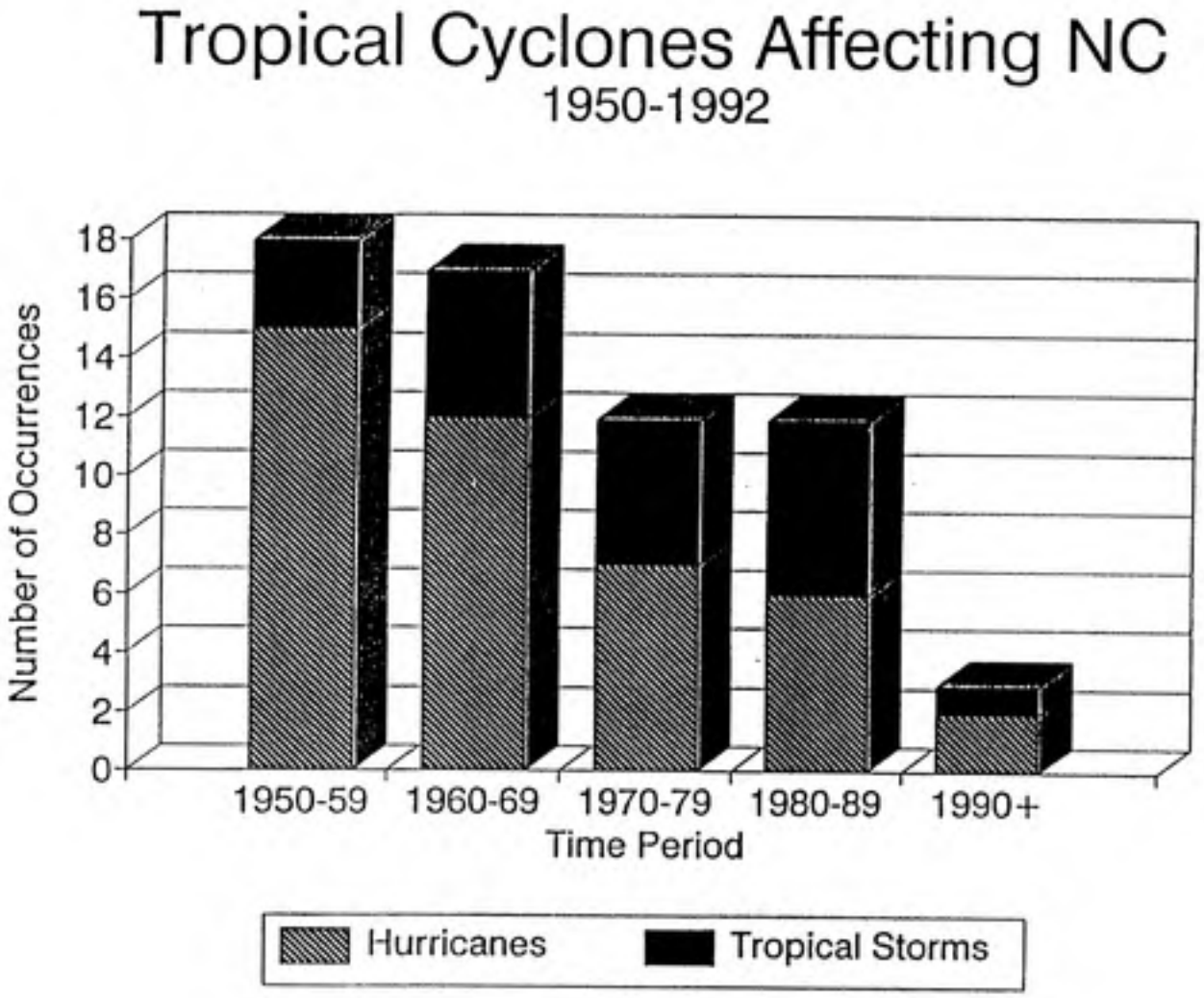


Figure 48 **Tropical Cyclones Affecting North Carolina, 1950-1992**
Source: *Robertson, A Field Study of Shoreline Dynamics of North Topsail Beach, North Carolina, with Special Reference to Coastal Management, 1994, Figure 9.*

Coastal storms are inevitable. At current locations and building rates, repetitive expenditures for storm repairs loom over the CBRS and the town. After future storms at NTB, homes are likely to be condemned structurally and/or forced onto the public sewer system. Above ground utilities, such as telephone and power lines, will have sustained periods of outages too. These occurrences were part of the reason for the adoption of CBRA.

In the event of a hurricane, the New River Inlet could realign itself or a new inlet could form at another low area on the island. Some people speculate a new inlet may be forming at Galleon Bay (Personal Communication, Town Manager). This highly eroded, low-lying section of the island has frequent overwash occurrences due to storms. Flood damage occurs to homes, roads, and county water and sewer lines. Currently, development at Galleon Bay receives federal flood insurance and it is surrounded by CBRS lands. Perhaps the population demands from the older development enhanced the coastal hazards of erosion and flooding of the area. For example, people making their way to the ocean may have disrupted the dunes and vegetation causing the oceanic waters to easily penetrate the natural dune barrier. Or, this area could be a naturally low-lying so that storm events and the resultant floods greatly varied the degree of erosion.

Potential Flood Damage

Flooding greatly enhances the hazard to coastal barriers. Coastal flooding can be even more intense than riverine flooding due to tides and high winds. Flooding in

a coastal town like NTB is less predictable. The coastline and even Topsail Island is forever changing its form while migrating landward. Barrier islands are especially susceptible to coastal flooding because they migrate and buffer the mainland from storm surges.

Much of the oceanfront property and developable land on NTB remains in jeopardy of serious coastal flooding. A great flood is highly likely every 100 years and the oceanfront property is likely to receive the worst damage. A 1982 study by the Corps of Engineers estimated that West Onslow Beach would suffer about $15 million in damage to real and personal property from flooding alone during a 100-year storm (Godschalk, 14). Increased development in the CBRS would raise the cost of flood damage.

Many homes and condominiums face the open waters around the New River Inlet. Ocean water can get pushed into the sound waters behind the island during a storm. The resultant high water table in the back barrier waters can cause sound-side flooding. After a storm, flooding can continue in the inlet areas (AEC's) due to the drainage of the lagoon back waters to the ocean (Pilkey, 25). One reason for denser population inside the New River Inlet hazard AEC may be the availability of federal flood insurance. This is another cost to the federal government. To the extent that flooding effects the development in the CBRS, it will be contrary to one of CBRA's goals, to reduce federal expenditures.

Threats of Erosion

Erosion control projects endanger a nationally treasured natural boundary - the beach. Beach stabilization techniques are only temporary and are usually very costly to the landowners at NTB. Furthermore, shoreline engineering upsets the natural process of ocean sand transfer which could threaten other inland properties.

Bulkheading on the soundward side is another example of an erosion control measure. It prevents overwash sand from reaching the lagoon. It interrupts the transfer of sediment from the lagoon shore to the lagoon (Bush, 71). This action keeps the lagoon shore from moving landward. Consequently, the island gets narrower as erosion from the oceanfront continues. In the longer term, fixed frontal dune lines by beach scraping and bulkheaded back-barrier shoreline causes static elevation of the island and leads to island narrowing. The short-term solutions to "save the beach house" actually inhibits natural island migration and slowly causes the barrier island to submerge.

Erosion becomes a major issue when the ocean encroaches upon edifices. The CAMA attempts to regulate areas unsuitable for development by establishing setback limitations. These regulations require a structure to be built behind 30 times the annual average erosion rate (AAER) for small structures and 60 times AAER for large structures (Personal Communication, Local CAMA Permit Officer). If the large building is in an Area of Environmental Concern, the setback limit is 60 times the AAER plus 100 feet.

"Large, high-density condominiums such as Villa Capriani, Topsail Dunes, Shipwatch Villas, St. Regis, and Topsail Reef are located on the northern end of the island (NTB 1991 LUP, 10)." "Short-term field surveys support the observations from previous photogammetric studies suggesting rapid migration of the northernmost 3.1 miles of Topsail Island (Robertson, 67)." Inside the CBRS, Topsail Dunes and St. Regis have an oceanfront erosion rate of 4 feet per year and Villa Capriani has as AAER of 3 feet per year. Refer to Figure 41. Erosion may occur more in some years and less in others as a result of dune denudation, development, or storms.

According to the equation:

((AAER) * (60' **Large** development or 30' **Small** development) + (100' if in AEC) = Number of feet a building must be from the mean high tide) / (AAER) = Average number of years before erosion will structurally threaten a building

Examples:

1. (4ft/yr) * (60' **Large**) + 100' = 340ft from mean high tide / (4ft/yr) = 85 years

2. (4ft/yr) * (30'**Small**) + 100' = 220ft from mean high tide / (4ft/yr) = 55 years

The million-dollar-high-rise buildings in the CBRS may be structurally threatened by erosion in about 85 years and smaller structures may be structurally undermined by erosion in 55 years. Outside the CBRS in highly vulnerable areas, erosion could threaten the smaller structures in about 50 years. Of course, these estimates will vary according to tides, storms, floods, winds, shoreline engineering, etc. The point is,

erosion threatens long term investments in shoreline properties and certain development practices can accelerate erosional forces.

In the late 1960's, the northernmost 1.3 miles of the island underwent a period of inlet mouth shoal attachment (Robertson, 71). The inlet mouth shoal attachment could have given the false impression of a accreting shoreline. The development boom soon followed. Now, 25 years later, the inlet's changing orientation is straightening the shoreline and the consequences are expected to be dramatic (Robertson, 71). The shoreline retreat at the inlet, as seen in Figure 49, shows the sea has already claimed some parcels of land (Personal Communication, Town Manager). Refer to Figure 26.

The 1986 Long Term Average Annual Erosion Rate Map does indicate some accretion occurring at the inlet. Refer to Figure 41. Part of this accretion can be accounted for by the dumping of spoil material from the inlet (Ache, 7). If this dredging is discontinued, large-scale erosion could occur at this newly formed beach (Ache, 7).

In the inlet hazard zone, an area of environmental concern, the land constantly changes. With land emerging and submerging, government officials realized the lack of clear regulations on inlet hazard areas (AEC's) could create problems in the future (1981 LUP, 27). The high-density development at the inlet is vulnerable to erosion, to massive storm damage, and to being disconnected from the rest of the island.

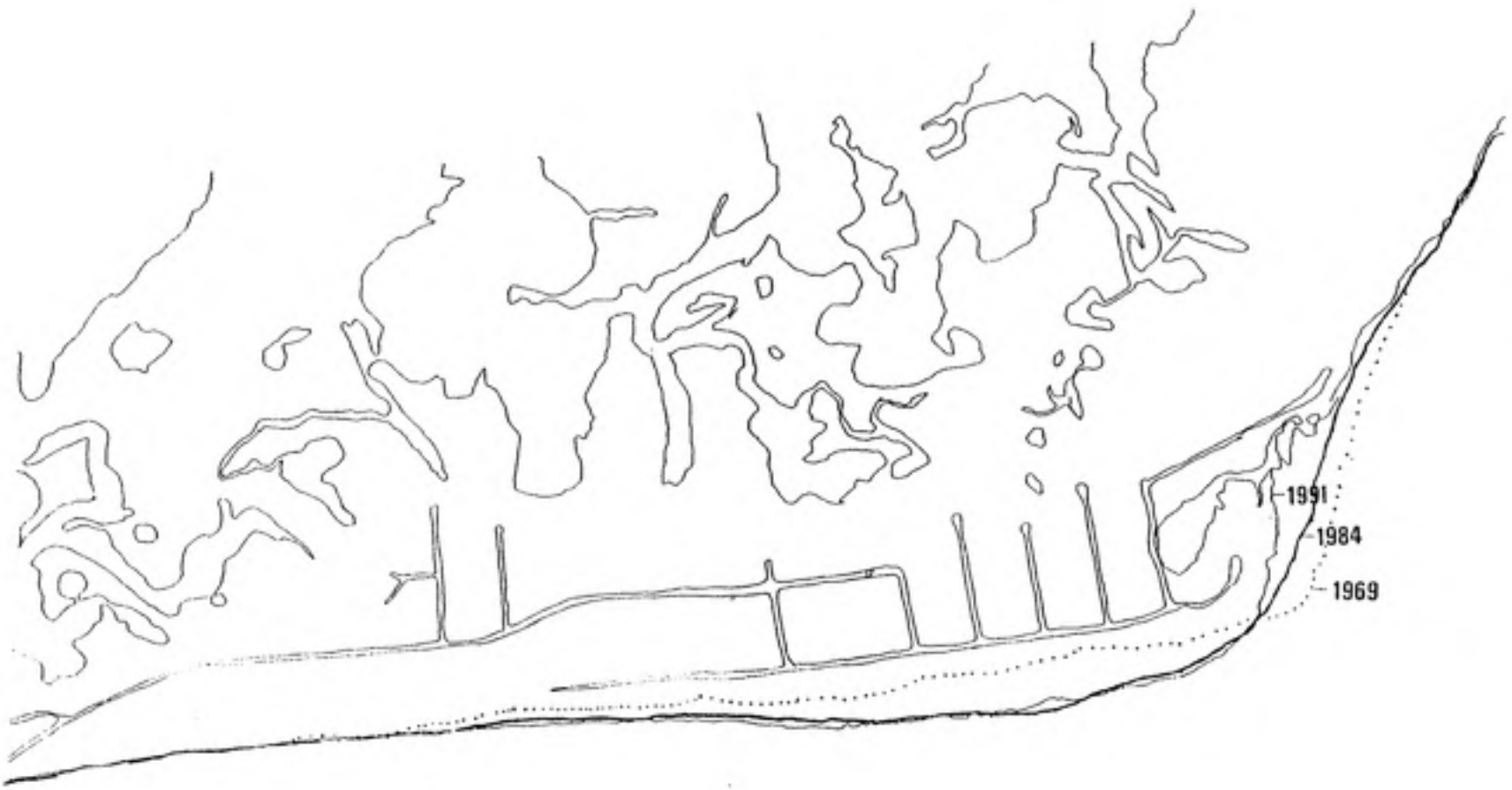


Figure 49 **Shoreline Retreat at New River Inlet, 1969, 1984, 1991**
Source: *Robertson, A Field Study of Shoreline Dynamics of North Topsail Beach, North Carolina, with Special Reference to Coastal Management, 1994, Figure 20.*

Water Quality Issues

Shoreline development in North Carolina may be associated with water pollution through excessive or polluted storm water run-off (Armingeon, 41). On developed coastal barriers, storm water flows over many different surfaces such as roads, roofs, and construction sites. This run-off can change the water quality of sounds. Certain sound-side waters are unable to flush well and water quality tends to decrease when rainfall run-off is trapped in stagnant areas. Often, water pollution from fecal coliform increases in nearby waters after heavy rains.

Heavy rains represent a danger to the Chadwick Bay and Stump Sound Survey Areas (Chadwick Bay Survey, 7). Refer to Figures 42 and 44. With the increase in development, more frequent closures of shellfish beds have occurred in sounds adjacent to NTB. The reason for these closures could be largely due to bacterial build up (Personal Communication, Environmental Technician I). Although a causal relationship is not established here, it is probable that increased population decreases water quality and hence, impairs wildlife habitat.

Currently, the quality of most of the sound-side water is good, however, potential harm exists. Paradoxically, some of the Outstanding Resource Waters (ORW), a designation placed on sound-side waters by the Division of Environmental Management, are located behind the southern part of the city. Mostly SA classified waters are behind the CBRS unit.

The ORW impact area designation greatly affects the less developed land of the CBRS. In two places, the ORW impact area covers the width of the island.

Where it meets the coast at Alligator Bay, it affects the Royal Dunes II development. The other ORW impact area section in the CBRS that meets the coast includes Sea Ranches and Ocean Wynds developments. Refer to the asterisks on Figure 47.

The two primary developers were sued by property owners in 1993 (5 F.3d 767; 1993). The plaintiffs were unable to get the environmental permits needed to build on their lots and to get the other amenities as promised in the deal. The developers were found guilty of unfair and deceptive trade practices involving the Ocean Ridge Village development and the plaintiffs were awarded $13 million (Associated Press, C8).

In 1986, high-density development began on the sound-side (1986 LUP, 18). County policy makers decided to promote oceanfront development to save environmentally sensitive areas. Perhaps one reason for the policy was to guide high-density development away from state designated areas, ORW's. See Figure 50.

Wastewater Treatment Limitations

Previously in county and local LUP's, wastewater treatment was listed as a very critical public health issue for NTB. The effluent from septic tanks may pose serious water contamination problems. Due to wetness, flooding, poor percolation, and poor filtration, all NTB soil has severe soil limitations for septic tank use (NTB 1991 LUP, 37). Study Figure 51. Yet, officials still permit septic tank systems on some sites (NTB 1991 LUP, 55). The ability of the ecosystem to absorb wastewater may be reaching its limits.

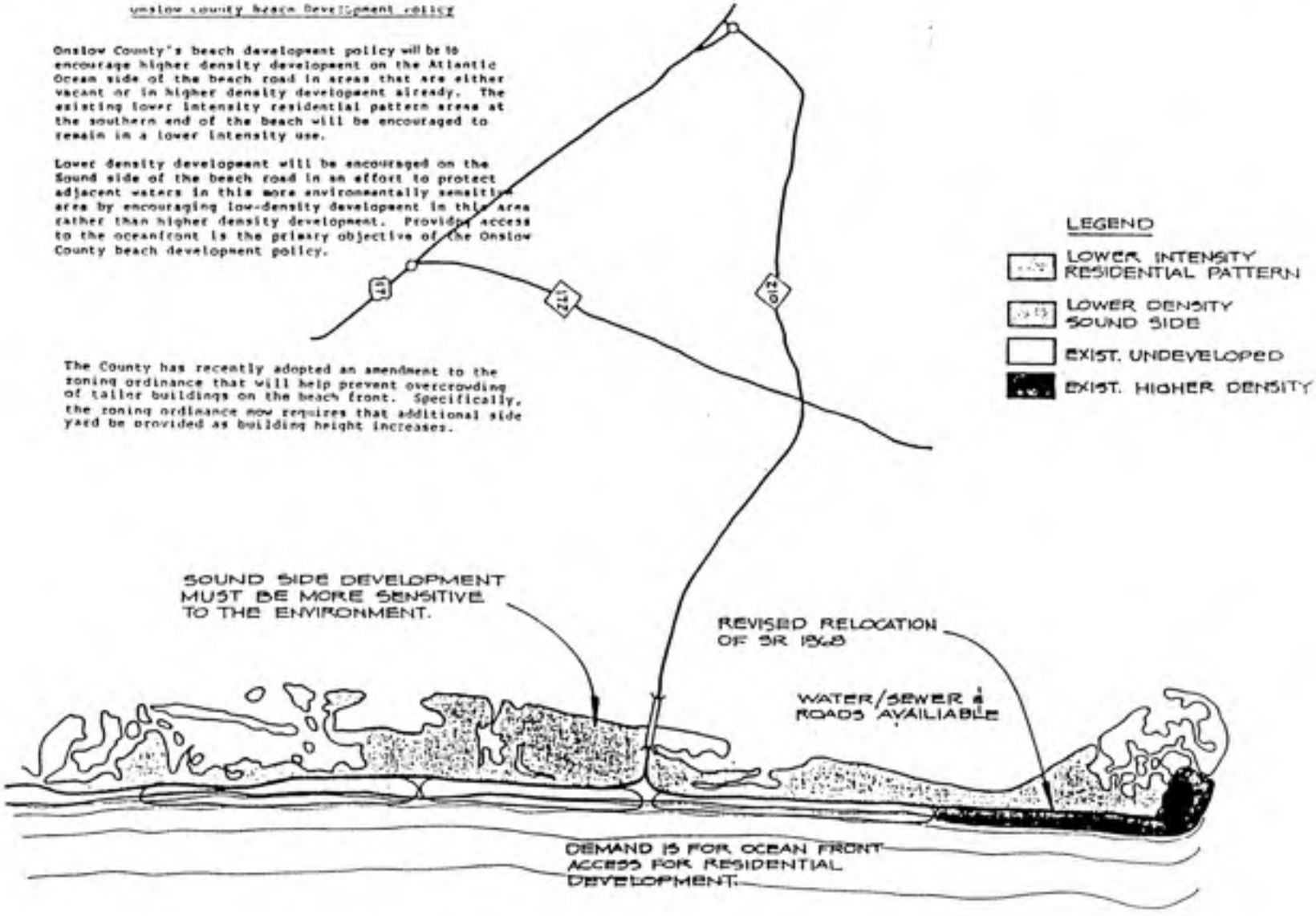


Figure 50 **Onslow County Beach Development Policy, 1986**
Source: *Onslow County Land Use Plan of 1986, 1987, p66(a).*

Soil Characteristics for North Topsail Beach

	Name	General Characteristics	Dwellings without Basements	Septic Tank Absorbtion	Sanitary Landfill
Bo	Bohicket	Very poorly drained soils of the Tidal Marshes	Severe – flooding, ponding, shrink-swell	Severe - Flooding, Ponding, Percs Slowly	Severe - Flooding, Ponding
NoE	Newhan*	Fine sand along the coast with slopes of 2 - 30 percent	Slight - 0 to 8%; Moderate - 8 to 15% Sever 16-30%	Severe - poor filter	Severe- too sandy, steep slope
Co	Corolla*	Fine sand of moderately well and somewhat poorly drained sands along the coast	Severe - flooding	Severe - wetness, poor filter	Severe - seepage, wetness
Dc	Duckston*	Poor drained sands along the coast	Severe - wetness, flooding	Severe, wetness, floods	Severe - flooding, seepages, ponding
Ca	Carteret*	Very poorly drained soils in tidal marshes	Severe - flooding, ponding	Severe - flooding, ponding, poor filter	Severe - flooding, seepages, ponding
Wab	Wando*	Well drained, rapidly permeable soils on lower coastal plains	Slight	Severe - poor filter	Severe - Seepage
Pa	Pactolus*	Nearly level and gently sloping with moderate to somewhat poorly drained soils	Moderate to severe	Severe - Wetness, poor filter	Severe - Seepage, ponding
Da	Dorovan	Very poorly drained, extremely acid soils, muck usually found in Tidal Marshes	Severe - subsides, ponding	Severe - subsides ponding	Severe - Seepage, ponding
YaA	Yaupon	Somewhat poorly to moderately drained soils along lower coastal plain	Severe - shrink - swell	Severe - percs slowly, wetness	Severe - wetness
NfC	Newhan - Corolla	Transitional zone: Combination of Newhan and Corolla soils, may indicate spoil area along the coast	Severe	Severe	Severe
NnE	Newhan	Sand and loam marine materials, somewhat poorly drained	Severe	Severe - poor filter	Severe - too sandy

Source: USDA Soil Conservation Service

Figure 51 **Soil Characteristics of North Topsail Beach, 1991**
Source: *Preliminary Town of North Topsail Beach, North Carolina: CAMA Land Use Plan 1991, Table 10.*

A topographical map of the CBRS at NTB shows marshlands surrounding Roger's Bay. See Figure 52. Figure 42 designates the entire bay, behind Roger's Bay Campground, closed to shellfishing. Other than the 17 septic tanks that are approximately 200 ft. from the water's edge, perhaps another reason exists for the closure such as poor drainage of various pollutants (Stump Sound Survey, 7).

Currently, NTW&S serves approximately 1,500 customers in three communities; 1,350 of which are on NTB (Personal Communication, NTW&S). The presence of a sewer system at NTB has contributed to better water quality for the area. On the other hand, this wastewater system did allow for the construction of higher density development in areas previously considered unsuitable for building (Stump Sound Survey, 6).

If only **half** of the peak seasonal population visits (8,308 persons) and at least four people use bathrooms per each sewer connection, NTW&S will not serve NTB's demand. Conservatively assume:

(8,308 people/4 people per household connection) =
2077 connections needed

(2077 connections needed) - (1350 connections) =
727 public sewer connection shortage

The private sewer system will not suffice based on population and development forecasts. During the tourist season, the soils of NTB may become overburdened with human excrement leading to public health problems.

COASTAL BARRIER RESOURCES SYSTEM

TOPSAIL UNIT L06

October 24, 1990

The town of NTB would benefit if all the dwellings were connected to the sewer system (Stump Sound Survey, 9). "The North Carolina Division of Environmental Management uses the guideline that the average per capita sewer use is 100 gallons of effluent per person per day (NTB 1991 LUP, 38)."

(878,000gpd capacity / 100 gallons per person per day) =
8,780 person + 3220 person storage capacity =
12,000 person potential service per day

At this rate, NTW&S has the capacity for 8,780 people on a daily basis and can store effluent for 3,220 additional people. Obviously, the wastewater system capacity is large enough for the permanent population of NTB alone, but would reach its limits during the peak season (16,616).

One of the potential sources of pollution to Mill Creek may be NTW&S (Chadwick Bay Survey, 4). The wastewater spray area of NTW&S is in the drainage basin of Mill Creek. The mouth of Mill Creek, where it feeds into Alligator Bay, is closed to shellfishing. Refer to Figure 44. The CBRS includes the lower half of Alligator Bay. Previously, several testing stations in Alligator Bay have exceeded national fecal coliform standards for shellfishing waters (Chadwick Bay Survey, 8). This could mean that the potential contamination due to wastewater discharges is being transferred from the highly developed coastal areas to less developed inland locations. The pollution may be partially responsible for the closure of shellfishing grounds further from the town.

Private sewage systems, such as NTW&S, have a reputation for frequent failure and maintenance problems and have been subject to state moratoria on building new plants. The lift stations for the private sewer system are subject to failure, which makes them a potential source of water contamination (Chadwick Bay Survey, 4). A descriptive listing of the location of each lift station at NTB and its proximity to surface waters in the Stump Sound Survey Area is in Figure 53. According to the physical location map of the lift stations, Figure 54, #2 and #3 are in the CBRS. Figure 55 of the Chadwick Bay Survey Area lifts stations #3, #4, #5, #6, #7, and #8 are inside the CBRS. Note the proximity of #5, #6, and #7 to ORW's in Figure 56. Refer to Figure 46.

Future moratoriums on sewer connections, such as the one that lasted for three years, will most likely result in additional septic tanks being installed beside or near estuarine waters (Chadwick Bay Survey, 4). Figure 57 shows the usage of NTW&S by new development and one instance of a violation. North Topsail Water & Sewer did ask to expand, but the state permit will not be granted until they improve their spray fields and receive an approved sludge management plan (Personal Communication, Wastewater Treatment Plant Consultant).

Conservation Needs

Dunes provide protection to inland residents from storms, erosion, overwash, and new inlet formation. Bulldozing artificial dunes for protection is a repetitive and costly cycle. Without vegetation, the simulated short dunes are likely to dissipate

NORTH TOPSAIL WATER & SEWER INC. LIFT STATION LOCATIONS

LOCATION:	PROXIMITY TO WATER
1) North Shore - Captains Lane	>100' to Water
2) Summertyme	100' to Dunes
3) St. Moritz	100' to Dunes
4) Sea Oaks	25' to Marsh
5) Sea Scape	50' to Marsh
6) Calinda Cay	>100' to Water
7) Bermuda Landing	75' to Water
8) Yacht Tender	100' to Dunes
9) Portofino	40' to Marsh

**A 10th Lift Station is planned to serve the Village at Stump Sound Development

*There are also six small individual stations located as follows:
1) Town Hall (N. Topsail Beach)
2) Home near Sea Scape
3) 4th Ave.
4) 5th Ave. (3 homes)
5) 17th Ave.
6) New River Rd. (near 17th)

Figure 53 **Stump Sound Survey Area North Topsail Water & Sewer Lift Station Listing, 1992**

Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Stump Sound, 1992, p10.*

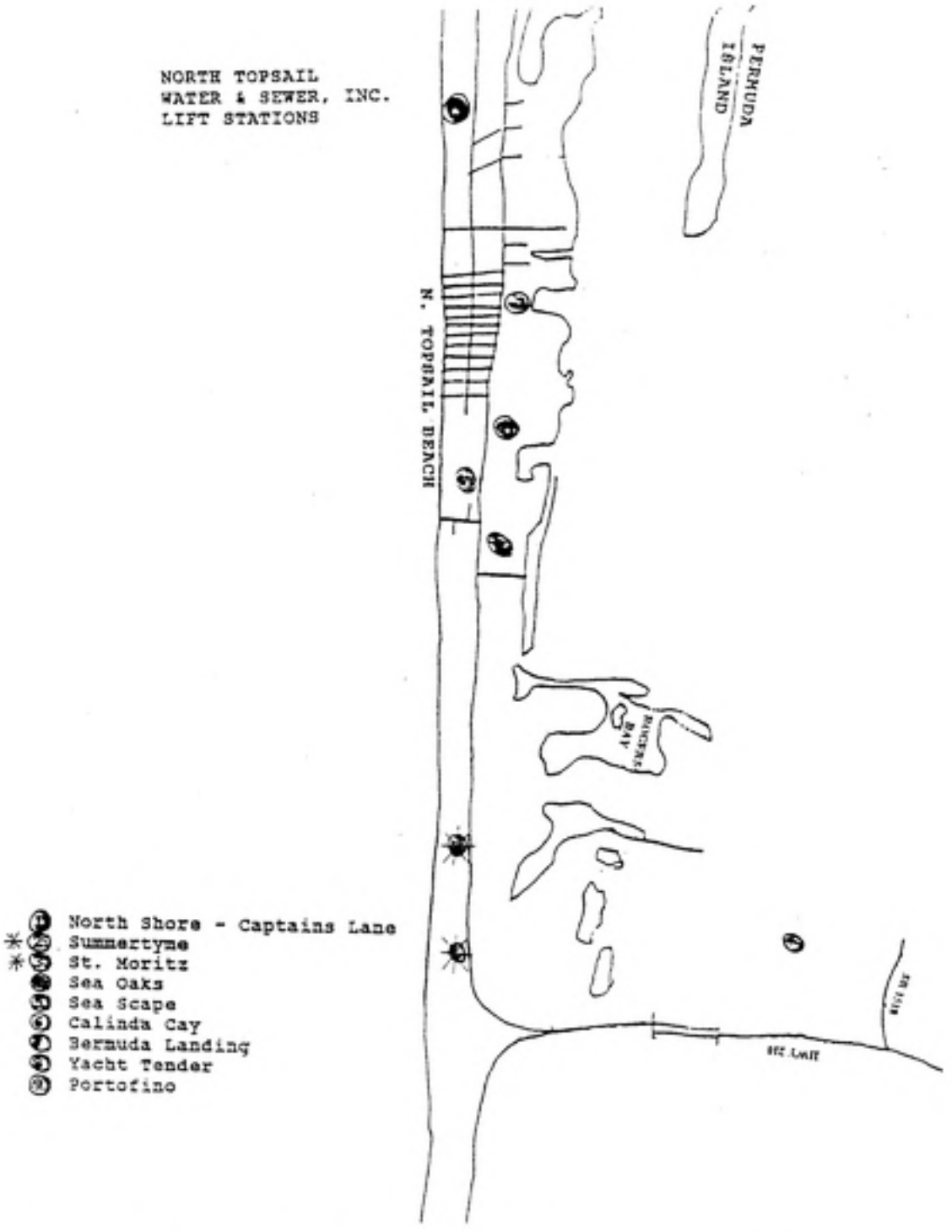


Figure 54 **Stump Sound Survey Area North Topsail Water & Sewer Lift Station Location, 1992**

Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Stump Sound, 1992, Exhibit IV.*

SUMMARY OF LOCATION OF LIFT STATIONS

*1)	River Road	20' from marsh
*2)	Coastal Dr.	main pump house 50' from marsh
3)	Bayshore Dr.	
4)	Ship Watch Villas	
*5)	Old Magee Pier	100' to canal, 100' to ocean
*6)	Ocean Bay Villas	50' to mosquito ditch
*7)	Salty's Pier	100' to mosquito ditch, 5' to marsh
8)	Villa Capriani (under ground chamber)	
*9)	Country Club #2	
10)	Country Club #3	
11)	North Shore Village	
12)	NE of North Shore Village	
13)	Alligator Rd.	
*14)	Pages Golden Acres (not in use yet)	
15)	Alligator Rd. (main pump house)	
16)	Chadwick Acres (not in use yet)	
17)	Chadwick Acres	
18)	Chadwick Acres	
*19)	Escola Bay	

*Lift Stations in close proximity to estuarine waters

Figure 55 Chadwick Bay Survey Area North Topsail Water & Sewer Lift Station Listing, 1991

Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Chadwick Bay Area, 1991, Exhibit III.*

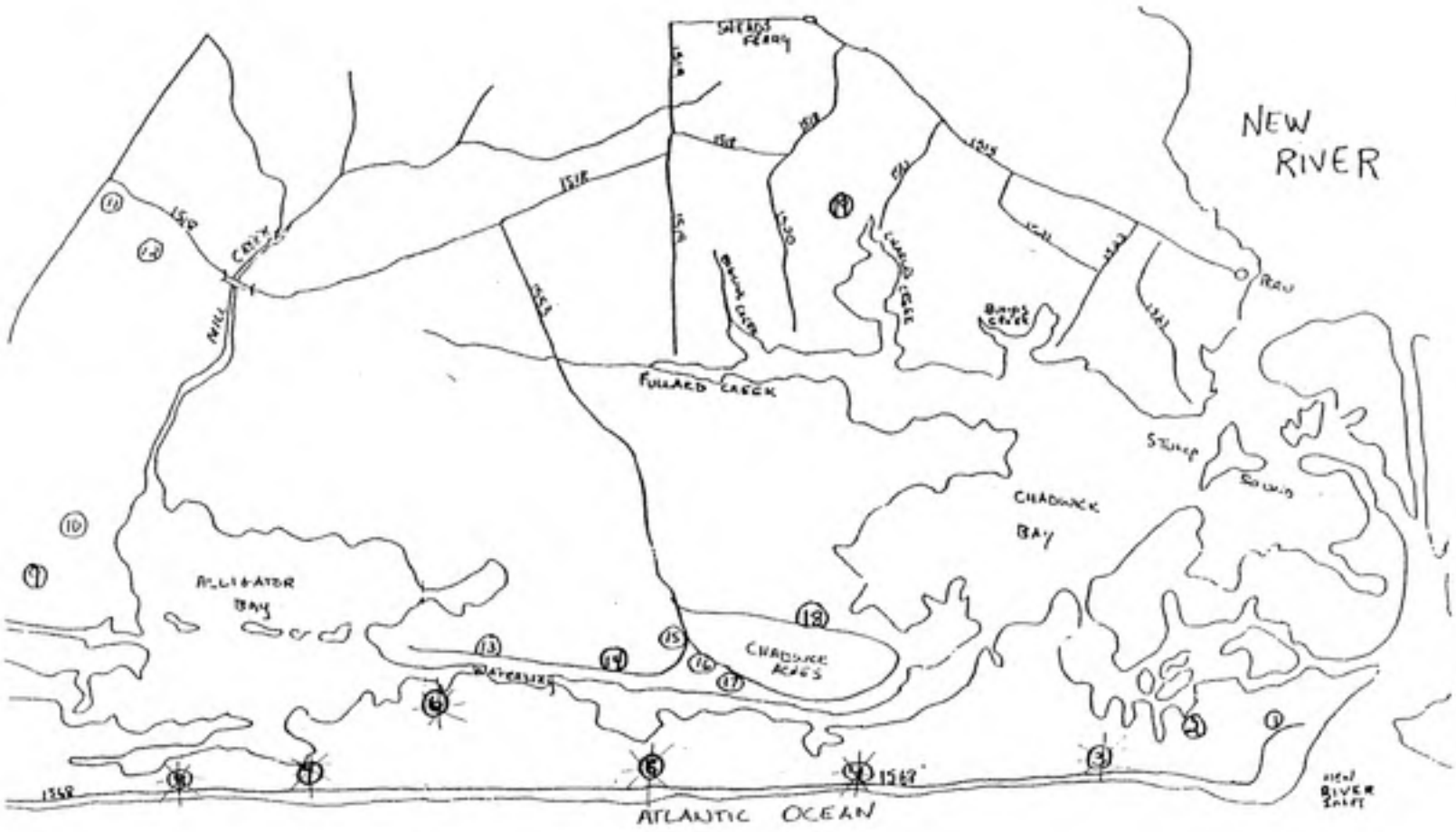


Figure 56 **Chadwick Bay Survey Area North Topsail Water & Sewer Lift Station Location, 1991**

Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Chadwick Bay Area, 1991, Exhibit III.*

NEW DEVELOPMENTS

NAME	Year Developed	Acres	# of Lots	# of Units/ Houses	Sewer
The Village	1990	35	118	4	**NTW&S
Portofino	1989	8	46	0	NTW&S
Bermuda Landing	1987	@4	62 (units)	40 (units)	NTW&S
Heron Cay	1989	2	N/A	17 (units)	NTW&S
Calinda Cay	1988	2	N/A	16 (units)	*NTW&S
Sea Oaks	1989	@12	20	8	NTW&S
✳ Ocean Ridge	1987	@20	80	8	NTW&S
✳ Summertyme	1987	14.8	42	3	NTW&S
✳ Hampton Colony	1988	18.07	26	2	NTW&S
North Shore	1986	41	125	12	NTW&S

*North Topsail Water and Sewer, Inc.

**The Village (at Stump Sound) has installed a sewer collection system, which will be tied into NTW&S's Inc's system, within the subdivision. This internal piping crosses New River Road, where it is then supposed to terminate at a lift station. Currently, the sales office/club house and two homes are connected to the collection system and waste is going to a tank which is suppose to function as the lift station. At this point it functions as nothing but a tank. There is no lid except a piece of plywood. There is no pump or connection to a force main. According to a DEM official there is evidence that the tank has been overflowing onto the surrounding area. DEM has issued NTW&S, Inc. a violation. There is no direct threat to shellfish waters due to the distance from lift stations.

✳ Inside CBRS

Figure 57 **New Developments Since 1986 in Stump Sound Area Survey**
Source: *Shellfish Sanitation Program, Report of Sanitary Survey - Stump Sound, 1992, p3.*

quickly into the sea. The lack of a dune field in front of certain hi-rise and lo-rise resorts makes them highly susceptible to wind, water, and erosion damage. If the oceanfront property owners create low spots in the frontal dunes, they subject the property owners behind them to more property damage. Salt-water sea spray from dune blowouts also kills vegetation. The less developed land in the CBRS has more unaltered, well established sand dunes and vegetation than the rest of the town (Ache, 16).

Growing populations inflict pressures on the dunes and coastal vegetation. Construction displaces vegetation that strengthens and holds the dune in place. Building a limited number of walkways over dunes for beach access is a good way to keep people off the dunes because walking on dunes damages the roots of many coastal plants. However, numerous decks, swimming pools, or people impede dune and plant proliferation.

Other than stabilizing and trapping sand on dunes, vegetation reduces the effects of flooding and erosion. Plants abate the flow of surface water run-off and protect wetland areas from contaminated storm water run-off. Trees and bushes also offer protection from wind damage from storms. Some moderate maritime forests thrive along the back-barrier shoreline. However, this vegetation does not offer considerable protection since most development is along the Atlantic coast.

Storms can be devastating, especially on coastal barriers. They endanger life and property and present elevated flood risks. Erosion can increase as population increases and structurally threatens buildings. Water pollution damages shellfish

territories and inadequate wastewater treatment endangers public health. Also, natural resource protection is very important to sustain barriers. Conservation efforts for dunes and vegetation help coastal barriers survive and migrate more slowly. Each of these environmental issues applies to the lands inside the CBRS.

Chapter 4

DISCUSSION

Policy Review

Expenditures Limitation Approach

The expenditures limitation policy of the Coastal Barrier Resources Act (CBRA) uses economic forces to strengthen environmental protection. As the first federal legislation using this approach, CBRA established a new direction for the implementation of national coastal policy. It may be a model for the protection of other areas of national and state concern. By denying federal financial assistance, CBRA attempts to deter resource destructive activities by making coastal development more expensive to the consumer. In other words, under CBRA, the taxpayer does not pay for repetitious expenditures to maintain coastal development.

New Policy Advantages

The market approach won favor for several reasons. First and foremost, it provides a way to protect the natural environment and efficiently uses scarce government funds. Traditionally, the federal government either acquired land, established regulations, or took planning initiatives to protect natural resources. If CBRA could reduce development pressure, and hence, lower property values, then future acquisition of Coastal Barrier Resource System (CBRS) units could be feasible.

Secondly, the denial of federal subsidies did not constitute a "taking" under the

fifth amendment. The CBRA could save the federal government money and still not interfere with private land use. Land owners could build on designated undeveloped land. The person, the state, or the local government, however, would assume the financial risk of the endeavor. Furthermore, many officials like the fact that CBRA promotes, rather than supersedes state and local land use programs to protect coastal areas.

Disadvantages of the Expenditures Limitation Approach

The greatest disadvantage to the expenditures limitation approach is that the denial of federal assistance may prove to be ineffective in protecting natural resources. The effectiveness of the expenditures limitation approach is uncertain because the ultimate level of protection for coastal resources in the CBRS depends on the demand for coastal property. Fostering the false illusion that natural resources are being adequately protected or that traditional methods of environmental protection should be abandoned is a distinct danger in this approach. Supplementary regulatory or acquisition efforts may need to be used in conjunction with this law (Kuehn, 628).

The expenditures limitation approach has not reached its goals in all instances. Actually, this technique just serves as an important first layer of protection. "The advantages of CBRA's expenditures limitation mechanism are contingent upon, or at least heavily influenced by, the prevailing political and social context in which the law is implemented (Jones, 1058)." "The success of this market-based policy will depend upon the extent of previous governmental involvement in promoting destructive

activity, the degree of withdrawal of government assistance, the availability of alternative sources of financing or economic support, and the strength of demand for the product resulting from the destructive actions (Kuehn, 631)."

Implementation Problems with the Coastal Barrier Resources Act

Agency Compliance

Over the years, a few legislative problems have been recognized in CBRA. Implementation problems undermine the purposes of the law. Frequently, there is no way of knowing if federal agencies, contrary to the law, are funding activities in the CBRS. Oversight functions are very limited and agency staff may be unaware of CBRA's restrictions (Jones, 1042). Examples of how federal monies have seeped into the CBRS include the Community Development Block Grants under the Department of Housing and some federal flood insurance policies which have been underwritten by the National Flood Insurance Program (NFIP).

Private insurance agents sell about 80% of NFIP insurance policies (Jones, 1042). Agency insurance policy oversight is nearly nonexistent because FEMA's resources are so limited (GAO, 26). It is difficult for FEMA to make sure private insurance companies are not approving flood insurance for structures within CBRS. If unsure of the boundaries, insurers would rather write a federal flood insurance policy to avoid costly errors. Land owners, who were incorrectly denied coverage, could bring liability based suits. According to FEMA, policies underwritten by private insurers would be considered invalid for claims following a major storm event

(GAO, 28). Property owners will undoubtably object if they find out their federal flood insurance policy will not cover the damage.

Also, the Department of Interior (DOI) and the Fish & Wildlife Service lack veto power over federally funded projects that are contrary to CBRA's goals (Jones, 1041). For example, the Department of Transportation (DOT) has been known to disregard the advice of DOI about rebuilding roads in the CBRS after storms (Jones, 1042).

Interpretation of the Act's Provisions

Loose legislative interpretation of CBRA exemptions exemplifies another problem. For instance, the DOT considers all federal highways to be "essential links" in a network (Jones, 1043). This attribute makes federal funding available for road reconstruction or maintenance in the CBRS regardless of CBRA's restrictions. No guidelines identify what criteria constitute an "essential link".

Sometimes, public roads and other facilities are built with private funds inside the CBRS and later dedicated to a government agency. If this situation occurs, the costs of road maintenance and structure rebuilding falls upon local, state, or federal governments (Jones, 1043). However, in the event of a disaster, FEMA will not provide the funds to rebuild the infrastructure in the CBRS.

"A similar interpretational conflict exists with the Department of Defense (Jones, 1044)." Some of the designated land in the CBRS belongs to the military. The CBRA exempts any activities the Department of Defense deems essential for

national security. The military claims all of its activities meet this criteria. One military base wants to build a beach clubhouse at Camp LeJuene, North Carolina, in a CBRS unit. Another base wants to build a commercial spaceport at Eglin Air Force Base, Florida in a CBRS unit (Jones, 1044).

Exemptions

It is extremely important to strictly define the types of financial assistance and expenditures restricted in the law. Although the effect of General Revenue Sharing grants on coastal development in the CBRS was suspected to be low, this exemption allowed coastal barrier communities to circumvent the thrust of CBRA by continuing to use federal funds for the construction of development-related projects such as highways, sewer, and utility systems (Kuehn, 620). Legislation providing funding for General Revenue grants died in 1986 (Jones, 1033).

Impact of Activities Outside the Coastal Barrier Resource System

Certain activities outside the CBRS encourage development within the "undeveloped" areas. Federal revenues are used for projects such as wastewater treatment plants, water supplies, and bridges to non-CBRS portions of the coastal barriers (Jones, 1045). Utility and sewer lines often cross CBRS units to reach developed areas. The DOI admits accessibility and infrastructure are prerequisites to the development of coastal barriers. "Clearly, subsidizing such projects outside the

boundaries of the CBRS units is contrary to CBRA's goals, if they promote construction inside unit boundaries (Jones, 1045)."

Tax Incentives

Also, various tax incentives for coastal development do not enhance the protection of CBRS areas. The CBRA did not prohibit *all* federal financial assistance for new development within the CBRS. Specifically, deductions from federal income taxes are still available (Jones, 1074).

The CBRA exempts casualty loss deductions from federal income tax. "Property owners can currently deduct non-reimbursed property damages from floods and storms in excess of 10% of their adjusted gross income (Jones & Stolzenburg, 10)." "In 1985, the federal government lost roughly $1.5 billion in revenues through casualty and theft-loss deductions including those for coastal flooding (Jones & Stolzenburg, 10)."

Additionally, CBRA does not affect the second-home mortgage income tax deduction. "The American Resort and Residential Developers Association estimates the federal government loses $2 billion through this deduction each year (Jones, 1075)." Federal and state governments underwrite the costs of coastal barrier development with such tax credits as interest deduction on loans and mortgages, accelerated depreciation of real property, casualty loss deductions, and capital gains tax rates on real estate transactions (Kuehn, 652). Often these tax incentives

encourage development (Kuehn, 626). Congressional witnesses warned that these tax incentives help make ownership of coastal barrier property an attractive investment.

Federally-Insured Mortgages in the Coastal Barrier Resource System

The Coastal Barrier Resources Act allows the issuance of federal loans in the CBRS as long as they are not federally insured or federally guaranteed (Jones & Stolzenburg, 11). In other words, as long as the developer gets insurance from a non-federal institution, they can secure a loan from the federal government.

An Inherent Problem with the Act

Often the general public has a difficult time understanding the "inequities" of the federal law. The CBRA creates an apparent inequity when it discontinues government benefits to some areas while adjunct areas receive benefits. Developed area's adjoining CBRS units are eligible for federal flood insurance and other subsidies even though they may be exposed to greater coastal hazards.

These are some of the problems inherent in CBRA. An abuse of CBRA's exemptions sets a poor precedent and limits the success of the law.

Federal Level Policy and Legislative Recommendations for the Coastal Barrier Resources Act

Improve Agency Compliance

The CBRA's effectiveness largely depends on agency compliance with the prohibition on federal subsides. If federal agencies do not enforce their policies that

govern activities within the CBRS, do not know of CBRA's existence and meaning, or intentionally circumvent the Act, the law will fail. Agency compliance with CBRA must improve.

The General Accounting Office (GAO) can conduct studies to identify non-complying agencies (Jones, 1069). All affected federal agencies would be required to write regulations to ensure compliance and report to the GAO. The GAO could then preform routine annual audits. The oversight expense is balanced by the savings from the denied federal subsidies.

Additionally, it is necessary for the DOI to be granted authority to stop federally funded projects that are inconsistent with CBRA's intent (Jones, 1070). The DOI should have veto power and consultation rights on major developments in the CBRS because they have expertise in determining the environmental impacts of projects on CBRS resources.

Tighten Loopholes: Provide Legislative Clarification of Act's Provisions

The CBRA has some prohibitions and exemptions that undermine the purposes of the law. All the terms in this legislation should be clearly defined to close loopholes that counter the purpose of the act. For example, the general revenue sharing exemption needed to be narrowly defined. Monitoring all federal block grants and insurance agents would confirm CBRA compliance. For the expenditures limitations method to work, the financial assistance prohibitions must be broad and the exemptions must be narrowly defined to achieve conservation goals.

Another provision requiring legislative clarification is the DOT's determination that all federal highways are "essential links" in a larger network. This exemption currently allows all highways within the CBRS to be rebuilt regardless of the number of times they are ruined by storms. Also, the CBRA needs an amendment which would declare that future federal assistance for roads, structures, and facilities will be contingent upon whether they existed before the CBRS designation (Jones, 1072).

Furthermore, the DOI could dictate what military activities are "essential" in the CBRA to national security. If the government allows the armed forces to circumvent the law, the military's ability to make sound environmental decisions will be questionable. A prime example is the number of waste sites taxpayers are paying to cleanup on military bases.

Monitor Activities Outside the Coastal Barrier Resource System

Currently, federal funding for projects outside the CBRS that influence development inside the CBRS is left up to agency discretion. Legislative language should explicitly prohibit all federal funding for projects that promote development within the CBRS, regardless of whether the project occurs within CBRS unit boundaries (Jones, 1072). A prohibition on federal assistance for new facilities and for the expansion of existing facilities that may serve CBRS units is consistent with CBRA purposes (Jones, 1071). If public services are sorely needed to improve public health and there are places unreachable except through CBRS units, private monies can finance the necessary additions in those areas.

Remove Tax Incentives

Certain tax incentives for development in the CBRS remain. "Fortunately, the Tax Reform Act of 1986 substantially removed many of the tax breaks promoting development within the CBRS (Jones, 1073)." Adjusting tax incentives by restricting casualty loss, capital gains, depreciation, business, or mortgage or loan interest deductions can make coastal barrier development an unattractive investment (Kuehn, 652).

The coastline is a popular place for vacation homes. Withdrawing the income tax write-off of the second-home mortgage deduction may preserve threatened ecosystems within the CBRS. Ending this deduction guides developers away from the CBRS. Tax code amendments enhance CBRA's efforts to alter the market forces sustaining development in the CBRS.

Deny Federally-Insured Mortgages in Coastal Barrier Resource System

"Some officials predict that CBRA's effectiveness depends on the banks' willingness to offer loans to persons without flood insurance and the availability of private flood insurance (Jones, 1075)." Passing an amendment to deny federally insured financial institutions from providing loans within CBRS units will help. Also, federal regulatory agencies for lending institutions can take a closer look at loans that aid development within the CBRS.

Inequities and Risk

Areas designated under CBRA were not based on the extent of risk such as that posed by land at low elevations, extensive erosion, or probability of hurricane landfall. The amount of existing development determined the designation of CBRS units. In terms of risk, CBRA does not make sense. An amendment to the CBRA which would deny federal flood insurance for new structures even in hazardous developed coastal areas would be helpful. For instance, restricting the availability of federal flood insurance in erosion-prone coastal areas outside the CBRS would decrease the development in CBRS.

Phase Out Subsidies on Coastal Barriers

Legislative reform of the National Flood Insurance Program is integral to these changes. "A uniform policy for administering the flood insurance program should be adopted, which would eliminate the existing double standard which denies insurance coverage for certain flood prone areas, such as coastal barriers, wetlands, and other environmentally sensitive areas yet retain coverage for the remainder of the United States subject to flooding (Jones, 1078)." The federal government could initiate oversight rules to meet the original purpose of guiding development away form flood zones. They could also incorporate erosion rates and setback regulations in their policies. Perhaps CBRA should have limited the availability of private flood insurance in the CBRS.

The CBRA did not regulate the economic factors that are incentives for development in the CBRS. The expenditures limitation approach in CBRA did not put restrictions on private or local and state expenditures in the undeveloped units. Changes in CBRA could prevent certain private, state and local financial resources from being used to develop the CBRS.

The CBRA needs to comprehensibly prohibit federal regulatory activities that encourage coastal barrier development, or, at least, require agency consultation on large projects planned for coastal barriers. This would be the beginning of a national coastal retreat strategy. At least, such amendments could eliminate all the remaining forms of federal financial assistance for System development.

Remember CBRA only applies to the "undeveloped" areas on coastal barriers. There are many developed barriers with the same problems that Congress should address. Politically, legislation to withdraw all the remaining forms of federal financial assistance from developed coastal barriers, is nearly impossible. Perhaps a subsidy phase-out plan could be instigated in which the subsidies would disappear gradually over 20 or more years.

Expand the Coastal Barrier Resource System to All Undeveloped Coastal Barriers

Expanding the Coastal Barrier Resource System could render additional environmental protection and save taxpayers a large amount of money. Potential additions might include more military and Coast Guard lands, otherwise protected barriers owned by federal, state, local and private entities, eligible areas along the

Pacific Coast, and those units excluded from the 1990 legislation for political reasons (Jones, 1077). Governmental acquisition of these lands is another good way to preserve the environment.

Alternative Proposals

Coastal researchers suggest an alternative to government subsidization of reconstruction after a natural disaster is to offer indemnity or compensation on the condition that the recipient use the financial assistance to relocate outside the hazardous areas. Second, if a structure inside the CBRS is damaged more than 50% during a storm, the federal government would thereafter cancel the federal flood insurance policy. "Another proposal is to develop a "post storm classification system" under which barriers with the destruction of more than 50% of the development in a storm would automatically be added to the CBRS (Jones, 1079)."

State Level Policy and Legislative Recommendations

State Coastal Management

The CBRA represents a step in the right direction to protect the public and the environment, and to reduce wasteful expenditures. However, this policy cannot accomplish its goals alone. There must be coordination between local and state coastal management efforts. The CBRA's effectiveness depends on state and local government enforcement of CBRA's goals and the future economic losses to the government and lending institutions.

The CBRA must be considered in state coastal planning processes to enhance public safety, reduce state expenditures, and protect natural resources. For instance, state level planners in North Carolina approve local coastal land use plans which contain policies on growth and reconstruction. This authority allows the state the opportunity to enforce the principal goals of CBRA. The legislative bodies guiding coastal development must seize such opportunities. Not only will this action maintain CBRS units, it will preserve other coastal lands.

States should follow the federal government's example in recognizing that the actual cost of some coastal development is greater than its benefits. It is very important that states adopt rules that curb state and local funding of CBRS development (Jones & Stolzenburg, 11). Higher property taxes and the denial of state agency funds for infrastructure and other local services are ways to decrease the incentive for development in the CBRS. Public disclosure of state and local expenditures in the CBRS is also important.

Coastal states need to pass a law similar to CBRA. North Carolina's Coastal Area Management Act (CAMA) is well known for its coastal management schema. However, CAMA must be made even more comprehensive. Perhaps there could be limits placed upon the annual granting of building permits, while adding requirements for larger parcel sizes, strengthened building codes, or designating maximum build-out situations in certain high-hazard coastal zones.

Taking legislative action to reduce coastal development outside the CBRS in hazardous barrier areas serves as another opportunity to protect the public welfare.

For example, states can devise policies on how to manage erosion and development in the areas with the highest annual erosion rates. New laws could make landowners financially responsible for the development in known erodible areas. Florida and Massachusetts already have laws that limit the use of state funds to subsidize development or support post-disaster redevelopment in hazardous barrier areas. Reducing development in hazardous barrier areas strengthens coastal development policy and provides a base for the efficacy of CBRA.

Transfer of development rights and carrying capacity techniques are two planning tools used to direct coastal growth. These planning tools can be incorporated into legislation. Transfer of development rights allows lots in hazardous coastal areas to be traded for lands identified as capable of bearing more intensive development. Switching construction to mainland locations will also relieve the financial pressures to develop in hazardous coastal zones.

The use of carrying capacity analysis supplements the state planning process through local land use plans. "Carrying capacity means to achieve a level of development that can be accommodated by the land. This level of development would be without serious hazards to life, property damage, or environmental degradation within acceptable standards of efficiency and economy (Godschalk, 29)." Using carrying capacity studies as a basis for determining the level of desirable development in a coastal region promotes the environment.

Other environmental laws help protect delicate vegetation and prevent more water contamination on coastal barriers. States can pass laws which increase set-back

requirements, augment dune recovery plans, strengthen floodplain management and wetland regulations, and promote land acquisition strategies. Many conservation groups offer the opportunity to establish political clout.

Trying to alter natural island migration involves exorbitant local and state expenditures on shoreline engineering projects. Such projects include pumping sand onto the shore, beach scraping, and building seawalls, jetties, and groins. These techniques to change the shoreline do not last and often have poor aesthetic side effects. North Carolina's CAMA currently outlaws the building of seawalls. Other states need to realize that local and state expenditures used for shoreline engineering are futile and require expenditure limitations.

State Coastal Education

State funded coastal barrier educational seminars should be conducted in inland as well as in coastal regions because coastal resources are important to all citizens. Many coastal builders and home buyers may be unaware of the ongoing natural processes affecting coastal barriers. Before development begins, land owners need to have a clear sense of the physical processes that take place in coastal areas such as coastal barrier migration, erosion, flooding, and hurricanes.

The public needs to be aware of CBRA, CAMA, land use regulations, and other environmental laws that effect their properties. North Carolina residents in coastal areas should be aware of local areas of environmental concern and the implications for environmental protection. Serious consideration must be given to

learning about sustainable development and the consequences of over development on coastal barriers.

When the hazard information is provided, potential buyers in the CBRS should assume full liability for their actions and not petition the government for relief in case of disaster. For example, private landowners, not the state, should financially maintain the sand covered, demolished, or flooded roads through CBRS units. This recommendation is based on how over-development or poor development of coastal barriers threatens natural resources, public safety, and the financial status of private as well as governmental resources.

Actions by the state which could be taken include consistent enforcement of current coastal barrier regulations, passing new coastal legislation curbing costs, and educating the public about coastal processes. Enforcing federal and state laws at the local level is also critical. Inconsistencies among federal, state, and local public policies may result in the potential destruction of certain environmentally significant areas.

Recommendations for Localities

Identify the Carrying Capacity of Coastal Barriers

Many seasonal residents and day visitors are attracted to the coastline. With high tourist visitation, seasonal population information is difficult to project. Such enormous population fluxes makes planning public facilities and services difficult. Coastal localities must design their facility capacities to meet the peak season demand

because tremendous population variances severely strain the carrying capacity of the land.

One recommendation for localities is to make adjustments to local land use plans after major storms. An immediate need exists for policies that demand sound redevelopment after storms. A relocation policy to move endangered structures inland or prohibiting land divisions in areas subject to rapid erosion are land use planning options. As aforementioned, zoning, transferable development rights, and carrying capacity studies of coastal barriers are planning tools that direct growth in a more environmentally sound manner.

The derivation of policies and regulations, consistent with the nature of the land form, is important. Each locality will have its own unique physical characteristics. Taking these differences into consideration, the policies or laws successful for one town may not work for another. Devising new laws can provide economic incentives or disincentives that lead to control techniques specific to the particular characteristics of a given hazardous area and its existing or proposed uses. It is within the realm of each particular situation that the new policies or laws become effective at the local level. The more environmentally sensitive and cost effective the regulations, the better.

Local Environmental Consciousness

As a high precedence, states and localities must determine the reasons for system development and study their shorelines to determine the high-hazard zones.

Then, towns can limit access to environmentally sensitive areas and laws with coastal population and development control, cost control, and environmental control can be adopted. These laws would protect public health and safety, reduce the recurrent costs of storm damage, and preserve wildlife habitat. Meeting these objectives will require public awareness, concern, and participation in the regulation and administration of the environmental laws.

Chapter 5

CONCLUSIONS

Results of the Coastal Barrier Resources Act

Coastal Barrier Resources Act Impact

In some places, the Coastal Barrier Resources Act (CBRA) did remove the financial burden from taxpayers by precluding development. In other places, CBRA has not had much of an effect on coastal development other than to delay it. It appears the economic disincentives in CBRA were not great enough in all cases, especially in areas with good infrastructure, flood insurance, and government agency involvement. Accessibility, opportunity for utility services, availability of flood insurance, and adjacent developed areas are key factors for determining if growth will occur in other Coastal Barrier Resource System (CBRS) units.

There is a reasonable probability that the growing market demand for coastal property will continue to overcome the development impediments created by the Act. Where a strong developer market exists, greater damage to natural resources and exposure to coastal hazards are likely. The market ultimately determines the outcome of CBRS areas.

The CBRA attempts to use economic tools to explicitly address the tradeoffs that must be made between economics and the environment. In this case, a delicate balance must be struck between environmentalists and investors. This balance

culminates itself in the question of how to protect the natural beauty that attracted people to the area. The actual choices made to govern development and the economic ramifications will determine the future outcome of these ever-changing land forms.

The Coastal Barrier Resources Act and North Topsail Beach

Initially, CBRA's effect was to bring high-density, multi-family units or inexpensive housing to the CBRS at North Topsail Beach (NTB). "High-density multi-family and commercial development construction has become the development pattern in the Topsail Beach unit (L06) (CBRS Draft, K-6)." Large construction projects were attempted either because they brought in short-term investment returns or did not need financing. Inexpensive housing was feasible because the losses from a natural catastrophe could be more easily absorbed. The CBRA might have changed the type, quality and amount of development here, but CBRA was virtually nonexistent when it came to planning efforts.

The CBRA did not stop development, it just delayed it until the NTB real estate market could rise above the disincentives. This hypothesis is supported by the lull in development from 1982 to 1985. The CBRA may have even increased the market demand for housing in developed areas. The housing market and insurers are extremely important factors in the development of the CBRS of NTB (Personal Communication, Town Manager). Even if CBRA does not stop environmental degradation, it will probably slow it down. It will not force taxpayers to pay for it and investors may ignore limitations.

Effectiveness of the Coastal Barrier Resources Act at North Topsail Beach, North Carolina

Recapitulation of Purpose

The primary objective of this research is to analyze the effectiveness of the Coastal Barrier Resources Act as an environmental policy. This report does not argue whether there should or should not be shoreline development. NOR IS IT MEANT TO CRITICIZE THE TOWN OF NORTH TOPSAIL BEACH, NORTH CAROLINA. Recent research indicates that at least nine other places with CBRS units are experiencing the same problems (GAO, 3). The results of this analysis can be applied to other coastal areas having problems managing their natural resources. The strengths and weaknesses of coastal management legislation in North Carolina may be used to identify similar trends in other states, especially the ones that have even more land designated as undeveloped.

Growth is Occurring in the Coastal Barrier Resource System Unit

Increased growth and development in the CBRS at NTB exemplifies CBRA's ineffectiveness in meeting its first goal of minimizing the loss of human life. Greater development produces greater risk to the people and the environment on this coastal barrier. As presented in the data, the national trend of population pressure on coastal areas can be seen in NTB. The town of NTB will continue to grow due to good upkeep and upgrading of infrastructure (roads, water and sewer, utilities) and governmental policies allowing coastal barrier land use in the CBRS.

In brief, population in the CBRS can be influenced. Mentioning CBRA in local land use plans, not encouraging development in the CBRS, establishing a population limit on the carrying capacity of the island, or putting a development limit inside the CBRS are methods of coastal population control. For CBRA to be effective in the long-term as an environmental policy, officials must try to keep development in more suitable areas.

Government Revenues Continue to Promote Growth in the Coastal Barrier Resource System Unit

The second purpose of CBRA is to minimize the wasteful expenditure of federal revenue. This investigation only discovered one instance of federal revenue being used in the CBRS of NTB, nevertheless, there is great potential for many others to contribute in the event of an emergency situation. By denying certain kinds of federal assistance, the costs of development were supposed to be so great that investors would choose to build elsewhere. Although the federal level of government has taken the initiative in protecting the coastal environment from harm, state and local governments have not always followed suit. Obviously, these entities believe the benefit of hazardous coastal development outweighs the costs.

The Coastal Area Management Act's goal to minimize damage to property on coastal barriers also is unmet. One purpose in trying to keep the CBRS in a more natural state is to reduce property damage expenses. Existing data strongly suggests this goal is not being achieved in the CBRS unit in the town of NTB.

It seems state and local revenues have compensated where federal monies have been withdrawn. In short, the entire cost and risk of development in or separated by the undeveloped areas must be borne by the purchasers. With static population growth and appropriate development in the CBRS, costs from natural disasters will lessen. Water lines and roads that must traverse CBRS land can be monitored. Local monitoring can reduce land uses not intended for that area.

Environmental Factors are Involved in the Development of the Coastal Barrier Resource System Unit

The third purpose of CBRA was to minimize the damage to fish, wildlife, and other natural resources associated with coastal barriers. The CBRA is insufficient as an environmental mandate for NTB, North Carolina. Since coastal barriers occupy so little acreage and the demand for development has been intense, the rate of habitat loss is high. Coastal habitat, critical to threatened or endangered species, is being altered in the CBRS.

The development occurring in the CBRS can interfere with the natural movement of sandy land and harm fish and wildlife. The pollutants closing shellfish territories diminish the productivity of estuaries and wetlands. Reductions in the number of septic tanks approved annually would protect water quality and working together, local and state authorities can be selective about allowable sewer connections.

Becoming cognizant of the safety of living in less altered portions of CBRS shows developers how to live **with** the coastal environment. Too much development

hinders the barrier's ability to protect itself and populated inland areas from storms. "It is important to return the dynamic coastal system to its natural state as much as possible (Ache, 5)."

Supplementary Research Questions

Recommendations for Future Research

The following list proposes potential follow-up studies.

- Urge coastal government officials, coastal developers, representatives of conservation organizations, and other people with coastal concerns to survey and identify the impacts of CBRA to date, its strengths, and its weaknesses.

- Survey bankers, realtor's, and public officials to give insight into the actual impact of the lack of federal flood insurance in the CBRS.

- "Compare System units and adjacent areas to fully assess the impact of CBRA on coastal barrier development (Jones & Stolzenburg, 1)."

- Review the implementation of coastal land use policies in other states to determine how to better prepare for future coastal land use management in North Carolina.

- Identify ways to improve the enforcement of current environmental laws.

- Initiate studies to ascertain the carrying capacity of coastal areas. These studies would provide valuable information to decision makers on the impacts of proposed development.

- Discover better development practices through sustainable development studies.

- Determine the knowledge of the general public about the vulnerability of coastal barriers to natural hazards.

- Research how education about coastal processes makes a difference on decisions to buy coastal property.

- Identify new areas to expand CBRA's domain and increase the number or size of CBRS units.

- Determine the actual economic impacts of storms, flood insurance, tourism, development and coastal legislation.

- Evaluate how state policy makers can weigh the value of economic development against maintaining a fragile ecosystem arises when conservationists and developers confront one another.

- Investigate the number of federal flood insurance policies issued and claims filed by residents inside the CBRS.

- Compare prices of private flood insurance and property values to similar properties with federal flood insurance.

Limitations of Study

North Topsail Beach, the study area, only addresses about half of a coastal barrier in North Carolina; not the entire island and only one CBRS unit. Many more units need to be researched and compared. Data on other units in the CBRS could reveal other factors affecting development. More research is needed to determine the impact of private flood insurance on the development of the CBRS at NTB.

Additional studies may discover the actual economic impacts of seasonal and permanent development versus its costs to the public. For example, "A detailed account of casualty loss deductions for coastal storm damages would be useful to evaluate their influence on coastal development (Jones & Stolzenburg, 11)." The actual economic effects of local land use controls are difficult to assess since many confounding factors may exist. For example, housing demands, interest rate changes,

and concurrent environmental legislation can impede proper analysis of land use regulations.

Learning to Live with Coastal Barriers

Recommendations to North Topsail Beach, North Carolina

It is possible through land use planning to maintain sustainable development in environmentally significant regions like coastal barriers. Figure 58 shows the most suitable place for development in the dune environment.

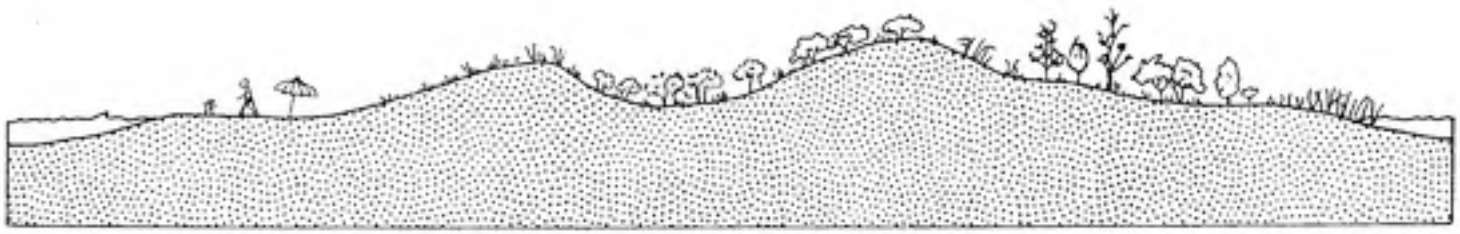
"Due to low elevation and the lack of protective frontal dunes, all areas in NTB have been designated as either extreme or high-hazard zones (Ache, 11)." Figure 59 is Ache's interpretation of a Final Hazard Map for NTB. Figure 60 describes the hazard zones listed on the map.

A storm hazard assessment study gives specific property damage mitigation recommendations for North Topsail Beach as listed in Figure 61. Many of the recommendations are centered around returning the coastal system to its natural state. Relocation and retreat are the best long term solutions. In the short term, politics and economics make such options unlikely.

Overall Outlook

Who should bear the costs of repairs when people living on dunes in front of you cause a blowout and your home gets damaged? How fair is it to require the citizens of inland regions to assist in the redevelopment costs on developed coastal

OCEAN	BEACH	PRIMARY DUNE	TROUGH	SECONDARY DUNE	BACKDUNE	BAYSHORE	BAY
Tolerant	Tolerant	Intolerant	Relatively tolerant	Intolerant	Tolerant	Intolerant	Tolerant
Intensive recreation	Intensive recreation	No passage, breaching or building	Limited recreation	No passage, breaching or building	Most suitable for development	No filling	Intensive recreation
Subject to pollution controls	No building		Limited structures				



Tolerance of the dune environment to disturbance. Each dune complex consists of a number of distinct areas that vary considerably in their stability or ability to withstand encroachment or alteration. A typical dune profile shows the backdune area to be the most suitable for human habitation. Adapted from I. McHarg, *Design with Nature*. Garden City, N.Y.: Natural History Press, 1969.

Figure 58 **Tolerance of a Dune Environment to Disturbance**
Source: *G. Griggs, Living with the California Coast. 1985, p18.*

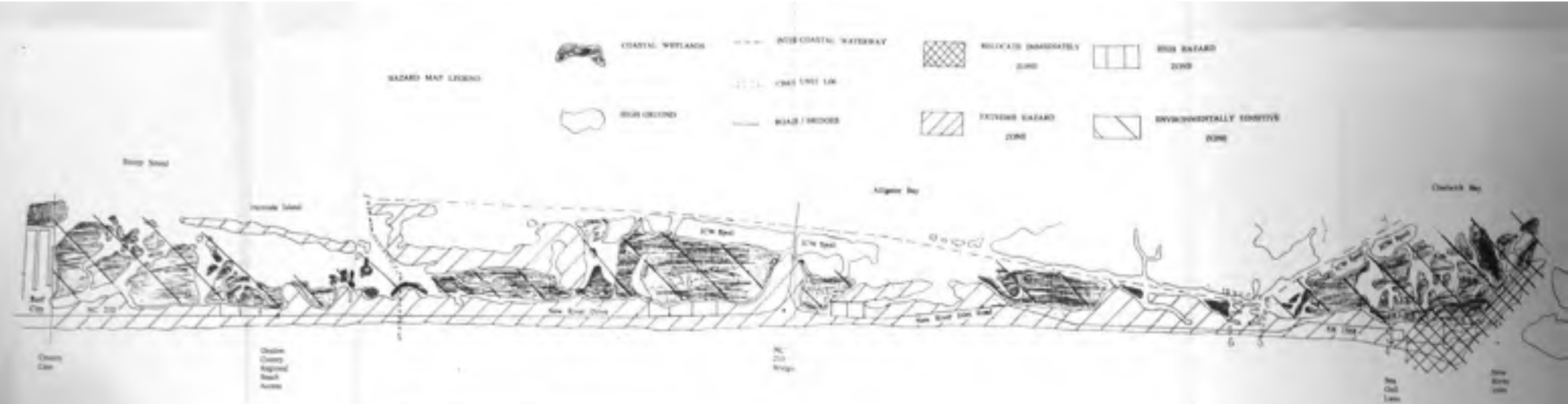


Figure 39 Flood Hazard Map for North Topsail Beach, North Carolina, 1993
Source: *N. Acho, Barrier Island Storm Hazard Assessment: An Onslow Island Scale Assessment of North Topsail Beach, North Carolina, 1993*, p.B-21.

Description of Hazard Zones

Relocate Immediately zones are inlet hazard zones where present structures should be relocated as soon as possible and no new development should be considered.

Extreme Hazard zones are areas of very low island elevation and narrow island width. The frontal dune line is low and discontinuous or perhaps non-existent, and no interior dunes exist. There is no dense vegetation; only sparse growths of dune grasses or maritime forest are present. This is an area of likely flooding, overwash, and shoreline erosion during storms. Any area designated as a "V-zone" by FEMA is included in this category (V-zones are Special Flood Hazard Areas inundated by the 100-year flood with the additional hazard do to "velocity", three feet or more of wave action).

High Hazard zones are areas of low to moderate island elevation and narrow to moderate island width. The frontal dune line is either low or discontinuous, and interior dunes are not well developed. Dense growths of maritime forest are present. Due to the low elevation, flooding and overwash potential for these areas are high, but because of the established vegetation the potential for wind damage and shoreline erosion is reduced.

Coastal wetlands and special habitats for endangered coastal species are designated as **Environmentally Sensitive** zones. Development in these areas should not be considered, and efforts should be made to protect these areas from future development.

Figure 60 **Description of Hazard Zones, 1993**
Source: *B. Ache, Barrier Island Storm Hazard Assessment: An Intra-Island Scale Assessment of North Topsail Beach, North Carolina, 1993, p4 & 5.*

*Use off-island supplies of sand to increase island elevation.

*Build a frontal dune line.

*Increase width of island by dumping sand on sound-side with sensitivity to wetlands.

*Use off-shore sand for beach replenishment.

*Plant dune grasses and maritime forests.

*Move some oceanfront structures inland.

*Relocate structures in the inlet hazard area.

*Build a high dune field in the inlet hazard area.

*Restrict reconstruction of damaged structures in inlet hazard area.

*Restrict rebuilding of damaged development in areas prone to inlet migration, flooding, overwash, and high rates of erosion.

*Elevate structures, ban mobile homes, and reinforce structures according to hurricane proof building codes.

*Bury electric and phone services.

*Write lower density development into hurricane hazard mitigation and reconstruction plans and create new development setbacks.

*Buy part of the Coastal Barrier Resource System and make into a park or public beach access area.

*Hard stabilization techniques are not recommended. If shoreline engineering is the last resort, the public should be fully informed of all costs, monetarily and environmentally.

Figure 61 **Specific Property Damage Mitigation Recommendations for North Topsail Beach, 1994**

Source: *B. Ache. Barrier Island Storm Hazard Assessment: An Intra-Island Scale Assessment of North Topsail Beach, North Carolina, 1993, p11.*

barriers through higher taxes? Should disaster assistance and other subsidies be available to those who choose to reside on federally designated undeveloped coastal barriers which are deemed generally unsuitable development? These are just some examples of taxes being used to cover the costs of those who choose to live on the beach and build in the CBRS.

Historically, people had summer cottages at the beach and visited seasonally (Personal Communication, Town Manger). Today, there may be a trend for Americans to sell their permanent residences and purchase oceanfront homes (Personal Communication, Town Manager). Obviously, more investment in a residence at the coast places a person's welfare in greater jeopardy. When hurricanes or rough storms strike, there is greater potential for total loss per household.

It is constitutionally impossible to prohibit private development on coastal barriers and there are people who want to live on the beach at any cost. People can build on high-hazard land, but should not ask someone else to pay for it. The local authorities can restrict densities and implement regulations in the CBRS; yet, the public may end up paying for their unwise planning. Allowing continual investment of taxpayer monies in developed barriers makes little economic sense.

People living in coastal areas must prepare themselves. It is important to live in accordance with the natural coastal system to promote survival on a long-term basis. Guiding the growing coastal population out of high-hazard zones will ultimately establish a synergy between man and the environment.

Coastal researchers must prove the long-term economic benefits of maintaining the natural functions of undeveloped coastal barrier ecosystems exceed the long-term economic benefits of urbanization of these ecosystems. Rising sea levels will exacerbate coastal erosion, flooding, and storm damages. "As if that were not bad enough, scientists are predicting that global warming will also bring with it severe increases in the frequency and intensity of hurricanes and other storms (Jones, 1027)."

Basically, the developed coastline is a disaster waiting to happen. It is hoped, the discussion of population and development, public expenditures, and the environment will provide a basis for development in a manner sensitive to local conditions. If we do not adhere to this lesson, only greater expenses will be incurred. And in the end, we will be forced to retreat from the shore anyway. Actions must be taken today to relieve the potential hardships of tomorrow.

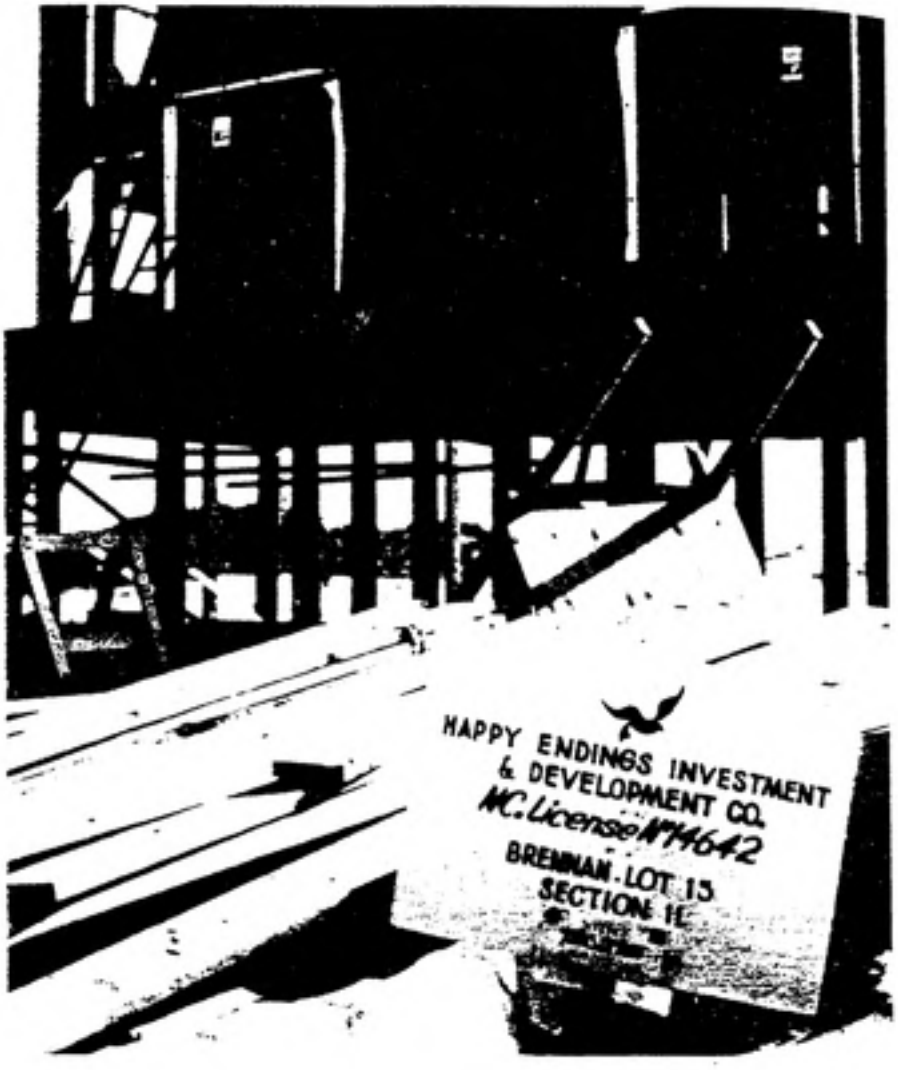


Figure 62 **Happy Endings Investment & Development Picture, 1985**
Source: *Environment, p38.*

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APPENDICES

APPENDIX A

Appendix A **Coastal Barrier Resources Act of 1982**
Source: *CBRA Public Law 97-348, 1982, p1653-1659.*

Public Law 97-347
97th Congress

An Act

Oct. 18, 1982
[H.R. 5662]

To extend until October 1, 1983, the authority and authorization of appropriations for certain programs under the Fish and Wildlife Act of 1956.

Fish and Wildlife Act of 1956, amendment

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That subsection (c) of section 4 of the Fish and Wildlife Act of 1956 (16 U.S.C. 742c(c)) (relating to loan authority to finance the acquisition, equipping, and maintenance of commercial fishing vessels and gear) is amended by striking out "September 30, 1982" each place it appears therein and inserting in lieu thereof "September 30, 1983".

SEC. 2. Subsection (c)(6) of section 7 of the Fish and Wildlife Act of 1956 (16 U.S.C. 742f(c)(6)) (relating to volunteer services in fish and wildlife programs) is amended by striking out "and 1982," and inserting in lieu thereof "1982 and 1983.".

Approved October 18, 1982.

LEGISLATIVE HISTORY—H.R. 5662:

HOUSE REPORT No. 97-514 (Comm. on Merchant Marine and Fisheries).
CONGRESSIONAL RECORD, Vol. 128 (1982):
June 8, considered and passed House.
Oct. 1, considered and passed Senate.

Public Law 97-348
97th Congress

An Act

To protect and conserve fish and wildlife resources, and for other purposes.

Oct. 18, 1982
[S. 1018]

Coastal Barrier Resources Act.
16 USC 3501 note.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Coastal Barrier Resources Act".

SEC. 2. FINDINGS AND PURPOSE.

16 USC 3501.

(a) FINDINGS.—The Congress finds that—

(1) coastal barriers along the Atlantic and Gulf coasts of the United States and the adjacent wetlands, marshes, estuaries, inlets and nearshore waters provide—

(A) habitats for migratory birds and other wildlife; and

(B) habitats which are essential spawning, nursery, nesting, and feeding areas for commercially and recreationally important species of finfish and shellfish, as well as other aquatic organisms such as sea turtles;

(2) coastal barriers contain resources of extraordinary scenic, scientific, recreational, natural, historic, archeological, cultural, and economic importance; which are being irretrievably damaged and lost due to development on, among, and adjacent to, such barriers;

(3) coastal barriers serve as natural storm protective buffers and are generally unsuitable for development because they are vulnerable to hurricane and other storm damage and because natural shoreline recession and the movement of unstable sediments undermine manmade structures;

(4) certain actions and programs of the Federal Government have subsidized and permitted development on coastal barriers and the result has been the loss of barrier resources, threats to human life, health, and property, and the expenditure of millions of tax dollars each year; and

(5) a program of coordinated action by Federal, State, and local governments is critical to the more appropriate use and conservation of coastal barriers.

(b) PURPOSE.—The Congress declares that it is the purpose of this Act to minimize the loss of human life, wasteful expenditure of Federal revenues, and the damage to fish, wildlife, and other natural resources associated with the coastal barriers along the Atlantic and Gulf coasts by restricting future Federal expenditures and financial assistance which have the effect of encouraging development of coastal barriers, by establishing a Coastal Barrier Resources System, and by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved.

SEC. 3. DEFINITIONS.

16 USC 3502.

For purposes of this Act—

(1) The term "undeveloped coastal barrier" means—

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

(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;

but only if such feature and associated habitats (i) contain few manmade structures and these structures, and man's activities on such feature and within such habitats, do not significantly impede geomorphic and ecological processes, and (ii) are not 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.

26 USC 170

(2) The term "Committees" refers to the Committee on Merchant Marine and Fisheries of the House of Representatives and the Committee on Environment and Public Works of the Senate.

(3) The term "financial assistance" means any form of loan, grant, guaranty, insurance, payment, rebate, subsidy, or any other form of direct or indirect Federal assistance other than—

(A) general revenue-sharing grants made under section 102 of the State and Local Fiscal Assistance Amendments of 1972 (31 U.S.C. 1221);

(B) deposit or account insurance for customers of banks, savings and loan associations, credit unions, or similar institutions;

(C) the purchase of mortgages or loans by the Government National Mortgage Association, the Federal National Mortgage Association, or the Federal Home Loan Mortgage Corporation;

(D) assistance for environmental studies, planning, and assessments that are required incident to the issuance of permits or other authorizations under Federal law; and

(E) assistance pursuant to programs entirely unrelated to development, such as any Federal or federally assisted public assistance program or any Federal old-age survivors or disability insurance program.

Effective date

Effective October 1, 1983, such term includes flood insurance described in section 1321 of the National Flood Insurance Act of 1968, as amended (42 U.S.C. 4028).

82 Stat. 572

(4) The term "Secretary" means the Secretary of the Interior.

(5) The term "System unit" means any undeveloped coastal barrier, or combination of closely-related undeveloped coastal barriers, included within the Coastal Barrier Resources System established by section 4.

16 USC 3503

SEC. 4. THE COASTAL BARRIER RESOURCES SYSTEM.

(a) ESTABLISHMENT.—(1) There is established the Coastal Barrier Resources System which shall consist of those undeveloped coastal barriers located on the Atlantic and Gulf coasts of the United States that are identified and generally depicted on the maps that are entitled "Coastal Barrier Resources System", numbered A01 through T12, and dated September 30, 1982.

(2) Any person or persons or other entity owning or controlling land on an undeveloped coastal barrier, associated landform or any portion thereof not within the Coastal Barrier Resources System established under paragraph (1) may, within one year after the date of enactment of this Act, elect to have such land included within the Coastal Barrier Resources System. This election shall be made in compliance with regulations established for this purpose by the Secretary not later than one hundred and eighty days after the date of enactment of this Act; and, once made and filed in accordance with the laws regulating the sale or other transfer of land or other real property of the State in which such land is located, shall have the same force and effect as if such land had originally been included within the Coastal Barrier Resources System.

(b)(1) As soon as practicable after the enactment of this Act, the maps referred to in paragraph (1) of subsection (a) shall be filed with the Committees by the Secretary, and each such map shall have the same force and effect as if included in this Act, except that correction of clerical and typographical errors in each such map may be made. Each such map shall be on file and available for public inspection in the Office of the Director of the United States Fish and Wildlife Service, Department of the Interior, and in other appropriate offices of the Service.

Maps, filing

Public inspection

(2) As soon as practicable after the date of the enactment of this Act, the Secretary shall provide copies of the maps referred to in paragraph (1) of subsection (a) to the chief executive officer of (A) each State and county or equivalent jurisdiction in which a system unit is located, (B) each State coastal zone management agency in those States which have a coastal zone management plan approved pursuant to section 306 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1455) and in which a system unit is located, and (C) each appropriate Federal agency.

Copies, distribution

(c) BOUNDARY MODIFICATIONS.—(1) Within 180 days after the date of enactment of this Act, the Secretary may make such minor and technical modifications to the boundaries of system units as depicted on the maps referred to in paragraph (1) of subsection (a) as are consistent with the purposes of this Act and necessary to clarify the boundaries of said system units; except that, for system units within States which have, on the date of enactment, a coastal zone management plan approved pursuant to section 306 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1455)—

(A) each appropriate State coastal zone management agency may, within 90 days after the date of enactment of this Act, submit to the Secretary proposals for such minor and technical modifications; and

(B) the Secretary may, within 180 days after the date of enactment of this Act, make such minor and technical modifications to the boundaries of such system units.

(2) The Secretary shall, not less than 30 days prior to the effective date of any such boundary modification made under the authority of paragraph (1), submit written notice of such modification to (A) each of the Committees and (B) each of the appropriate officers referred to in paragraph (2) of subsection (b).

Notice submittal

(3) The Secretary shall conduct, at least once every five years, a review of the maps referred to in paragraph (1) of subsection (a) and make, in consultation with the appropriate officers referred to in

Review

paragraph (2) of subsection (b), such minor and technical modifications to the boundaries of system units as are necessary solely to reflect changes that have occurred in the size or location of any system units as a result of natural forces.

(4) If, in the case of any minor and technical modification to the boundaries of system units made under the authority of this subsection, an appropriate chief executive officer of a State, county or equivalent jurisdiction, or State coastal zone management agency to which notice was given in accordance with this subsection files comments disagreeing with all or part of the modification and the Secretary makes a modification which is in conflict with such comments, or if the Secretary fails to adopt a modification pursuant to a proposal submitted by an appropriate State coastal zone management agency under paragraph (1)(A), the Secretary shall submit to the chief executive officer a written justification for his failure to make modifications consistent with such comments or proposals.

16 USC 3504

SEC. 6. LIMITATIONS ON FEDERAL EXPENDITURES AFFECTING THE SYSTEM.

(a) Except as provided in section 6, no new expenditures or new financial assistance may be made available under authority of any Federal law for any purpose within the Coastal Barrier Resources System, including, but not limited to—

(1) the construction or purchase of any structure, appurtenance, facility, or related infrastructure;

(2) the construction or purchase of any road, airport, boat landing facility, or other facility on, or bridge or causeway to, any System unit; and

(3) the carrying out of any project to prevent the erosion of, or to otherwise stabilize, any inlet, shoreline, or inshore area, except that such assistance and expenditures may be made available on units designated pursuant to section 4 on maps numbered S01 through S08 for purposes other than encouraging development and, in all units, in cases where an emergency threatens life, land, and property immediately adjacent to that unit.

(b) An expenditure or financial assistance made available under authority of Federal law shall, for purposes of this Act, be a new expenditure or new financial assistance if—

(1) in any case with respect to which specific appropriations are required, no money for construction or purchase purposes was appropriated before the date of the enactment of this Act; or

(2) no legally binding commitment for the expenditure or financial assistance was made before such date of enactment.

16 USC 3505

SEC. 6. EXCEPTIONS.

(a) Notwithstanding section 5, the appropriate Federal officer, after consultation with the Secretary, may make Federal expenditures or financial assistance available within the Coastal Barrier Resources System for—

(1) any use or facility necessary for the exploration, extraction, or transportation of energy resources which can be carried out only on, in, or adjacent to coastal water areas because the use or facility requires access to the coastal water body;

(2) the maintenance of existing channel improvements and related structures, such as jetties, and including the disposal of dredge materials related to such improvements;

(3) the maintenance, replacement, reconstruction, or repair, but not the expansion, of publicly-owned or publicly-operated roads, structures, or facilities that are essential links in a larger network or system;

(4) military activities essential to national security;

(5) the construction, operation, maintenance, and rehabilitation of Coast Guard facilities and access thereto; and

(6) any of the following actions or projects, but only if the making available of expenditures or assistance therefor is consistent with the purposes of this Act:

(A) Projects for the study, management, protection and enhancement of fish and wildlife resources and habitats, including, but not limited to, acquisition of fish and wildlife habitats and related lands, stabilization projects for fish and wildlife habitats, and recreational projects.

(B) The establishment, operation, and maintenance of air and water navigation aids and devices, and for access thereto.

(C) Projects under the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 460l-4 through 11) and the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.). 16 USC 460l-4

(D) Scientific research, including but not limited to aeronautical, atmospheric, space, geologic, marine, fish and wildlife and other research, development, and applications.

(E) Assistance for emergency actions essential to the saving of lives and the protection of property and the public health and safety, if such actions are performed pursuant to sections 305 and 306 of the Disaster Relief Act of 1974 (42 U.S.C. 5145 and 5146) and section 1362 of the National Flood Insurance Act of 1968 (42 U.S.C. 4103) and are limited to actions that are necessary to alleviate the emergency.

(F) The maintenance, replacement, reconstruction, or repair, but not the expansion, of publicly owned or publicly operated roads, structures, or facilities.

(G) Nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore natural stabilization systems.

(b) For purposes of subsection (a)(2), a channel improvement or a related structure shall be treated as an existing improvement or an existing related structure only if all, or a portion, of the moneys for such improvement or structure was appropriated before the date of the enactment of this Act.

SEC. 7. CERTIFICATION OF COMPLIANCE. 16 USC 3506

The Director of the Office of Management and Budget shall, on behalf of each Federal agency concerned, make written certification that each such agency has complied with the provisions of this Act during each fiscal year beginning after September 30, 1982. Such certification shall be submitted on an annual basis to the House of Representatives and the Senate pursuant to the schedule required under the Congressional Budget and Impoundment Control Act of 1974. Submittal to Congress. 31 USC 1301 note.

16 USC 3147

SEC. 6. PRIORITY OF LAWS.

Nothing contained in this Act shall be construed as indicating an intent on the part of the Congress to change the existing relationship of other Federal laws to the law of a State, or a political subdivision of a State, or to relieve any person of any obligation imposed by any law of any State, or political subdivision of a State. No provision of this Act shall be construed to invalidate any provision of State or local law unless there is a direct conflict between such provision and the law of the State, or political subdivision of the State, so that the two cannot be reconciled or consistently stand together. This Act shall in no way be interpreted to interfere with a State's right to protect, rehabilitate, preserve, and restore lands within its established boundary.

16 USC 3148

SEC. 9. SEPARABILITY.

If any provision of this Act or the application thereof to any person or circumstance is held invalid, the remainder of the Act and the application of such provision to other persons not similarly situated or to other circumstances shall not be affected thereby.

16 USC 3149

SEC. 10. REPORTS TO CONGRESS.

(a) IN GENERAL.—Before the close of the 3-year period beginning on the date of the enactment of this Act, the Secretary shall prepare and submit to the Committees a report regarding the System.

(b) CONSULTATION IN PREPARING REPORT.—The Secretary shall prepare the report required under subsection (a) in consultation with the Governors of the States in which System units are located and with the coastal zone management agencies of the States in which System units are located and after providing opportunity for, and considering, public comment.

(c) REPORT CONTENT.—The report required under subsection (a) shall contain—

(1) recommendations for the conservation of the fish, wildlife, and other natural resources of the System based on an evaluation and comparison of all management alternatives, and combinations thereof, such as State and local actions (including management plans approved under the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.)), Federal actions (including acquisition for administration as part of the National Wildlife Refuge System), and initiatives by private organizations and individuals;

(2) recommendations for additions to, or deletions from, the Coastal Barrier Resources System, and for modifications to the boundaries of System units;

(3) a summary of the comments received from the Governors of the States, State coastal zone management agencies, other government officials, and the public regarding the System; and

(4) an analysis of the effect, if any, that general revenue sharing grants made under section 102 of the State and Local Fiscal Assistance Amendments of 1972 (31 U.S.C. 1221) have had on undeveloped coastal barriers.

SEC. 11. AMENDMENTS REGARDING FLOOD INSURANCE.

96 Stat. 619

(a) Section 1321 of the National Flood Insurance Act of 1968 (42 U.S.C. 4028) is amended to read as follows:

"UNDEVELOPED COASTAL BARRIERS

"SEC. 1321. No new flood insurance coverage may be provided under this title on or after October 1, 1983, for any new construction or substantial improvements of structures located on any coastal barrier within the Coastal Barrier Resources System established by section 4 of the Coastal Barrier Resources Act. A federally insured financial institution may make loans secured by structures which are not eligible for flood insurance by reason of this section.".

Ante, p. 1654

(b) Section 341(d)(2) of the Omnibus Budget and Reconciliation Act of 1981 (Public Law 97-35) is repealed.

96 Stat. 358
42 USC 4028 note

SEC. 12. AUTHORIZATION OF APPROPRIATIONS.

16 USC 3150

There is authorized to be appropriated to the Department of the Interior $1,000,000 for the period beginning October 1, 1982, and ending September 30, 1985, for purposes of carrying out sections 4 and 10.

Approved October 18, 1982.

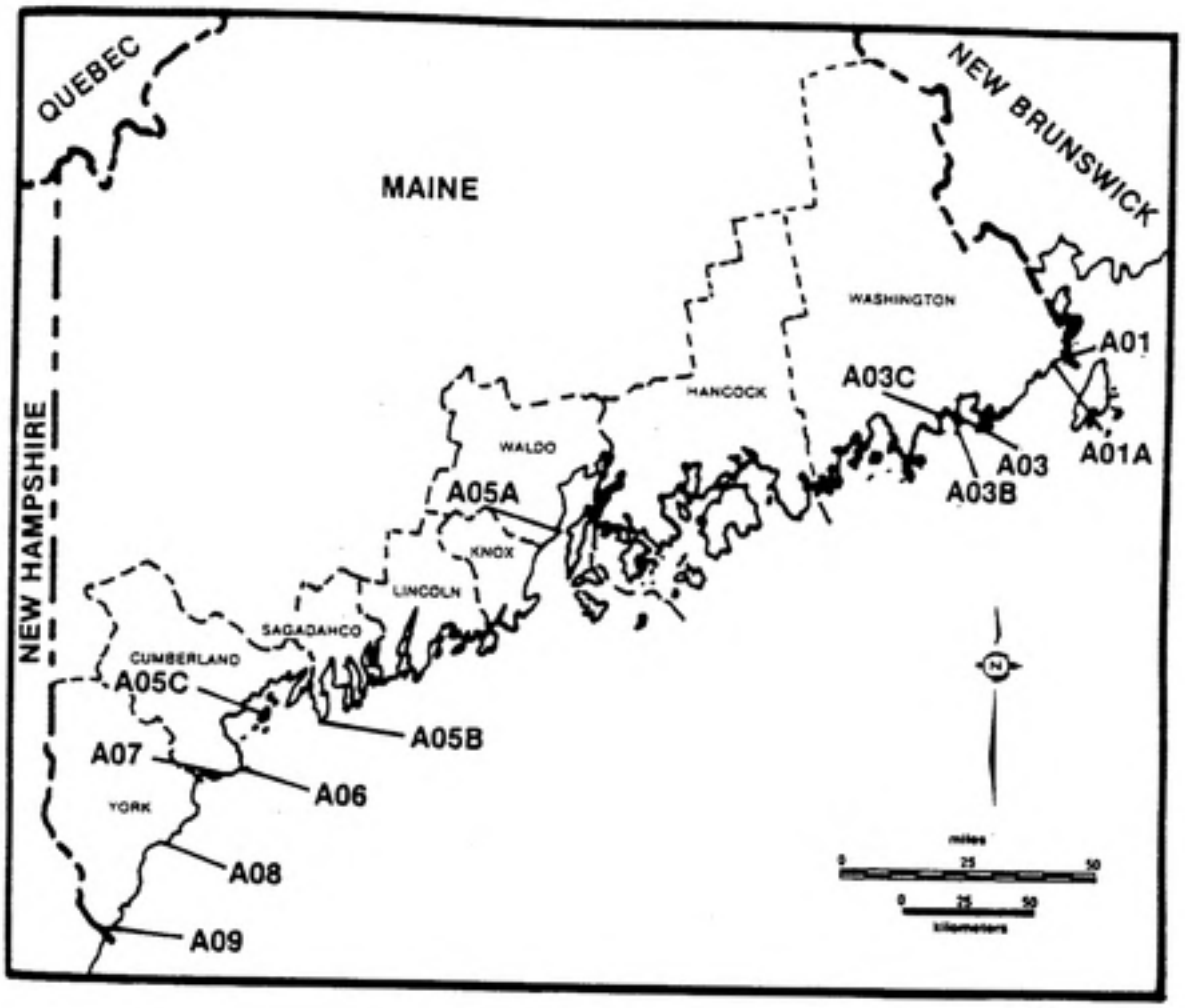
LEGISLATIVE HISTORY—S. 1018 (H.R. 3252):

HOUSE REPORTS: No. 97-841, pt. 1 accompanying H.R. 3252 (Comm. on Merchant Marine and Fisheries) and No. 97-918 (Comm. of Conference).
SENATE REPORT No. 97-419 (Comm. on Environment and Public Works).
CONGRESSIONAL RECORD, Vol. 128 (1982):
Sept. 23, considered and passed Senate.
Sept. 29, H.R. 3252 considered and passed House; S. 1018, amended, passed in lieu.
Oct. 1, Senate and House agreed to conference report.
WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 18, No. 42 (1982):
Oct. 18, Presidential statement.

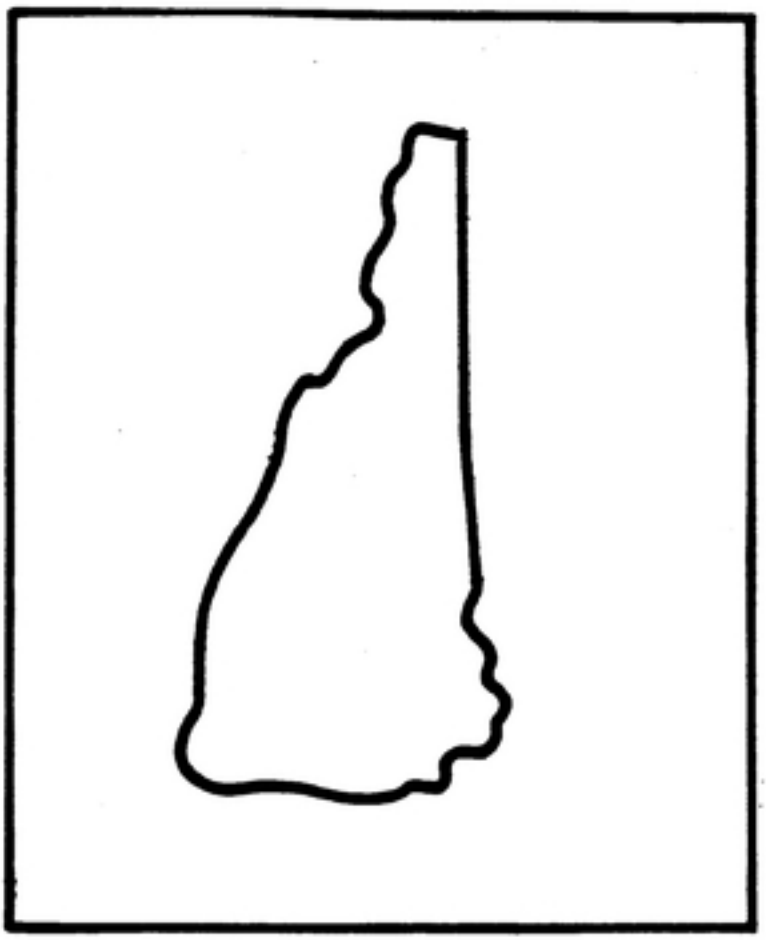
APPENDIX B

Appendix B **Coastal Barrier Resource System Units (Draft Maps), 1985**
Source: *Coastal Barrier Resource System Draft Report to Congress: Required by CBRA of 1982. United States Department of Interior. Washington, DC. April 1985.*

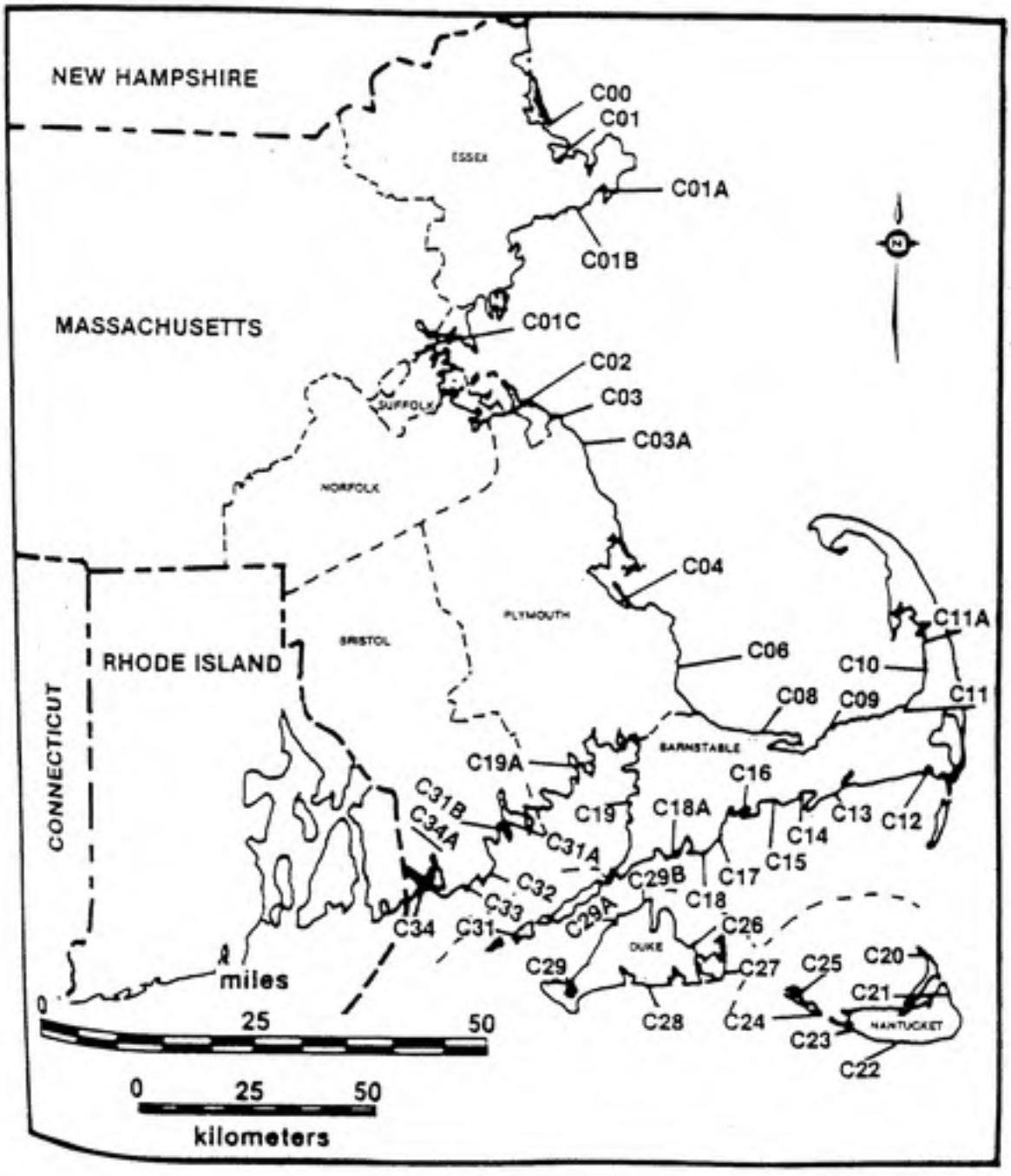
COASTAL BARRIER RESOURCES SYSTEM
MAINE UNITS



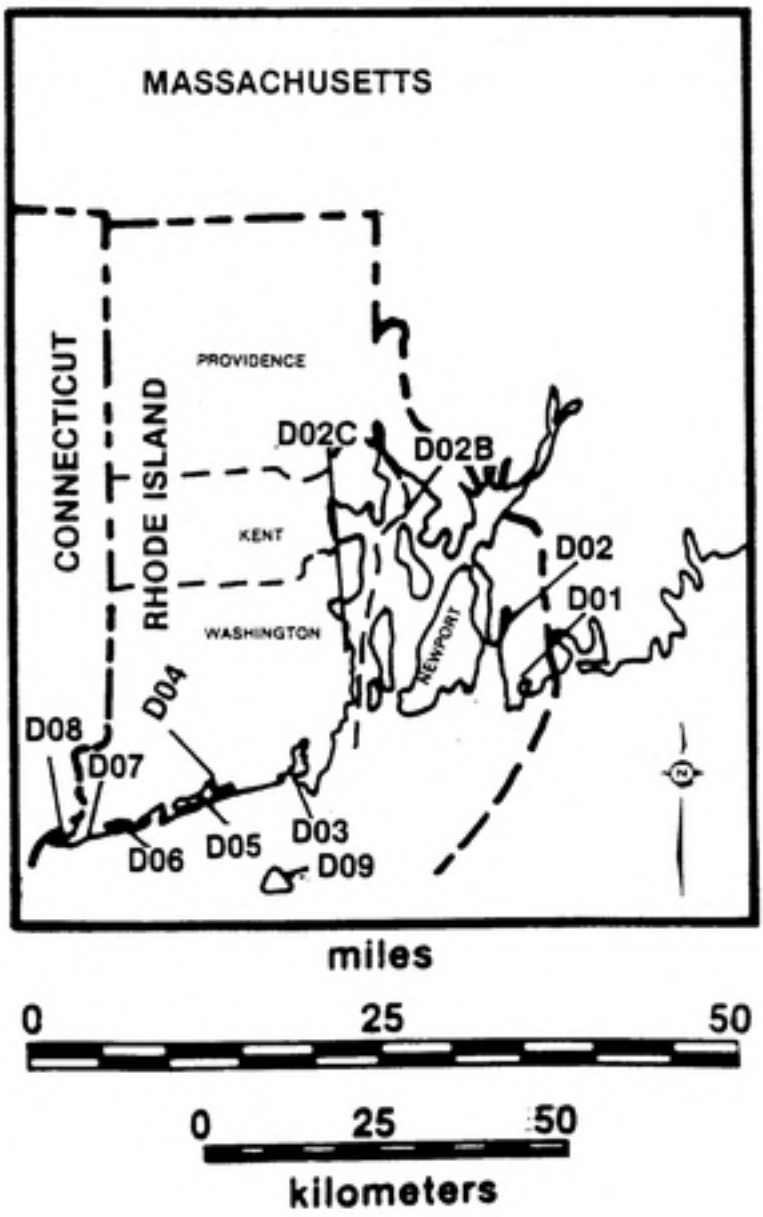
COASTAL BARRIER RESOURCES SYSTEM
NEW HAMPSHIRE



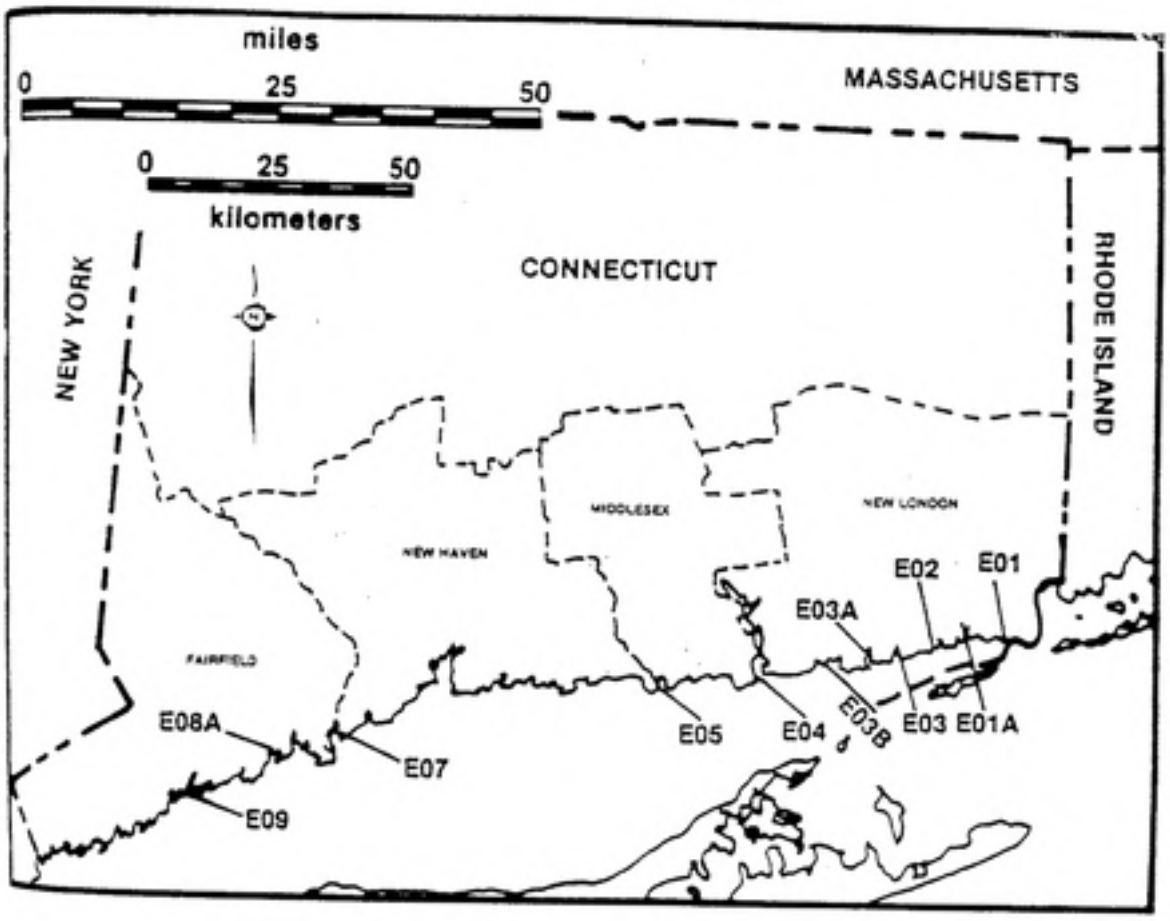
COASTAL BARRIER RESOURCES SYSTEM
MASSACHUSETTS UNITS



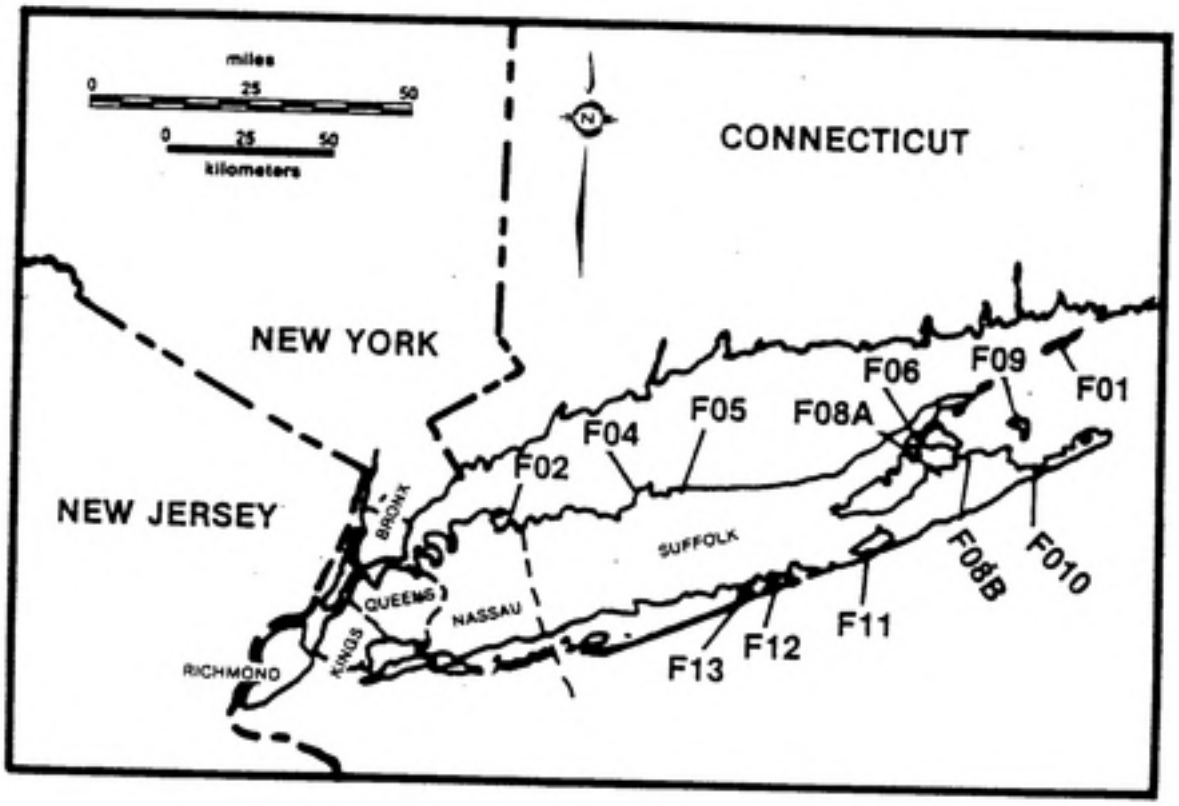
COASTAL BARRIER RESOURCES SYSTEM
RHODE ISLAND UNITS



COASTAL BARRIER RESOURCES SYSTEM
CONNECTICUT UNITS

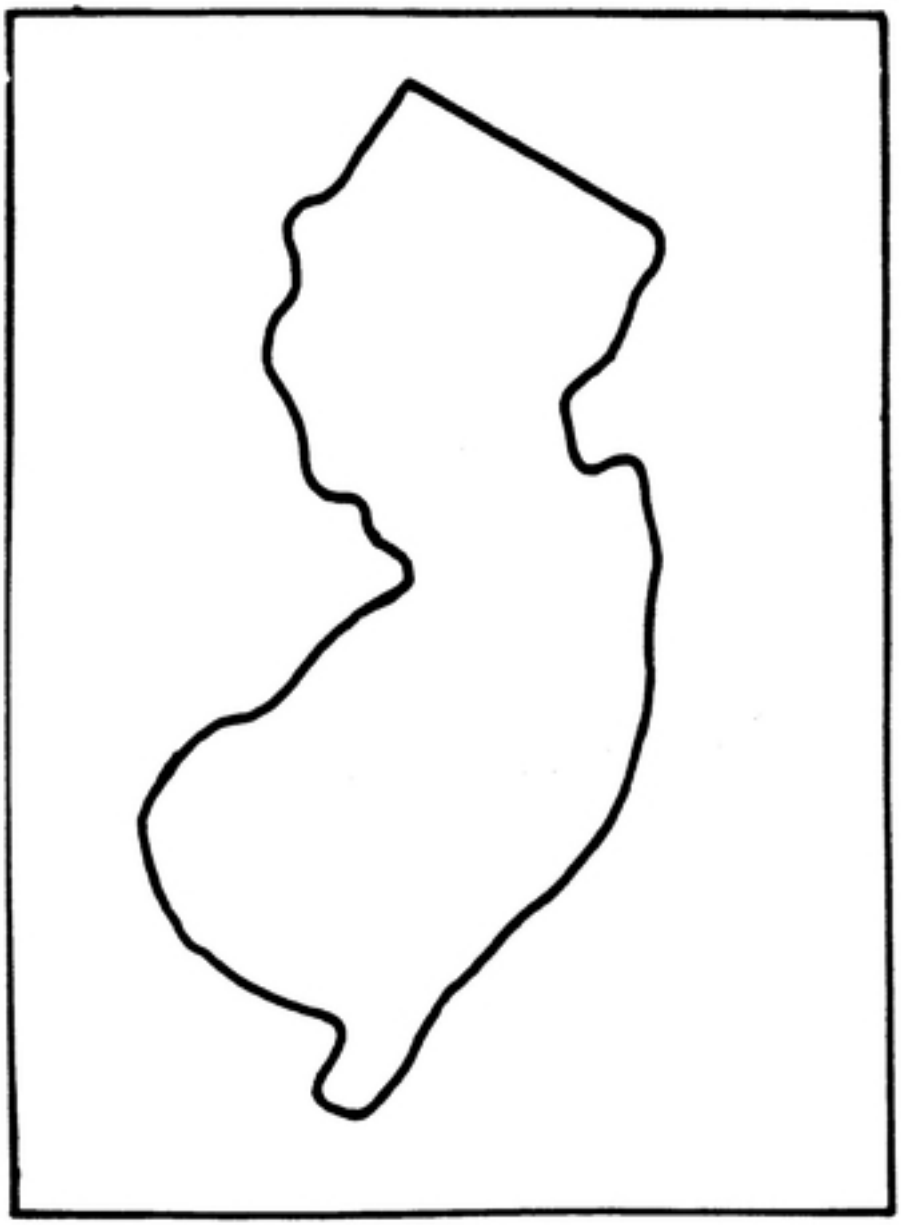


COASTAL BARRIER RESOURCES SYSTEM
NEW YORK UNITS

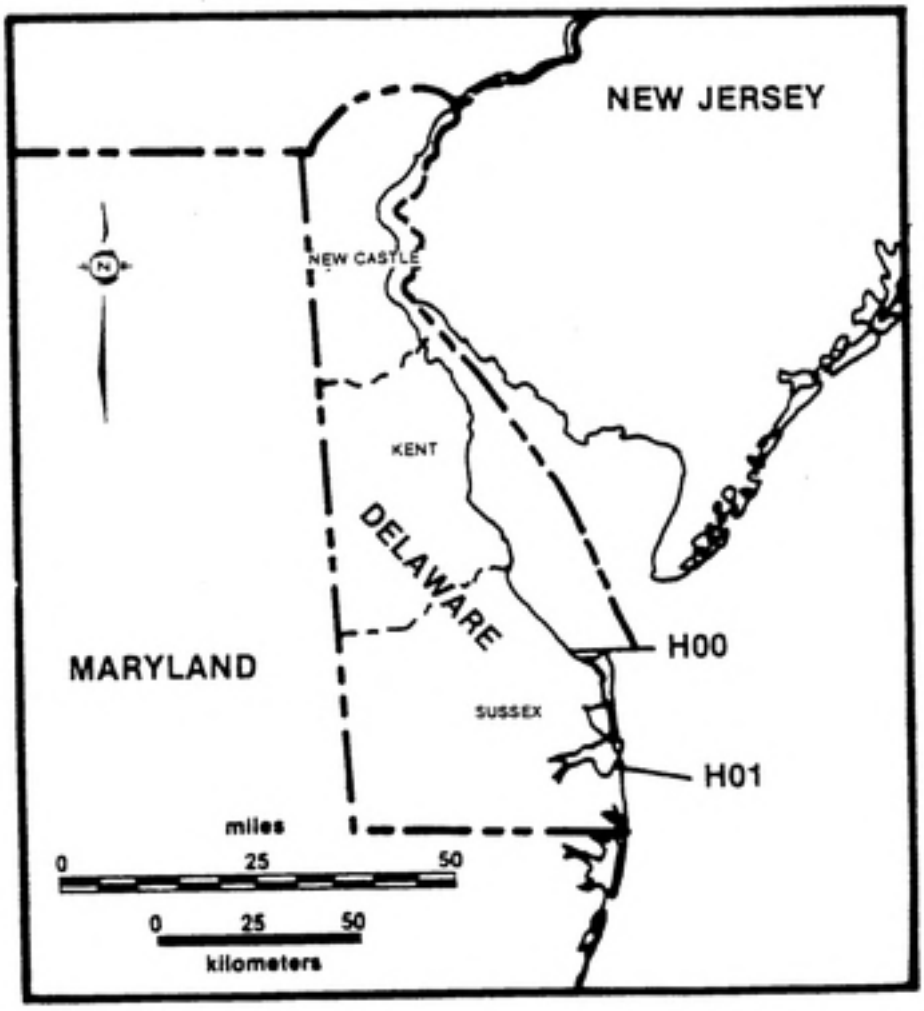


COASTAL BARRIER RESOURCES SYSTEM

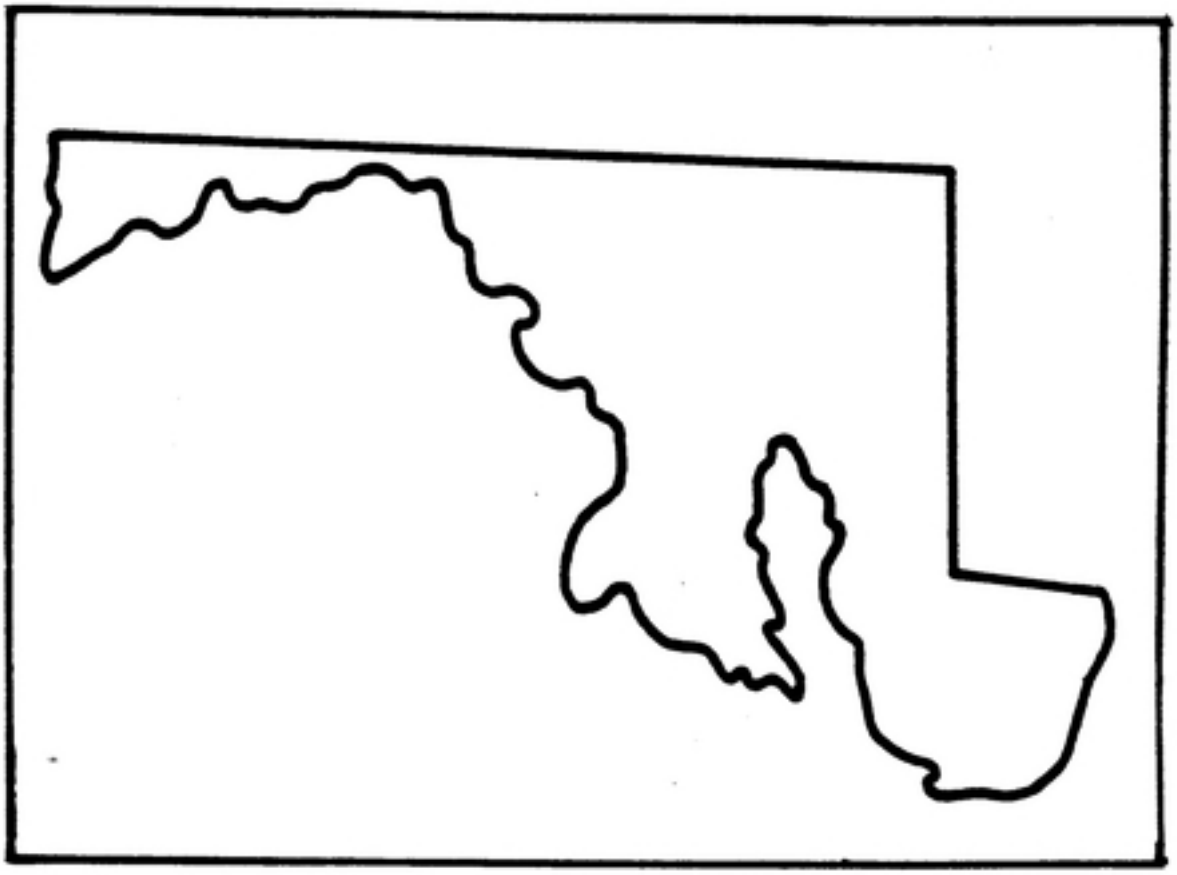
NEW JERSEY



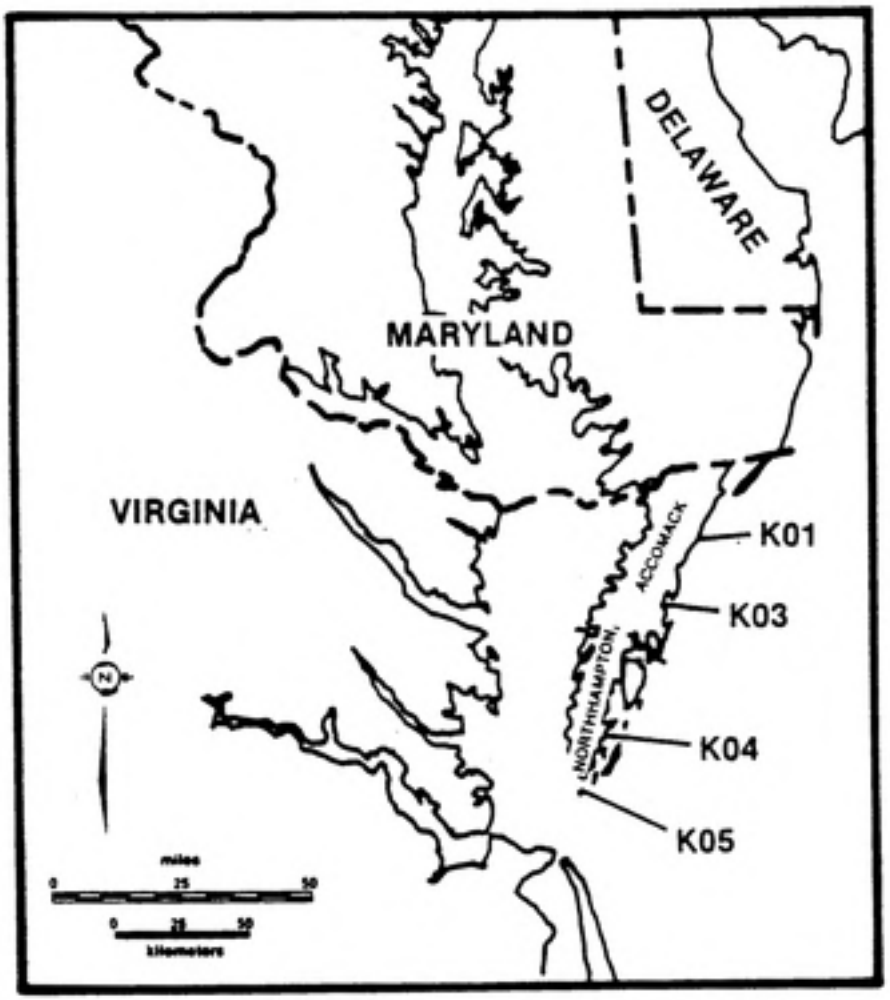
COASTAL BARRIER RESOURCES SYSTEM
DELAWARE UNITS



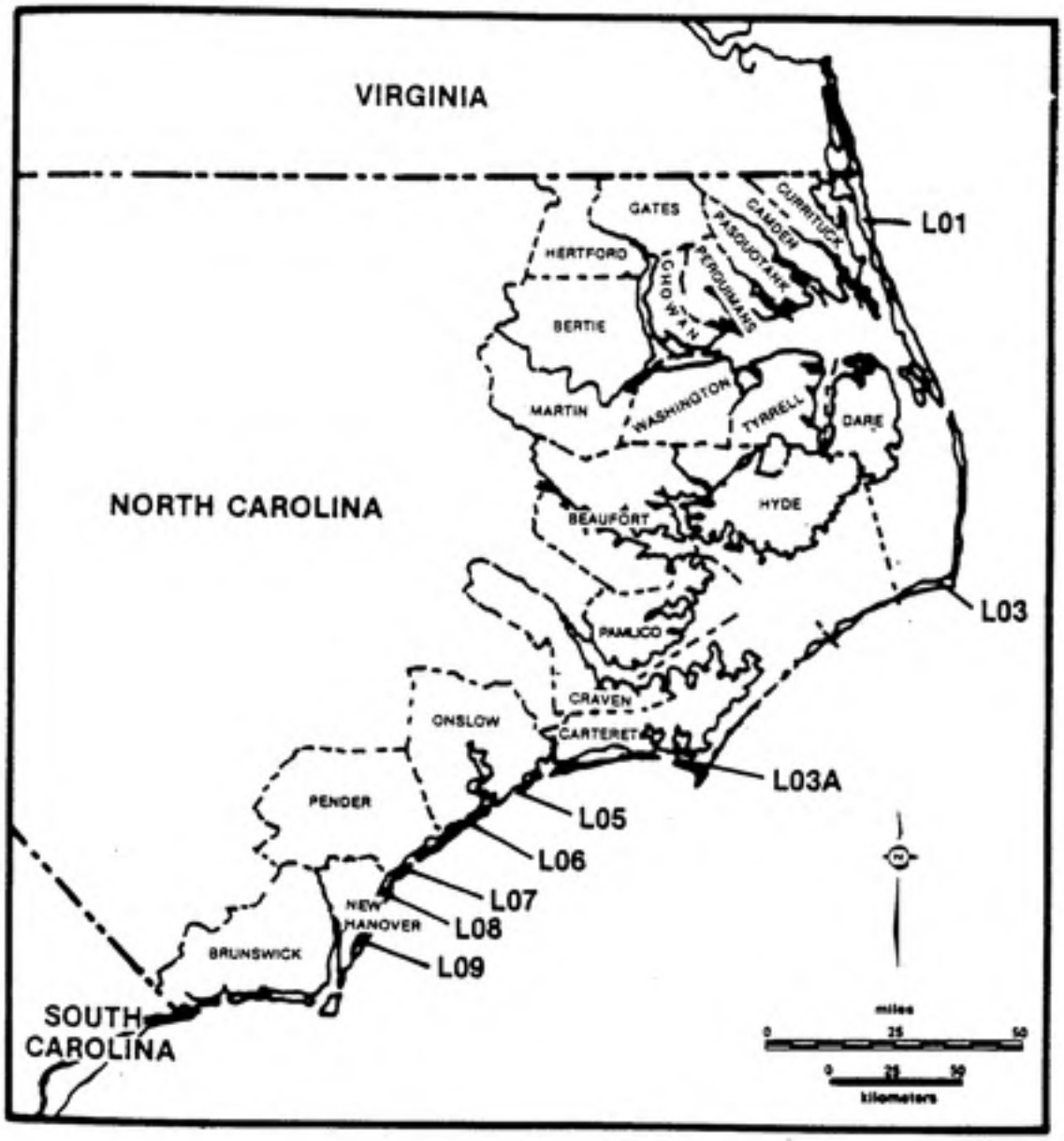
COASTAL BARRIER RESOURCES SYSTEM
MARYLAND



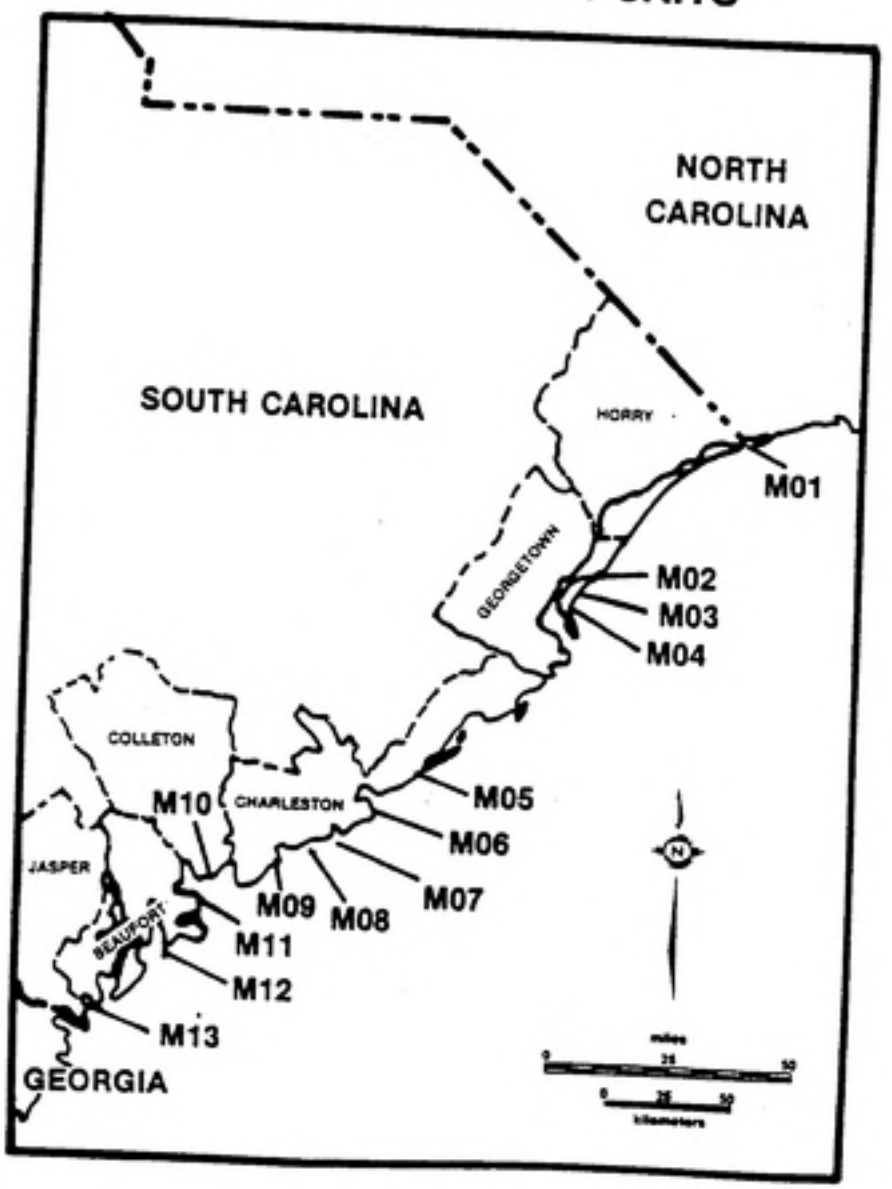
COASTAL BARRIER RESOURCES SYSTEM
VIRGINIA UNITS



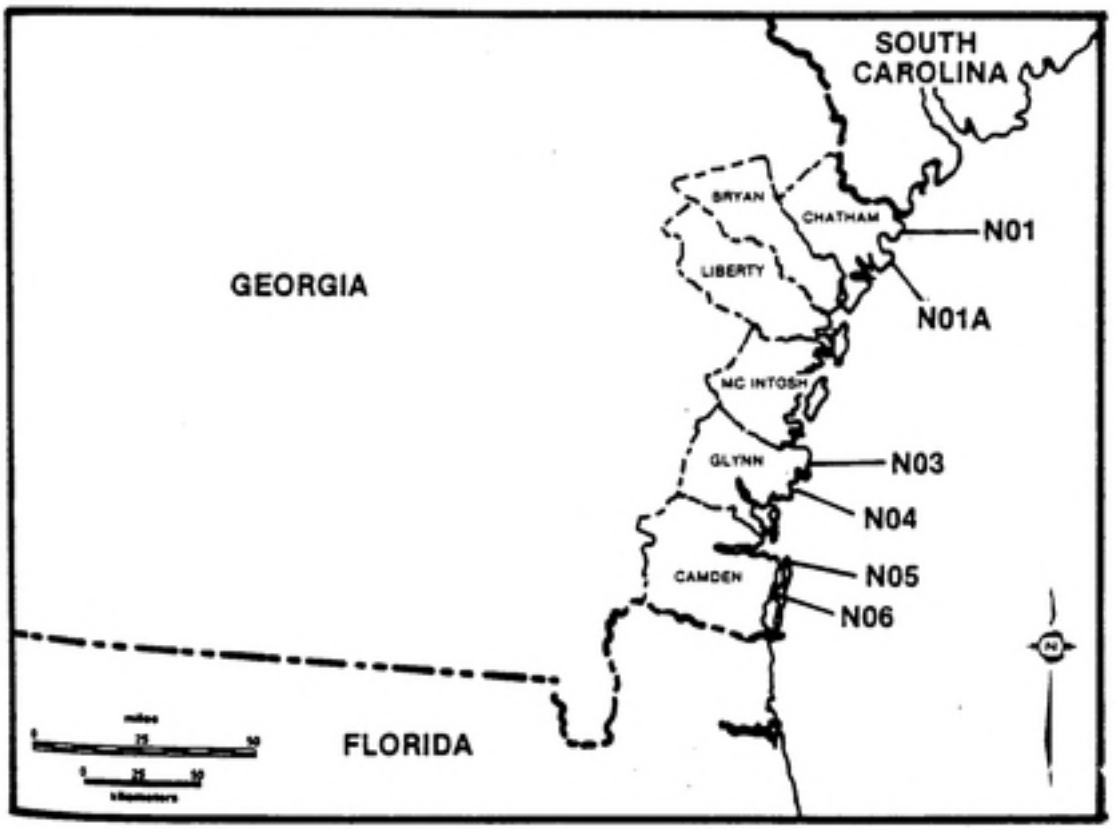
COASTAL BARRIER RESOURCES SYSTEM
NORTH CAROLINA UNITS



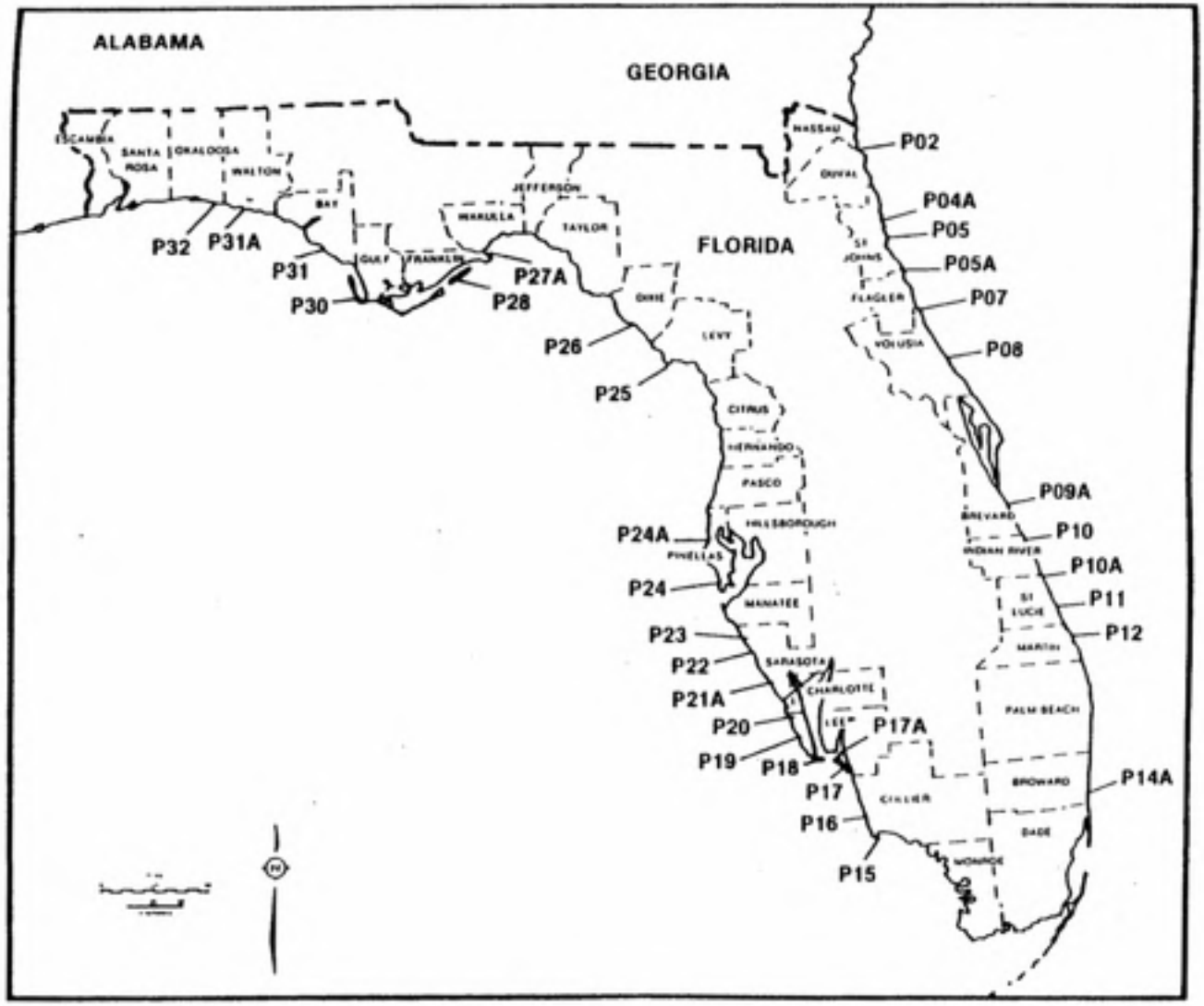
COASTAL BARRIER RESOURCES SYSTEM
SOUTH CAROLINA UNITS



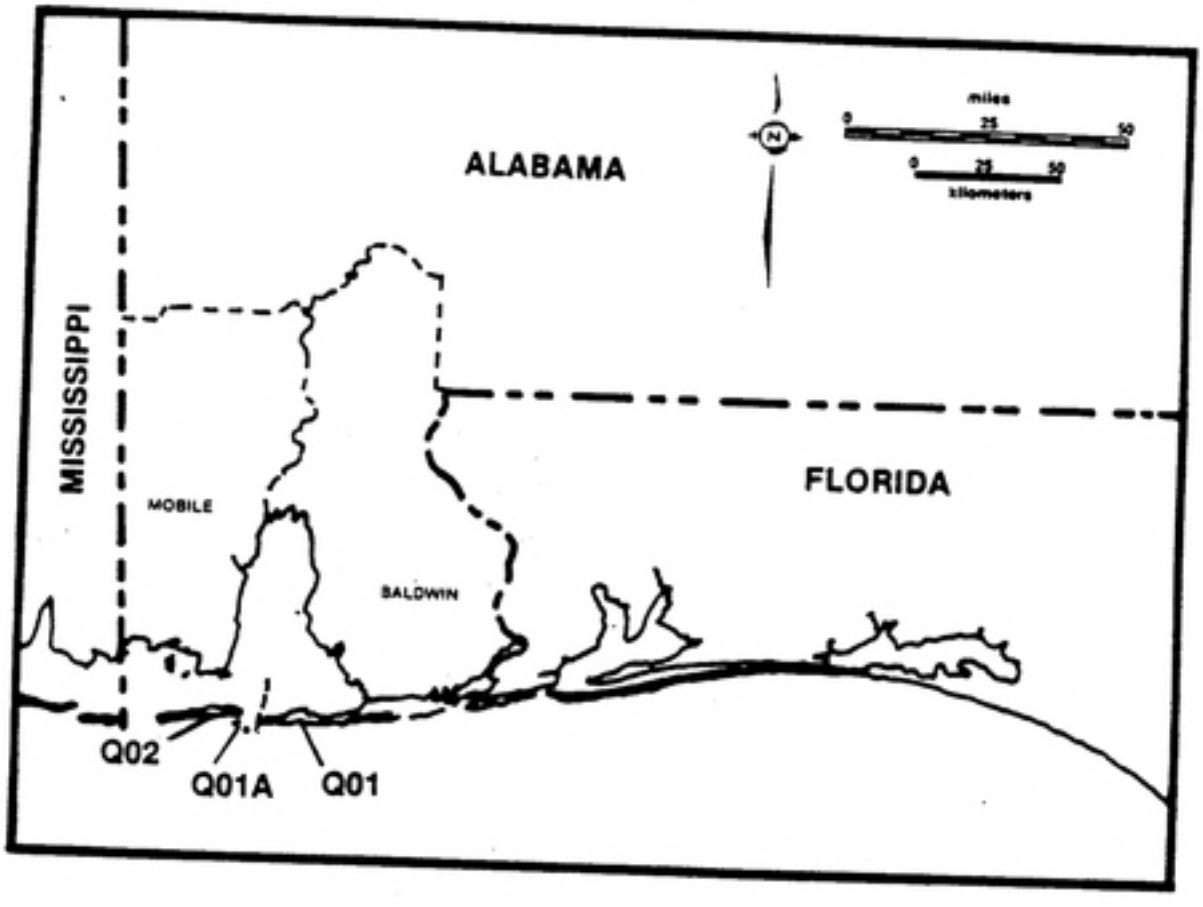
COASTAL BARRIER RESOURCES SYSTEM
GEORGIA UNITS



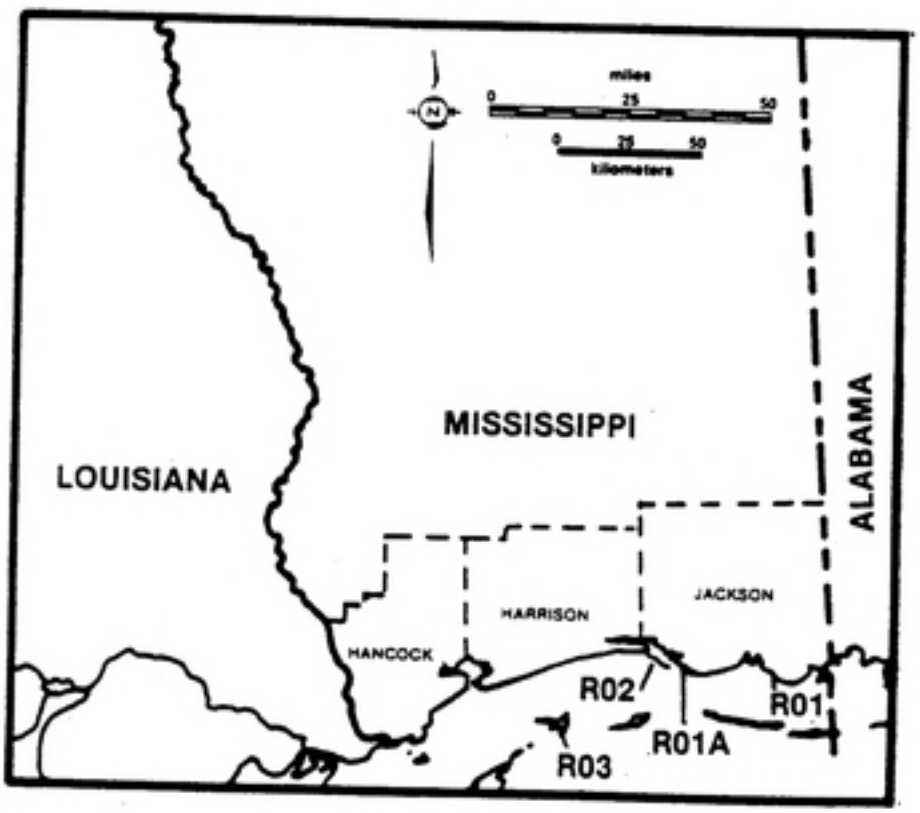
COASTAL BARRIER RESOURCES SYSTEM
FLORIDA UNITS



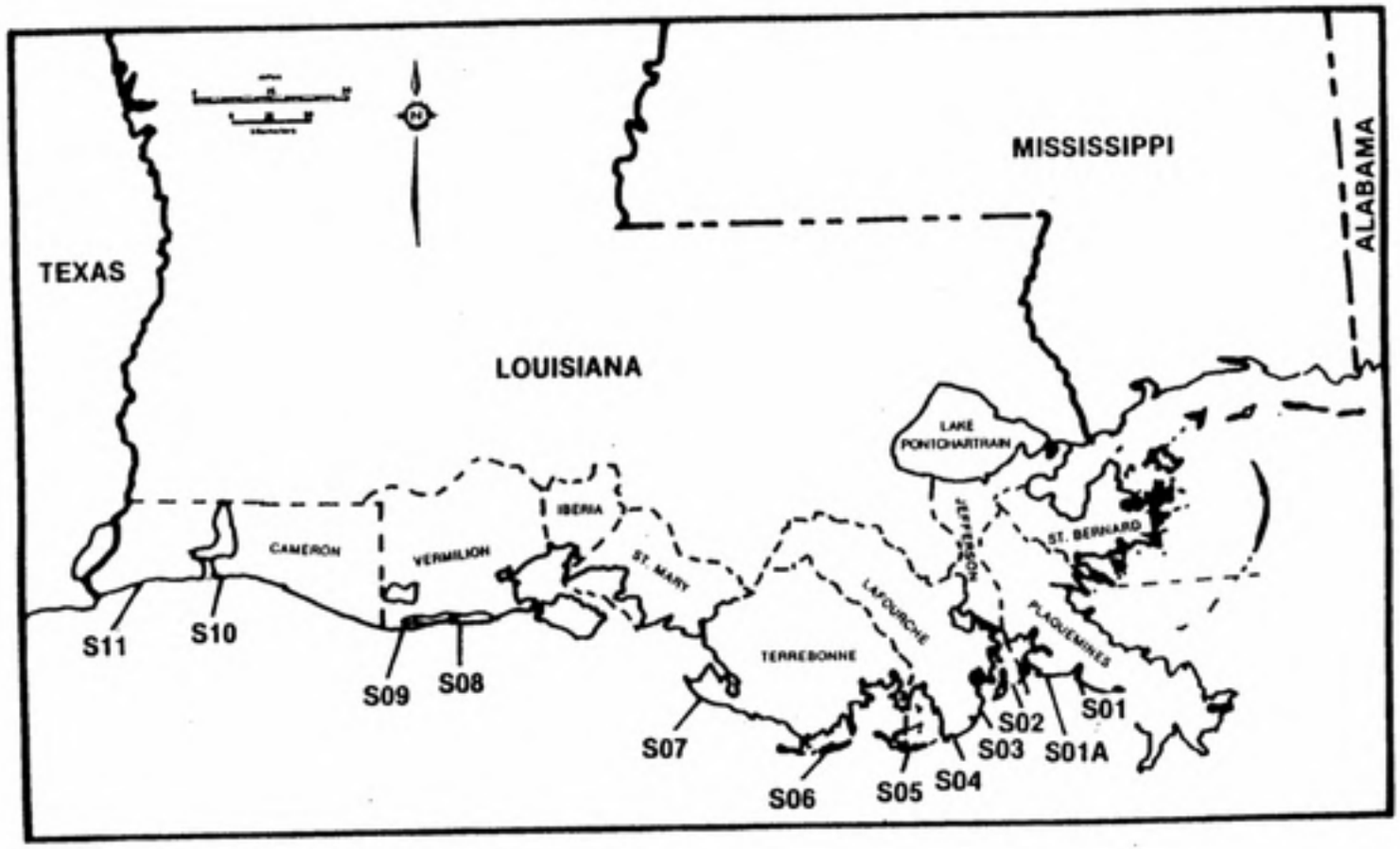
COASTAL BARRIER RESOURCES SYSTEM
ALABAMA UNITS



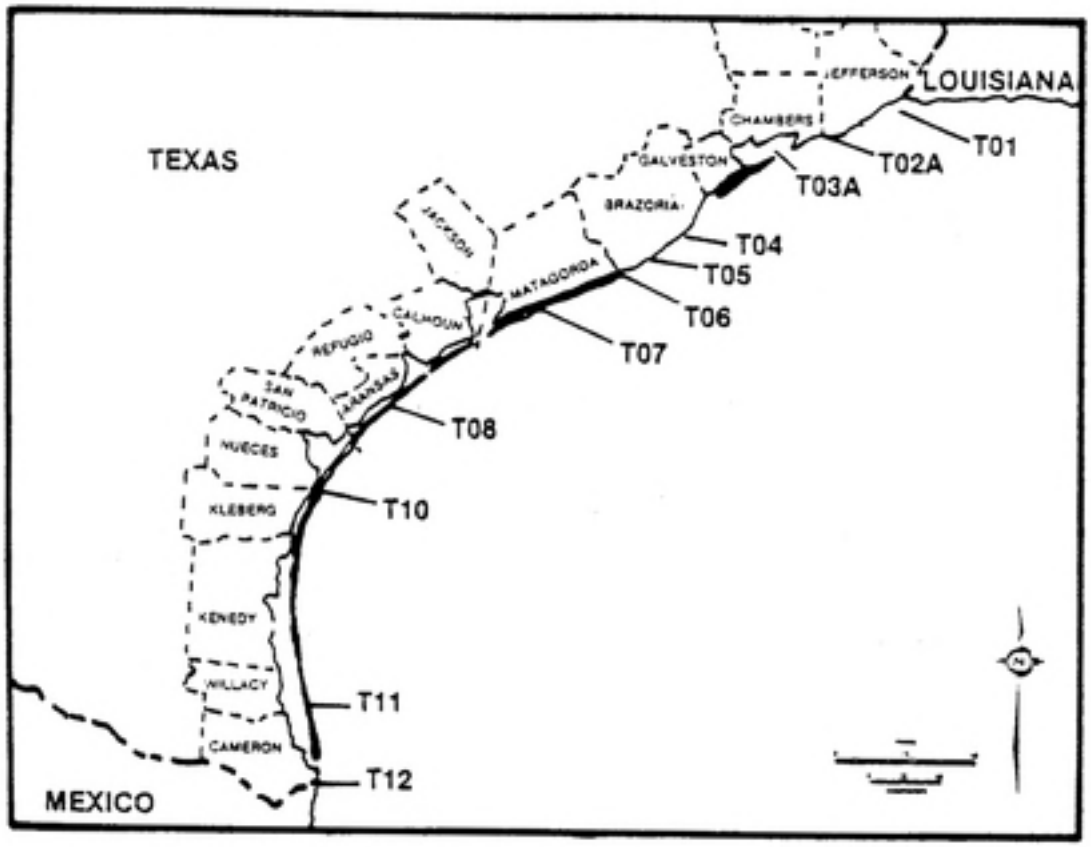
COASTAL BARRIER RESOURCES SYSTEM
MISSISSIPPI UNITS



COASTAL BARRIER RESOURCES SYSTEM
LOUISIANA UNITS



COASTAL BARRIER RESOURCES SYSTEM
TEXAS UNITS



APPENDIX C

Appendix C Coastal Barrier Improvement Act of 1990
Source: *CBIA Public Law 101-591, 1990, p2931-2942.*

(2) AMOUNT OF GRANT.—Subject to the extent of amounts made available in appropriations Act, the amount of a grant under subsection (a) shall be $50,000,000.

Approved November 16, 1990.

LEGISLATIVE HISTORY—H.R. 1602 (S. 15):

HOUSE REPORTS: No. 101-346 (Comm. on Energy and Commerce) and No. 101-656 (Comm. of Conference).
SENATE REPORTS: No. 101-292 accompanying S. 15 (Comm. on Labor and Human Resources).
CONGRESSIONAL RECORD:
Vol. 135 (1989): Nov. 14, considered and passed House.
Vol. 136 (1990): Oct. 17, S. 15 considered and passed Senate.
Oct. 18, H.R. 1602 considered and passed Senate, amended, in lieu of S. 15.
Oct. 26, House agreed to conference report.
Oct. 27, Senate agreed to conference report.

Public Law 101-591
101st Congress

An Act

To reauthorize the Coastal Barrier Resources Act, and for other purposes.

Nov. 16, 1990
[H.R. 2846]

Coastal Barrier Improvement Act of 1990.
16 USC 3501 note.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the "Coastal Barrier Improvement Act of 1990".

SEC. 2. DEFINITION AMENDMENTS.

(a) UNDEVELOPED COASTAL BARRIER.—The Coastal Barrier Resources Act is amended in section 3(1)(A) (16 U.S.C. 3502(1)(A))—
(1) by striking clause (i); and
(2) by redesignating clauses (ii) and (iii) as clauses (i) and (ii), respectively.

(b) SYSTEM MAPS; SYSTEM.—
(1) REPEAL AND ADDITION OF DEFINITION.—Section 3(6) of the Coastal Barrier Resources Act (16 U.S.C. 3502(6)) is amended to read as follows:
"(6) The term 'System' means the Coastal Barrier Resources System established by section 4(a).".
(2) CONFORMING AMENDMENTS.—Section 5 of the Coastal Barrier Resources Act (16 U.S.C. 3504) is amended—
(A) in subsection (a), by striking "Coastal Barrier Resources";
(B) in subsection (b)(1), by striking "of the enactment of this Act" and inserting in lieu thereof "on which the relevant System unit or portion of the System unit was included within the System under this Act or the Coastal Barrier Improvement Act of 1990"; and
(C) at the end of subsection (b)(2), by striking "of enactment".

(c) OTHERWISE PROTECTED AREAS.—Section 3(1) of the Act (16 U.S.C. 3502(1)) is amended—
(1) by striking "(i)" immediately before "contain few"; and
(2) by inserting a period immediately following "ecological processes" and striking the balance of the sentence.

SEC. 3. COASTAL BARRIER RESOURCES SYSTEM, GENERALLY.

Section 4 of the Coastal Barrier Resources Act (16 U.S.C. 3503) is amended to read as follows:

"SEC. 4. ESTABLISHMENT OF COASTAL BARRIER RESOURCES SYSTEM.

"(a) ESTABLISHMENT.—There is established the Coastal Barrier Resources System, which shall consist of those undeveloped coastal barriers and other areas located on the coasts of the United States that are identified and generally depicted on the maps on file with the Secretary entitled 'Coastal Barrier Resources System', dated

October 24, 1990, as such maps may be revised by the Secretary under section 4 of the Coastal Barrier Improvement Act of 1990.

"(b) SYSTEM MAPS.—The Secretary shall keep the maps referred to in subsection (a) on file and available for public inspection in the Office of the Director of the United States Fish and Wildlife Service, and in such other offices of that service as the Director considers appropriate.

Inter-governmental relations

"(c) BOUNDARY REVIEW AND MODIFICATION.—At least once every 5 years, the Secretary shall review the maps referred to in subsection (a) and shall make, in consultation with the appropriate State, local, and Federal officials, such minor and technical modifications to the boundaries of System units as are necessary solely to reflect changes that have occurred in the size or location of any System unit as a result of natural forces.".

16 USC 3503 note

SEC. 4. TECHNICAL REVISION OF MAPS; MODIFICATION OF BOUNDARIES; ADDITIONS TO SYSTEM.

(a) TECHNICAL REVISION OF MAPS AND PROVISION TO STATE AND LOCAL GOVERNMENT.—Not later than 180 days after the date of the enactment of this Act, the Secretary shall—

(1) make such technical revisions to the maps referred to in section 4(a) of the Coastal Barrier Resources Act (as amended by section 3 of this Act) as may be necessary to correct existing clerical and typographical errors in the maps; and

(2) provide copies of the maps, as so revised, to—

(A) each State and each local government in which is located a unit of the System;

(B) the coastal zone management agency of each State—

(i) in which is located a unit of the System; and

(ii) which has a coastal zone management program approved pursuant to section 306 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1455); and

(C) appropriate Federal agencies.

(b) RECOMMENDATIONS OF STATE AND LOCAL GOVERNMENTS FOR BOUNDARY MODIFICATIONS.—(1) Not later than 1 year after the date of the enactment of this Act—

(A) a local government in which is located a unit of the System and which is in a State which has a coastal zone management program approved pursuant to section 306 of the Coastal Zone Management Act of 1972 (16 U.S.C. 1455); and

(B) the coastal zone management agency of a State in which is located a unit of the System and which has such a program approved;

may each submit to the Secretary recommendations for minor and technical modifications to the boundaries of existing units of the System located in that local government or State, respectively.

(2) If, in the case of any minor and technical modification to the boundaries of System units made under the authority of subsection (d) of this section, an appropriate chief executive officer of a State, county or equivalent jurisdiction, or State coastal zone management agency to which notice was given in accordance with this subsection files comments disagreeing with all or part of the modification and the Secretary makes a modification which is in conflict with such comments, or if the Secretary fails to adopt a modification pursuant to a proposal submitted by an appropriate State coastal zone management agency under paragraph (1) of this subsection, the Secretary shall submit to the chief executive officer a written justification for the failure to make modifications consistent with such comments or proposals.

(c) ELECTIONS TO ADD TO SYSTEM.—

(1) PROVISION OF MAPS BY SECRETARY.—Not later than 180 days after the date of the enactment of this Act, the Secretary shall provide—

(A) to each local government in which is located an undeveloped coastal barrier not included within the System; and

(B) to the Governor of each State in which such an area is located;

maps depicting those undeveloped coastal barriers not included within the System located in that local government or State, respectively.

(2) ELECTIONS.—Not later than 18 months after the date of the enactment of this Act, a local government and the Governor of any State referred to in paragraph (1), and any qualified organization—

(A) may each elect to add to the System, as a new unit or as an addition to an existing unit, any area of qualified coastal barrier (or any portion thereof) which is owned or held by the local government, State, or qualified organization, respectively;

(B) shall notify the Secretary of that election; and

(C) shall submit to the Secretary a map depicting the area, if—

(i) the area (or portion) is not depicted on a map provided by the Secretary under paragraph (1); or

(ii) the local government, State, or qualified organization was not provided maps under paragraph (1).

(3) EFFECTIVE DATE OF ELECTION.—An area elected by a local government, Governor of a State, or qualified organization to be added to the System under this subsection shall be part of the System effective on the date on which the Secretary publishes notice in the Federal Register under subsection (e)(1)(C) with respect to that election.

(d) ADDITION OF EXCESS FEDERAL PROPERTY.—

(1) CONSULTATION AND DETERMINATION.—Prior to transfer or disposal of excess property under the Federal Property and Administrative Services Act of 1949 (40 U.S.C. 471 et seq.) that may be an undeveloped coastal barrier, the Administrator of General Services shall consult with and obtain from the Secretary a determination as to whether and what portion of the property constitutes an undeveloped coastal barrier. Not later than one hundred and eighty days after the initiation of such consultation, the Secretary shall make and publish notice of such determination. Immediately upon issuance of a positive determination, the Secretary shall—

(A) prepare a map depicting the undeveloped coastal barrier portion of such property; and

(B) shall publish in the Federal Register notice of the addition of such property to the System.

Federal Register, publication

(2) EFFECTIVE DATE OF INCLUSION.—An area to be added to the System under this subsection shall be part of the System effective on the date on which the Secretary publishes notice in the Federal Register under subsection (d)(1)(B) with respect to that area.

(3) REVISION OF MAPS.—As soon as practicable after the date on which a unit is added to the System under subsection (d)(2), the Secretary shall revise the maps referred to in section 4(a) of the Act (as amended by section 3 of this Act) to reflect each such addition.

(e) MODIFICATION OF BOUNDARIES, REVISION OF MAPS, AND PUBLICATION OF NOTICE.—

(1) IN GENERAL.—Not later than 2 years after the date of the enactment of this Act, the Secretary—

(A) based on recommendations submitted by local governments and State coastal zone management agencies under subsection (b), may make such minor and technical modifications to the boundaries of existing units of the System as are consistent with the purposes of the Coastal Barrier Resources Act (16 U.S.C. 3501 et seq.) and are necessary to clarify the boundaries of those units;

(B) shall revise the maps referred to in section 4(a) of the Act (as amended by section 3 of this Act)—

(i) to reflect those modifications; and

(ii) to reflect each election of a local government, Governor of a State, or qualified organization to add an area to the System pursuant to subsection (c); and

(C) shall publish in the Federal Register notice of each such modification or election.

Federal Register, publication

(2) EFFECTIVE DATE OF MODIFICATIONS.—A modification of the boundaries of a unit of the System under paragraph (1)(A) shall take effect on the date on which the Secretary published notice in the Federal Register under paragraph (1)(C) with respect to that modification.

(f) NOTIFICATION REGARDING MODIFICATIONS AND ELECTIONS.—Not less than 30 days before the effective date of any modification of the boundaries of a unit of the System under subsection (d)(1)(A), or of an election of a local government, Governor of a State, or qualified organization to add an area of qualified coastal barrier to the System pursuant to subsection (c) or of an addition to the System pursuant to subsection (d), the Secretary shall submit written notice of such modification or election to—

(1) the Committee on Merchant Marine and Fisheries of the House of Representatives and the Committee on Environment and Public Works of the Senate; and

(2) appropriate State and Federal officials.

SEC. 5. EXCEPTIONS TO LIMITATIONS ON FEDERAL EXPENDITURES.

(a) EXCEPTIONS GENERALLY.—Section 6 of the Coastal Barrier Resources Act (16 U.S.C. 3505) is amended to read as follows:

"SEC. 6. EXCEPTIONS TO LIMITATIONS ON EXPENDITURES.

"(a) IN GENERAL.—Notwithstanding section 5, the appropriate Federal officer, after consultation with the Secretary, may make Federal expenditures and may make financial assistance available within the System for the following:

"(1) Any use or facility necessary for the exploration, extraction, or transportation of energy resources which can be carried out only on, in, or adjacent to a coastal water area because the use or facility requires access to the coastal water body.

"(2) The maintenance or construction of improvements of existing Federal navigation channels (including the Intracoastal Waterway) and related structures (such as jetties), including the disposal of dredge materials related to such maintenance or construction.

"(3) The maintenance, replacement, reconstruction, or repair, but not the expansion, of publicly owned or publicly operated roads, structures, or facilities that are essential links in a larger network or system.

"(4) Military activities essential to national security.

"(5) The construction, operation, maintenance, and rehabilitation of Coast Guard facilities and access thereto.

"(6) Any of the following actions or projects, if a particular expenditure or the making available of financial assistance for the action or project is consistent with the purposes of this Act:

"(A) Projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats, including acquisition of fish and wildlife habitats and related lands, stabilization projects for fish and wildlife habitats, and recreational projects.

"(B) Establishment, operation, and maintenance of air and water navigation aids and devices, and for access thereto.

"(C) Projects under the Land and Water Conservation Fund Act of 1965 (16 U.S.C. 4601-4 through 11) and the Coastal Zone Management Act of 1972 (16 U.S.C. 1451 et seq.).

"(D) Scientific research, including aeronautical, atmospheric, space, geologic, marine, fish and wildlife, and other research, development, and applications.

"(E) Assistance for emergency actions essential to the saving of lives and the protection of property and the public health and safety, if such actions are performed pursuant to sections 402, 403, and 502 of the Disaster Relief and Emergency Assistance Act and section 1362 of the National Flood Insurance Act of 1968 (42 U.S.C. 4103) and are limited to actions that are necessary to alleviate the emergency.

"(F) Maintenance, replacement, reconstruction, or repair, but not the expansion (except with respect to United States route 1 in the Florida Keys), of publicly owned or publicly operated roads, structures, and facilities.

"(G) Nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore a natural stabilization system.

"(b) EXISTING FEDERAL NAVIGATION CHANNELS.—For purposes of subsection (a)(2), a Federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System unit or portion of the System unit was included within the System.

"(c) EXPANSION OF HIGHWAYS IN MICHIGAN.—The limitations on the use of Federal expenditures or financial assistance within the System under subsection (a)(3) shall not apply to a highway—

"(1) located in a unit of the System in Michigan; and

"(2) in existence on the date of the enactment of the Coastal Barrier Improvement Act of 1990.

"(d) SERVICES AND FACILITIES OUTSIDE SYSTEM.—

"(1) IN GENERAL.—Except as provided in paragraphs (2) and (3) of this subsection, limitations on the use of Federal expenditures or financial assistance within the System under section 5

shall not apply to expenditures or assistance provided for services or facilities and related infrastructure located outside the boundaries of unit T-11 of the System (as depicted on the maps referred to in section 4(a)) which relate to an activity within that unit.

"(2) PROHIBITION OF FLOOD INSURANCE COVERAGE.—No new flood insurance coverage may be provided under the National Flood Insurance Act of 1968 (42 U.S.C. 4001 et seq.) for any new construction or substantial improvements relating to services or facilities and related infrastructure located outside the boundaries of unit T-11 of the System that facilitate an activity within that unit that is not consistent with the purposes of this Act.

"(3) PROHIBITION OF HUD ASSISTANCE.—

"(A) IN GENERAL.—No financial assistance for acquisition, construction, or improvement purposes may be provided under any program administered by the Secretary of Housing and Urban Development for any services or facilities and related infrastructure located outside the boundaries of unit T-11 of the System that facilitate an activity within that unit that is not consistent with the purposes of this Act.

"(B) DEFINITION OF FINANCIAL ASSISTANCE.—For purposes of this paragraph, the term 'financial assistance' includes any contract, loan, grant, cooperative agreement, or other form of assistance, including the insurance or guarantee of a loan, mortgage, or pool of mortgages.".

(b) CONFORMING AMENDMENT.—Subsection (d) of section 204 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (16 U.S.C. 3505 note) is repealed.

(c) APPLICATION OF EXISTING LOUISIANA EXCEPTION.—Section 5(a)(3) of the Coastal Barrier Resources Act (16 U.S.C. 3504(a)(3)) is amended by inserting "and LA07" after "S01 through S06".

16 USC 3503 note

SEC. 6. PACIFIC COASTAL BARRIER PROTECTION STUDY AND MAPS.

IN GENERAL.—

(1) STUDY.—Not later than 6 months after the date of the enactment of this Act, the Secretary shall prepare and submit to the Committee on Merchant Marine and Fisheries of the House of Representatives and to the Committee on Environment and Public Works of the Senate a study which examines the need for protecting undeveloped coastal barriers along the Pacific coast of the United States south of 49 degrees north latitude through inclusion in the System. Such study shall examine—

(A) the potential for loss of human life and damage to fish, wildlife, other natural resources, and the potential for the wasteful expenditure of Federal revenues given the geologic differences of the coastal barriers along the Pacific coast as opposed to those found along the Atlantic and Gulf coasts; and

(B) the differences in extreme weather conditions which exist along the Pacific coast as opposed to those found along the Atlantic and Gulf coasts.

(2) PREPARATION AND SUBMISSION OF MAPS.—

(A) As soon as practicable after the date of the enactment of this Act, the Secretary shall prepare maps identifying the boundaries of those undeveloped coastal barriers (as that term is defined in section 3(1) of the Coastal Barrier Resources Act (16 U.S.C. 3502(1)) of the United States bordering the Pacific Ocean south of 49 degrees north latitude.

(B) Not later than 12 months after the date of enactment of this Act, the Secretary shall submit to the Committee on Merchant Marine and Fisheries of the House of Representatives and to the Committee on Environment and Public Works of the Senate maps identifying the boundaries of those undeveloped coastal barriers of the United States bordering the Pacific Ocean south of 49 degrees north latitude which the Secretary and the appropriate Governor consider to be appropriate for inclusion in the System.

SEC. 7. SPECIAL UNIT. Florida.

(a) DESIGNATION.—The southernmost portion of unit P-11 of the System, as depicted on the maps referred to in section 4(a) of the Coastal Barrier Resources Act (as amended by this Act), located on Hutchinson Island north of St. Lucie Inlet in Florida, is designated as the "Frank M. McGilvrey Unit". In revising those maps under section 4(a) of this Act, the Secretary shall so identify that unit.

(b) REFERENCES.—Any reference in a law, map, regulation, document, paper, or other record of the United States to the unit of the System referred to in subsection (a) is deemed to be a reference to the "Frank M. McGilvrey Unit" of the System.

SEC. 8. REPORT REGARDING COASTAL BARRIER MANAGEMENT. 16 USC 3503 note

(a) COASTAL BARRIERS TASK FORCE.—

(1) ESTABLISHMENT.—There is established an interagency task force to be known as the Coastal Barriers Task Force (hereinafter in this section referred to as the "Task Force").

(2) MEMBERSHIP.—The Task Force shall be composed of 11 individuals as follows:

(A) A designee of the Secretary of Agriculture.

(B) A designee of the Secretary of Commerce.

(C) A designee of the Secretary of Defense.

(D) A designee of the Secretary of Energy.

(E) A designee of the Secretary of Housing and Urban Development.

(F) A designee of the Secretary of the Interior.

(G) A designee of the Secretary of Transportation.

(H) A designee of the Secretary of the Treasury, who shall represent the Internal Revenue Service.

(I) A designee of the Administrator of the Environmental Protection Agency.

(J) A designee of the Director of the Federal Emergency Management Agency.

(K) A designee of the Administrator of the Small Business Administration.

(3) CHAIRPERSON.—The chairperson of the Task Force shall be the designee of the Secretary of the Interior.

(b) REPORT.—

(1) IN GENERAL.—Not later than the expiration of the 2-year period beginning on the date of the enactment of this Act, the Task Force shall submit to the Congress a report regarding the Coastal Barrier Resources System.

(2) CONTENTS.—The report required under paragraph (1) shall include the following:

(A) An analysis of the effects of any regulatory activities of the Federal Government on development within units of the System, for the period from 1975 to 1990.

(B) An analysis of the direct and secondary impacts of tax policies of the Federal Government on development (including development of second home and investment properties) within units of the System, for the period from 1975 to 1990.

(C) An estimate and comparison of the costs to the Federal Government with respect to developed coastal barriers on which are located units of the System, for the period from 1975 to 1990, which shall include costs of shore protection activities, beach renourishment activities, evacuation services, disaster assistance, and flood insurance subsidies under the national flood insurance program.

(D) A determination of the number of structures for which flood insurance under the national flood insurance program has been unavailable since the enactment of the National Flood Insurance Act of 1968 because of the prohibition, under section 1321 of such Act, of the provision of insurance for structures located on coastal barriers within the System.

(E) An estimate of the number of existing structures located on coastal barriers that are included within the System because of the expansion of the System under this Act and the amendments made by this Act.

(F) A summary of the opinions and comments expressed pursuant to paragraph (3).

(G) Recommendations for Federal policies and legislative action with respect to developed and undeveloped coastal barriers to promote the protection of coastal barriers and minimize activities of the Federal Government that contribute to the destruction and degradation of coastal barriers.

(3) HEARINGS.—In carrying out its responsibilities under this subsection, the Task Force shall hold hearings to provide opportunity for State and local governments and members of the public to express their opinions and comment on Federal policy regarding coastal barriers.

(c) TERMINATION.—The Task Force shall terminate 90 days after submission of the report required under subsection (b)(1).

SEC. 9. PROHIBITION OF FLOOD INSURANCE COVERAGE IN CERTAIN COASTAL BARRIERS.

Section 1321 of the National Flood Insurance Act of 1968 (42 U.S.C. 4028) is amended—

(1) by inserting "(a)" after the section designation; and

(2) by adding at the end the following new subsection:

"(b) No new flood insurance coverage may be provided under this title after the expiration of the 1-year period beginning on the date of the enactment of the Coastal Barrier Improvement Act of 1990 for any new construction or substantial improvements of structures located in any area identified and depicted on the maps referred to in section 4(a) of the Coastal Barrier Resources Act as an area that is (1) not within the Coastal Barrier Resources System and (2) is in an otherwise protected area. Notwithstanding the preceding sentence, new flood insurance coverage may be provided for structures in such protected areas that are used in a manner consistent with the purpose for which the area is protected.".

SEC. 10. RTC AND FDIC PROPERTIES. 12 USC 1441a-3

(a) REPORTS.—

(1) SUBMISSION.—The Resolution Trust Corporation and the Federal Deposit Insurance Corporation shall each submit to the Congress for each year a report identifying and describing any property that is covered property of the corporation concerned as of September 30 of such year. The report shall be submitted on or before March 30 of the following year.

(2) CONSULTATION.—In preparing the reports required under this subsection, each corporation concerned may consult with the Secretary of the Interior for purposes of identifying the properties described in paragraph (1).

(b) LIMITATION ON TRANSFER.—

(1) NOTICE.—The Resolution Trust Corporation and the Federal Deposit Insurance Corporation may not sell or otherwise transfer any covered property unless the corporation concerned causes to be published in the Federal Register a notice of the availability of the property for purchase or other transfer that identifies the property and describes the location, characteristics, and size of the property. Federal Register, publication.

(2) EXPRESSION OF SERIOUS INTEREST.—During the 90-day period beginning on the date that notice under paragraph (1) concerning a covered property is first published, any governmental agency or qualified organization may submit to the corporation concerned a written notice of serious interest for the purchase or other transfer of a particular covered property for which notice has been published. The notice of serious interest shall be in such form and include such information as the corporation concerned may prescribe.

(3) PROHIBITION OF TRANSFER.—During the period under paragraph (2), a corporation concerned may not sell or otherwise transfer any covered property for which notice has been published under paragraph (1). Upon the expiration of such period, the corporation concerned may sell or otherwise transfer any covered property for which notice under paragraph (1) has been published if a notice of serious interest under paragraph (2) concerning the property has not been timely submitted.

(4) OFFERS AND PERMITTED TRANSFER.—If a notice of serious interest in a covered property is timely submitted pursuant to paragraph (2), the corporation concerned may not sell or otherwise transfer such covered property during the 90-day period beginning upon the expiration of the period under paragraph (2) except to a governmental agency or qualified organization for use primarily for wildlife refuge, sanctuary, open space, recreational, historical, cultural, or natural resource conservation purposes, unless all notices of serious interest under paragraph (2) have been withdrawn.

(c) DEFINITIONS.—For purposes of this section:

(1) CORPORATION CONCERNED.—The term "corporation concerned" means—

(A) the Federal Deposit Insurance Corporation, with respect to matters relating to the Federal Deposit Insurance Corporation; and

(B) the Resolution Trust Corporation, with respect to matters relating to the Resolution Trust Corporation.

(2) COVERED PROPERTY.—The term "covered property" means any property—

(A) to which—

(i) the Resolution Trust Corporation has acquired title in its corporate or receivership capacity; or

(ii) the Federal Deposit Insurance Corporation has acquired title in its corporate capacity or which was acquired by the former Federal Savings and Loan Insurance Corporation in its corporate capacity; and

(B) that—

(i) is located within the Coastal Barrier Resources System; or

(ii) is undeveloped, greater than 50 acres in size, and adjacent to or contiguous with any lands managed by a governmental agency primarily for wildlife refuge, sanctuary, open space, recreational, historical, cultural, or natural resource conservation purposes.

(3) GOVERNMENTAL AGENCY.—The term "governmental agency" means any agency or entity of the Federal Government or a State or local government.

(4) UNDEVELOPED.—The term "undeveloped" means—

(A) containing few manmade structures and having geomorphic and ecological processes that are not significantly impeded by any such structures or human activity; and

(B) having natural, cultural, recreational, or scientific value of special significance.

Wildlife refuges

SEC. 11. ACQUISITION OF PROPERTY BY SECRETARY OF THE INTERIOR.

The Secretary of the Interior may purchase any property within the area added to unit T-12 of the System by this Act, as depicted on the maps referred to in section 4(a) of the Coastal Barrier Resources Act. The Secretary of the Interior shall provide that any property purchased under this section is used and administered in accordance with the provisions of the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee).

16 USC 3502 note

SEC. 12. DEFINITIONS.

For purposes of this Act—

(1) the term "undeveloped coastal barrier" means—

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

(i) is subject to wave, tidal, and wind energies, and

(ii) protects landward aquatic habitats from direct wave attack; and

(B) all associated aquatic habitats including the adjacent wetlands, marshes, estuaries, inlets, and nearshore waters;

but only if such features and associated habitats contain few manmade structures and these structures, and man's activities on such features and within such habitats, do not significantly impede geomorphic and ecological processes.

(2) the term "otherwise protected area" means an undeveloped coastal barrier within the boundaries of an area established under Federal, State, or local law, or held by a qualified organization, primarily for wildlife refuge, sanctuary, recreational, or natural resource conservation purposes;

(3) the term "qualified organization" means such an organization under section 170(h)(3) of the Internal Revenue Code of 1986 (26 U.S.C. 170(h)(3));

(4) the term "Secretary" means the Secretary of the Interior; and

(5) the term "System" means the Coastal Barrier Resources System established by the Coastal Barrier Resources Act (16 U.S.C. 3501 et seq.), as amended by this Act.

SEC. 13. AUTHORIZATIONS OF APPROPRIATIONS.

(a) COASTAL BARRIER RESOURCES ACT.—Section 12 of the Coastal Barrier Resources Act (16 U.S.C. 3510) is amended to read as follows:

"SEC. 12. AUTHORIZATION OF APPROPRIATIONS.

"There is authorized to be appropriated to the Secretary for carrying out this Act not more than $1,000,000 for each of the fiscal years 1990, 1991, 1992, and 1993.".

(b) THIS ACT.—

(1) IN GENERAL.—There is authorized to be appropriated to the Secretary for carrying out this Act not more than $1,000,000 for each of the fiscal years 1991 and 1992.

(2) PROPERTY ACQUISITION.—In addition to the amounts authorized to be appropriated under paragraph (1), there is authorized to be appropriated to the Secretary of the Interior during fiscal years 1991, 1992, and 1993 an aggregate amount of $15,000,000 to carry out section 11.

SEC. 14. CERTIFICATION OF COMPLIANCE.

Section 7 of the Coastal Barrier Resources Act (16 U.S.C. 3506) is amended to read as follows:

"SEC. 7. CERTIFICATION OF COMPLIANCE.

"(a) REGULATIONS.—Not later than 12 months after the date of enactment of the Coastal Barrier Improvement Act of 1990, the head of each Federal agency affected by this Act shall promulgate regulations to assure compliance with the provisions of this Act.

"(b) CERTIFICATION.—The head of each Federal agency affected by this Act shall report and certify that each such agency is in compliance with the provisions of this Act. Such reports and certifications shall be submitted annually to the Committees and the Secretary.". Reports.

SEC. 15. DARE COUNTY, NORTH CAROLINA, TRANSFER.

Notwithstanding another law, the Secretary of Transportation shall transfer without consideration by quitclaim deed to Dare County, North Carolina, all rights, title, and interest of the United States in Coast Guard property and improvements located on the northern end of Pea Island east side of State road 1257, 0.3 miles north of North Carolina Highway 12 in Rodanthe, Dare County,

North Carolina. The Secretary shall require the property to be surveyed before it is transferred.

Approved November 16, 1990.

LEGISLATIVE HISTORY—H.R. 2840 (S. 2729):

HOUSE REPORTS: No. 101-657, Pt. 1 (Comm. on Merchant Marine and Fisheries) and Pt. 2 (Comm. on Banking, Finance and Urban Affairs).

SENATE REPORTS: No. 101-529 accompanying S. 2729 (Comm. on Environment and Public Works).

CONGRESSIONAL RECORD, Vol. 136 (1990):

Sept. 28, considered and passed House.

Oct. 26, considered and passed Senate, amended. House concurred in Senate amendments.

WEEKLY COMPILATION OF PRESIDENTIAL DOCUMENTS, Vol. 26 (1990):

Nov. 16, Presidential remarks.

Public Law 101-592
101st Congress

An Act

To require that certain fasteners sold in commerce conform to the specifications to which they are represented to be manufactured, to provide for accreditation of laboratories engaged in fastener testing, to require inspection, testing, and certification, in accordance with standardized methods, of fasteners used in critical applications to increase fastener quality and reduce the danger of fastener failure, and for other purposes.

Nov. 15, 1990
[H.R. 3000]

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

Fastener Quality Act.
Consumer protection.
15 USC 5401 note.

SECTION 1. SHORT TITLE.

This Act may be cited as the "Fastener Quality Act".

15 USC 5401.

SEC. 2. FINDINGS AND PURPOSE.

(a) FINDINGS.—The Congress finds that—

(1) the American economy uses billions of fasteners each year;

(2) millions of mismarked, substandard, counterfeit, and other nonconforming fasteners have been sold in commerce to end-users in the United States, and their use has dramatically increased the risk of equipment and infrastructure failures;

(3) both the military and civilian sectors of the economy have encountered unnecessary, unwarranted, and dangerous equipment and construction failures, as well as extraordinary expenses, as a result of the use of nonconforming fasteners;

(4) the sale in commerce of nonconforming fasteners and the use of nonconforming fasteners in numerous critical applications have reduced the combat readiness of the Nation's military forces, endangered the safety of other Federal projects and activities, and cost both the public and private sectors large sums in connection with the retesting and purging of fastener inventories;

(5) the purchase and use of nonconforming fasteners stem from material misrepresentations about such fasteners made by certain manufacturers, importers, and distributors engaged in commerce;

(6) current fastener standards of measurement evaluate bolts and other fasteners according to multiple criteria, including strength, hardness, and composition, and provide grade identification markings on fasteners to make the characteristics of individual fasteners clear to purchasers and users;

(7) current tests required by consensus standards, designed to ensure that fasteners are of standard measure, are adequate and appropriate for use as standards in a program of high-strength fastener testing;

(8) the lack of traceability by lot number of fasteners sold in commerce is a serious impediment to effective quality control efforts; and

(9) the health and safety of Americans is threatened by the widespread sale in commerce of mismarked, substandard, and

APPENDIX D

Appendix D **Amended List of Coastal Barrier Resource System Units, 1990**

Source: *The Coastal Barrier Improvement Act of 1990. Hearing Before the Subcommittee on Policy Research and Insurance of the Committee on Banking, Finance and Urban Affairs House of Representatives. 101st Congress, 2nd Session, Serial No. 101-167. Appendix A. United States Government Printing Office, Washington, DC. September 11, 1990.*

APPENDIX

COASTAL BARRIER RESOURCES SYSTEM

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
Maine:	
ME-01	Carrying Place Cove, Washington
ME-02	Birch Point, Washington
A01	Lubec Barriers, Washington
A01A	Baileys Mistake, Washington
ME-04	Seal Cove, Washington
A03	Jasper, Washington
A03B	Starboard, Washington
ME-06	Bare Cove, Washington
A03C	Popplestone Beach/Roque Island, Washington
ME-08	Flake Point, Washington
ME-10	Over Point, Washington
ME-11	Pond Island, Hancock
ME-12	Thrumcap, Hancock
A05A	Seven Hundred Acre Island, Waldo
ME-14	Nash Point, Knox
ME-15	Hunnewell Beach, Sagahadoc
ME-16	Hunnewell Beach, Sagahadoc
ME-17	Small Point Beach, Sagahadoc
A05B	Head Beach, Sagahadoc
A05C	Jenks Landing/Waldo Point, Cumberland
ME-18	Stover Point, Cumberland
A06	Cape Elizabeth, Cumberland
ME-19	Crescent Beach, Cumberland
A07	Scarborough Beach, Cumberland
A08	Crescent Surf, York
ME-23	Phillips Cove, York
A09	Seapoint, York
C00	Clark Pond, Essex
MA-03	Castle Neck, Essex
C01	Wingaersheek, Essex
C01A	Good Harbor Beach, Essex
C01B	Brace Cove, Essex
MA-04	West Beach, Essex
MA-06	Phillips Beach, Essex
C01C	West Head Beach, Suffolk
MA-11	Peddocks Island, Plymouth
MA-12	The Glades, Plymouth
C02	North Scituate, Plymouth
C01	Rivermoor, Plymouth
C03A	Hexhame, Plymouth
MA-13	Duxbury Beach, Plymouth
C04	Plymouth Bay, Plymouth
C06	Center Hill Complex, Plymouth
C05	Scorton, Barnstable
C09	Sandy Neck, Barnstable
MA-16	Nobscusset, Barnstable
C10	Freemans Pond, Barnstable
C11	Namskaket Spits, Barnstable
C11A	Boat Meadow, Barnstable

COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
MA-18	Pamet Harbor, Barnstable
C12	Chatham Roads, Barnstable
C13	Lewis Bay, Barnstable
C14	Squaw Island, Barnstable
C15	Centerville, Barnstable
C16	Dead Neck, Barnstable
C17	Popponesset Spit, Barnstable
C18	Waquoit Bay, Barnstable
C18A	Falmouth Ponds, Barnstable
C19	Black Beach, Barnstable
MA-24	Naushon Island Complex, Dukes
MA-30	Herring Brook, Barnstable
C31	Elizabeth Islands, Dukes
C20	Coatue, Nantucket
C21	Sesachacha Pond, Nantucket
C22	Cisco Beach, Nantucket
C23	Esther Island Complex, Nantucket
C24	Tuckernuck Island, Nantucket
C25	Muskeget Island, Nantucket
MA-26	Harthaven, Dukes
C26	Eel Pond Beach, Dukes
C27	Cape Poge, Dukes
C28	South Beach, Dukes
C29	Squibnocket Complex, Dukes
C29A	James Pond, Dukes
C29B	Mink Meadows, Dukes
MA-31	Squeteague Harbor, Barnstable
MA-32	Bassetts Island, Barnstable
MA-33	Phinneys Harbor, Barnstable
MA-34	Long Beach Point, Plymouth
MA-35	Planting Island, Plymouth
C19A	Buzzards Bay Complex, Plymouth
C31A	West Sconticut Neck, Bristol
C31B	Harbor View, Bristol
MA-36	Round Hill, Bristol
C32	Mishaum Point, Bristol
C33	Little Beach, Bristol
C34	Horseneck Beach, Bristol
C34A	Cedar Cove, Bristol
D01	Little Compton Ponds, Bristol
Rhode Island:	
D01	Little Compton Ponds, Newport
RI-01	Brown Point, Newport
D02	Fogland Marsh, Newport
RI-02	Sapowet Point, Newport
RI-02A	McCurry Point, Newport
RI-05	Easton Beach, Newport
RI-06	Almy Pond, Newport
RI-07	Hazards Beach, Newport
D02B	Prudence Island Complex, Washington
D02C	West Narragansett Bay Complex, Washington
RI-08	Fox Hill Marsh, Newport
RI-09	Sonnet Shores Beach, Washington
RI-10	Narragansett Beach, Washington
RI-11	Seaweed Beach, Wasington
D04	Green Hill Beach, Washington
D05	East Beach, Washington
D06	Quonochontaug, Washington
D07	Maschaug Ponds, Washington
D08	Napatree, Washington

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COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
D09	Block Island, Washington
Connecticut:	
D08	Napatree, New London
E01	Wilcox Beach, New London
E01A	Ram Island, New London
CT-01	Mason Island, New London
E02	Goshen Cove, New London
E03	Jordan Cove, New London
E03A	Niantic Bay, New London
CT-06	Mile Creek, New London
E03B	Lynde Point, Maddlesex
CT-08	Cold Spring Brook, Middlesex
E04	Menunketesuck Island, Middlesex
CT-09	Harbor View, Middlesex
CT-11	Sea View Beach, Maddlesex
CT-12	Lindsey Cove, New Haven
CT-13	Kelsey Island, New Haven
E09	Norwalk Islands, Fairfield
New York:	
NY-03	Sands Point, Nassau
NY-06	Frost Creek, Nassau
F02	Eatons Neck, Suffolk
NY-11	East Beach, Suffolk
F04	Crane Neck, Suffolk
F05	Old Field Beach, Suffolk
NY-24	Plum Island, Suffolk
F01	Fishers Island Barriers, Suffolk
NY-26	Pipes Cove, Suffolk
NY-27	Conkling Point, Suffolk
NY-28	Southold Bay, Suffolk
NY-30	Hog Neck Bay, Suffolk
NY-31	Broadwater Cove, Suffolk
NY-32	Downs Creek, Suffolk
NY-33	Robins Island, Suffolk
NY-36	Flanders Bay, Suffolk
NY-37	Red Creek Pond, Suffolk
NY-38	Squire Pond, Suffolk
NY-39	Cow Neck, Suffolk
NY-40	North Deal Harbor, Suffolk
NY-41	Clam Island, Suffolk
NY-42	Mill Creek, Suffolk
NY-43	Sag Harbor, Suffolk
NY-44	Gleason Point, Suffolk
NY-46	Crab Creek, Suffolk
NY-47	Hay Beach Point, Suffolk
F06	Shelter Island Barriers, Suffolk
NY-48	Mashomack Point, Suffolk
NY-49	Smith Cove, Suffolk
NY-50	Fresh Pond, Suffolk
F08A	Sammys Beach, Suffolk
NY-52	Hog Creek, Suffolk
F08B	Acabonack Harbor, Suffolk
F09	Gardiners Island Barriers, Suffolk
F10	Napeague, Suffolk
NY-56	Amagansett, Suffolk
NY-57	Georgia/Wainscott Ponds, Suffolk
NY-58	Sagaponack Pond, Suffolk
F11	Mecox, Suffolk
F12	Southampton Beach, Suffolk
F13	Tiana Beach, Suffolk

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COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
New Jersey:	
NJ-02	Seidler Beach, Middlesex
NJ-04	Corsaknok Point, Monmouth
NJ-04a	Shrewsbury-Navesink Island Complex, Island Complex
NJ-04b	Metdeconk Neck, Ocean
NJ-05	05Cedar Bonnett, Ocean
NJ-09	Stone Harbor, Cape May
NJ-12	Del Haven, Cape May
NJ-13	Kimbles Creek, Cape May
NJ-14	Moores Beach, Cape May and Cumberland
Delaware:	
DE-01	Little Creek, Kent
H00	Broadkill Beach Complex, Kent and Sussex
DE-06	Silver Lake, Sussex
H01	North Bethany Beach, Sussex
Maryland:	
MD-02	Fair Island, Somerset
MD-03	Sound Shore, Somerset
MD-06	Jones Cove, Somerset
MD-11	Little Deal Island, Somerset
MD-12	Deal Island, Somerset
MD-14	Franks Island, Somerset
MD-15	Long Point, Somerset
MD-16	Stump Point, Wicomico
MD-19	Holland Island, Dorchester
MD-20	Jenny Island, Dorchester
MD 22	Hooper Neck, Dorchester
MD-24	Covey Creek, Dorchester
MD-25	Castle Haven Point, Dorchester
MD-26	Boone Creek, Talbot
MD-27	Benon Point, Talbot
MD-28	Lowes Point, Talbot
MD-29	Rich Neck Point, Talbot
MD-30	Kent Point, Queen Annes
MD-32	Stevensville, Queen Annes
MD-33	Wesley Church, Queen Annes
MD-35	Wilson Pond, Kent
MD-38	Cove Point March, Calvert
MD-39	Drum Point, Calvert
MD-40A	Lewis Creek, St. Marys
MD-41	Green Holly Pond, St. Marys
MD-44	St. Clarence Creek, St. Marys
MD-45	Deep Point, St. Marys
MD-46	Point Lookin, St. Marys
MD-47	Cornfield Harbor, St. Marys
MD-49	Biscoe Creek, St. Marys
MD-50	Chicken Cock Creek, St. Marys
MD-51	Piney Point Creek, St. Marys
MD-52	McKay Cove, St. Marys
MD-53	Blake Creek, St. Marys
MD-54	Belvedere Creek, St. Marys
MD-56	St. Catherine Island, St. Marys
Virginia:	
K03	Cedar Island, Accomack
K04	Little Cobb Island, Northampton
K05	Fishermans Island
VA-09	Elliotts Creek, Northampton
VA-10	Old Plantation Creek, Northampton
VA-11	Remus Creek, Northampton
VA-12	Church Neck, Northampton

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COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
VA-13	Westerhouse Creek, Northampton
VA-14	Shooting Point, Northampton
VA-15	Horse Island, Northampton
VA-16	Scarborough Neck, Accomack
VA-17	Craddock Neck, Accomack
VA-18	Bluff Point, Accomack
VA-19	Parkers Island, Accomack
VA-21	Beach Island, Accomack
VA-22	Russell Island, Accomack
VA-23	Simpson Bend, Accomack
VA-24	Drum Bay, Accomack
VA-25	Fox Islands, Accomack
VA-26	Cheeseman Island, Accomack
VA-27	Watts Island, Accomack
VA-28	Tangier Island, Accomack
VA-29	Elbow Point, Westmoreland
VA-30	White Point, Westmoreland
VA-31	Cabin Point, Westmoreland
VA-32	Glebe Point, Westmoreland
VA-33	Sandy Point, Westmoreland
VA-34	Judith Sound, Northumberland
VA-35	Cod Creek, Northumberland
VA-36	Presley Creek, Northumberland
VA-37	Cordreys Beach, Northumberland
VA-38	Marshalls Beach, Northumberland
VA-40	Gaskin Pond, Northumberland
VA-41	Owens Pond, Northumberland
VA-42	Chesapeake Beach, Northumberland
VA-43	Fleet Point, Northumberland
VA-44	Bussel Point, Northumberland
VA-45	Harveys Creek, Northumberland
VA-46	Ingram Cove, Northumberland
VA-47	Bluff Point Neck, Northumberland
VA-48	Barnes Creek, Northumberland
VA-49	North Point, Lancaster
VA-50	Windmill Point, Lancaster
VA-51	Deep Hole Point, Lancaster
VA-52	Sturgeon Creek, Middlesex
VA-53	Jackson Creek, Middlesex
VA-54	Stove Point, Middlesex
VA-55	Rigby Island/Bethel Beach, Mathews
VA-56	New Point Comfort, Mathews
VA-57	Ware Neck, Gloucester
VA-57A	Severn River, Gloucester
North Carolina:	
L01	Currituck Banks, Currituck
NC-02	Nags Head Woods, Dare
L03	Hatteras Island, Dare
L03A	Shackleford Banks, Carteret
L05	Onslow Beach Complex, Onslow
L06	Topsail, Onslow
L07	Lea Island Complex, Pender and New Hanover
L08	Wrightsville Beach, New Hanover
L09	Masonboro Island, New Hanover
M01	Waits Island Complex, Brunswick
South Carolina:	
M01	Waites Island Complex, Horry
SC-01	Long Pond, Horry
M02	Litchfield Beach, Georgetown
M03	Pawleys Inlet, Georgetown

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COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
M04	Debidue Beach, Georgetown
M05	Dewees Island, Charleston
M06	Morris Island Complex, Charleston
M07	Bird Key Complex, Charleston
M08	Captain Sams Inlet, Charleston
M09	Edisto Complex, Charleston
M10	Otter Island, Colleton
M11	Harbor Island, Beaufort
M12	St. Phillips Island, Beaufort
M13	Dufuskie Island, Beaufort
Georgia:	
N01	Little Tybee Island, Chatham
N01A	Wassaw Island, Chatham
N03	Little St. Simons Island, Glynn
N04	Sea Island, Glynn
N05	Little Cumberland Island, Camden
N06	Cumberland Island, Camden
Florida—east coast:	
P04A	Usinas Beach, St. Johns
P05	Conch Island, St. Johns
P05A	Matanzas River, St. Johns
P07	Ormond-by-the-Sea, Volusia
P08	Ponce Inlet, Volusia
P09	Coconut Point, Brevard
P10	Vero Beach, Indian River
P10A	Blue Hole, Indian River and St. Lucie
P11	Hutchinson Island, St. Lucie and Martin
P11A	Frank B. McGilvrey Unit
P12	Hobe Sound, Martin
FL-34	Soldier and Ragged Keys, Dade
FL-35	Palo Alto/Angelfish Key Complex, Monroe
FL-36	Rattlesnake Key, Monroe
FL-37	Rodriguez Key, Monroe
FL-39	Tavernier Key, Monroe
FL-40	Snake Creek, Monroe
FL-43	Channel Key, Monroe
FL-44	Tom Harbor Keys, Monroe
FL-45	Deer Key, Monroe
FL-46	Bapt Key, Monroe
FL-50	Spanish Harbor, Monroe
FL-51	Newfound Harbor Keys, Monroe
FL-52	Little Knockemdown Key Complex, Monroe
FL-53	Bud Keys, Monroe
FL-54	Sugarloaf Sound, Monroe
FL-55	Saddlebunch Keys, Monroe
FL-57	Cow Key, Monroe
Florida—west coast:	
P15	Cape Romano, Collier
P16	Keewaydin Island, Collier
P17	Lovers Key Complex, Lee
P17A	Bedwitch Point, Lee
FL-67	Bunch Beach, Lee
P18	Sanibel Island Complex, Lee
P19	North Captiva Island, Lee
P20	Cayo Costa, Lee
P21	Bocilla Island, Charlotte
P21A	Manasota Key, Sarasota
P22	Casey Key, Sarasota
P23	Longboat Key, Manatee
FL-78	Rattlesnake Key, Manatee

COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
FL-81	Cockroach Bay, Manatee
FL-82	Bishop Harbor, Manatee
FL-83	Cockroach Bay, Hillsborough
P24	The Reefs, Pinellas
P24A	Mandalay Point, Pinellas
P25	Atsena Otie Key, Levy
P26	Pepperfish Keys, Dixie
P27A	Ochlockonee Complex, Franklin and Wakulla
P28	Dog Island, Franklin
FL-90	St. George Island, Franklin
FL-92	Indian Peninsula, Gulf
P30	Cape San Blas, Gulf
P31	St. Andrew Complex, Bay
FL-94	Deer Lake Complex, Walton
FL-96	Draper Lake, Walton
P31A	Four Mile Village, Walton
P32	Boreno Point, Walton and Okaloosa
FL-97	Santa Rosa Island, Escambia and Santa Rosa
FL-98	Gulf Islands, Escambia
FL-99	Tom King, Santa Rosa
FL-100	Town Point, Santa Rosa
FL-101	Garcon Point, Santa Rosa
FL-102	Basin Bayou, Santa Rosa
Alabama:	
Q01	Mobile Point, Baldwin
Q01	Pelican Island, Mobile
Q02	Dauphin Island, Mobile
AL-03	Skunk Bay, Baldwin
Mississippi:	
R01	Round Island, Jackson
R01A	Bell Fountain Point, Jackson
MS-02	Marsh Point, Jackson
R02	Deer Island, Harrison
R03	Cat Island, Harrison
MS-04	Heron Bay Point, Hancock
Louisiana:	
LA-01	Isle au Pitre, St. Bernard
LA-02	Grand Island, St. Bernard
S01	Bastian Bay Complex, Plaquemines
S01A	Bay Joe Wise Complex, Plaquemines
S02	Grande Terre Islands, Plaquemines and Jefferson
S03	Caminada, Jefferson and Lafourche
S04	Bay Champagne, Lafourche
S05	Timbalier Island, Lafourche and Terrebonne
S06	Isles Dernieres, Terrebonne
S07	Point au Fer, Terrebone and St. Mary
S08	Chenieee au Tigre, Vermillion
LA-07	Freshwater Bayou, Vermillion
S09	Rollover, Vermillion
S10	Mermentau River, Cameron
LA-09	Cameron, Cameron
LA-10	Calcasieu Pass, Cameron
S11	Sabine, Cameron
Texas—north coast:	
T01	Sea Rim, Jefferson
T02A	High Island, Jefferson and Galveston
T03A	Bolivar Peninsula, Galveston
TX-04	Swan Lake, Galveston
T04	Follets Island, Brazoria
T05	Brazos River Complex, Brazoria

COASTAL BARRIER RESOURCES SYSTEM—Continued

[As amended by the Committee on Merchant Marine and Fisheries]

State and unit number	Location
T06	Sargent Beach, Brazoria
T07	Matagorda Peninsula, Matagorda and Calhoun
TX-09	Coon Island Bay, Matagorada
TX-10	Shell Beach, Matagorda
T08	San Jose Island Complex, Calhoun
Texas—south coast:	
TX-17	Shamrock Island, Nueces
T10	North Pardre Island, Kleberg
TX-19	Starvation Point, Kleberg
TX-21	Kleberg Point, Kleberg
T11	South Pardre Island, Willacy & Cameron
T12	Boca Chica, Cameron
Virgin Islands:	
VI-01	Rust Up Twist, St. Croix
VI-01A	Salt River Bay, St. Croix
VI-02	Altona Lagoon, St. Croix
VI-03	Southgate Pond, St. Croix
VI-04	Conkley Bay, St. Croix
VI-05	Robin Bay, St. Croix
VI-06	Great Pond, St. Croix
VI-07	Canegarden Bay, St. Croix
VI-07a	Krause Lagoon, St. Croix
VI-08	Long Point, St. Croix
VI-09	Westend Saltpond, St. Croix
VI-14	Newfound Bay, St. Thomas & St. John
VI-14a	Pond Bay, St. Thomas & St. John
VI-15	Lagoon Point, St. Thomas & St. John
VI-22	Fish Bay, St. Thomas & St. John
VI-25	Sprat Point, St. Thomas & St. John
VI-26	Limestone Bay, St. Thomas & St. John
VI-27	Perseverance Bay, St. Thomas & St. John
VI-28	Magens Bay, St. Thomas & St. John
VI-29	Mandal Bay, St. Thomas & St. John
VI-31	Smith Bay, St. Thomas & St. John
VI-32	Vessup Bay, St. Thomas & St. John
VI-33	Great Bay, St. Thomas & St. John
Puerto Rico:	
PR-02	Ensenada Comezon, Rio Grande
PR-03	Rio Mameyes, Rio Grande
PR-05	Luquillo Spit, Luquillo
PR-06	Juan Martin Spit, Luquillo
PR-07	Laguna Aguas Prietas, Fajardo
PR-08A	La Cordillera, Fajardo
PR-10	Punta Barrancas, Fajardo
PR-39	Puerto Yabucoa, Yabucoa
PR-40	Punta Tuna, Maunabo
PR-41	Rio Maunabo, Maunabo
PR-42	Punta Viento, Patillas
PR-42A	Punta Figurara, Arroyo
PR-43	Las Mareas, Guayama
PR-44	Bahia de Jobos, Guayama
PR-45	Cayos de Barca/Cayos de Ratones Complex, Salinas
PR-46	Arenzal, Salinas
PR-50	Chardon, Santa Isabel
PR-51	Rio Descalabrado, Santa Isabel and Juana Diaz
PR-52	Punta Pastillo, Juana Diaz
PR-53	Bajio de Mares, Juana Diaz
PR-54	Rio Jacaguas, Ponce
PR-55	Isla del Frio, Ponce
PR-56	Punta Cabullones, Ponce

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COASTAL BARRIER RESOURCES SYSTEM—Continued

(As amended by the Committee on Merchant Marine and Fisheries)

State and unit number	Location
PR-57	Punta Cucharas, Ponce
PR-59	Punta Ballena, Vauco and Guanica
PR-61	Ensenada las Pardas, Guanica
PR-66	Cabo Rojo, Cabo Rojo
PR-68	Prieta, Cabo Rojo
PR-69	Punta Carenero, Cabo Rojo
PR-70	Belvedere, Cabo Rojo
PR-72	Rio Guanajibo, Mayaguez
PR-75	Espinar, Aguadilla
PR-76	Putan Aquajereada, Aguadilla
PR-77	Bajura, Isabela
PR-78	Guayabos, Isabela
PR-79	Penon Brusi, Camuy and Hatillo
PR-80	Punta Maracayo, Hatillo
PR-81	Puerto de Arecibo, Arecibo
PR-83	Tortugero, Manati and Vega Baja
PR-84	Punta Garza, Vega Baja
PR-00	Punta Boca Juana, Dorado Toa Baja
PR-87	Punta Vacia Talega, Carolina Loiza
	Great Lakes Areas
New York:	
NY-01	Wilson Bay, Jefferson
NY-02	Grenadier Island, Jefferson
NY-03	Fox Island, Jefferson
NY-04	The Isthmus, Jefferson
NY-05	Point Peninsula, Jefferson
NY-06	Hounsfield, Jefferson
NY-07	Dutch John Bay, Jefferson
NY-08	Sherwin Bay, Jefferson
NY-09	Association Island, Jefferson
NY-11	North Pond, Oswego
NY-12	Deer Creek Marsh, Oswego
NY-13	Grindstone Creek, Oswego
NY-14	Butterfly Swamp, Oswego
NY-15	Walker, Oswego
NY-16	Snake Swamp, Oswego
NY-17	Juniper Pond, Cayuga
NY-18	Blind Sodus Bay, Cayuga/Wayne
NY-19	Port Bay, Wayne
NY-21	Maxwell Bay, Wayne
NY-22	Bogus Point, Monroe
NY-23	Big Sister Creek, Erie
Ohio:	
OH-01	Toussaint River, Ottawa
OH-03	Middle Bass Island, Ottawa
OH-04	North Bass Island, Ottawa
OH-05	Bay Point, Ottawa
OH-06	Mentor, Lake
Michigan:	
MI-02	Toledo Beach, Monroe
MI-03	Enrico Fermi, Monore
MI-04	Sturgeon Bay, Wayne
MI-05	Huron City, Huron
MI-06	Alaska Bay, Huron
MI-07	Pointe Aux Barques, Huron
MI-08	Charity Island, Arenac
MI-13	Squaw Bay, Alpena
MI-14	Whitefish Bay, Alpena
MI-16	Trails End Bay, Emmet

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COASTAL BARRIER RESOURCES SYSTEM—Continued

(As amended by the Committee on Merchant Marine and Fisheries)

State and unit number	Location
MI-20	Lower Herring Lake, Benzie
MI-21	Arcadia Lake, Manistee
MI-22	Sudony Bayou, Muskegon
MI-24	Deadmans Point, Menominee
MI-25	Little Bay De Noc, Delta
MI-28	Goodreaus Harbor, Schoolcraft
MI-29	Seul Choix, Schoolcraft
MI-31	Fox Point, Mackinac
MI-32	McNeil Creek, Mackinac
MI-33	Millecoquins Point, Mackinac
MI-34	Fast Mile Creek, Mackinac
MI-35	Mattix Creek, Mackinac
MI-36	Mackinac, Mackinac
MI-37	Davenport Creek, Mackinac
MI-38	Hudson, Mackinac
MI-39	Epoufette, Mackinac
MI-40	Green Island, Mackinac
MI-41	Big Saint Martin Island, Mackinac
MI-42	Bass Cove Lake, Mackinac
MI-43	Prentiss Bay, Mackinac
MI-44	Albany Island, Mackinac
MI-45	St. Vital Bay, Mackinac
MI-46	Esquanore Lake, Chippewa
MI-49	Shelldrake, Chippewa
MI-51	Marsh Lake, Chippewa
MI-52	Superior, Chippewa
MI-53	Vermillion, Chippewa
MI-55	Little Two-Hearted River, Luce
MI-59	Laughing Whitefish River, Alger
MI-62	Snake Head Lake, Marquette
MI-63	Iron River, Marquette
MI-64	Squaw Beach, Marquette
MI-65	Salmon Trout May, Marquette
MI-66	Huron Bay, Baraga
MI-71	Jacobs Creek, Keweenaw
MI-74	Gratiot River, Keweenaw
Wisconsin:	
WI-01	Two Creeks, Manitowoc
WI-02	Point Au Sable, Brown
WI-03	Peshtigo Point, Marinette
WI-04	Dyers Slough, Marinette
WI-05	Bark Bay, Bayfield
WI-06	Herbster, Bayfield
WI-07	Flag River, Bayfield

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