COMPREHENSIVE BEACH MANAGEMENT PLAN

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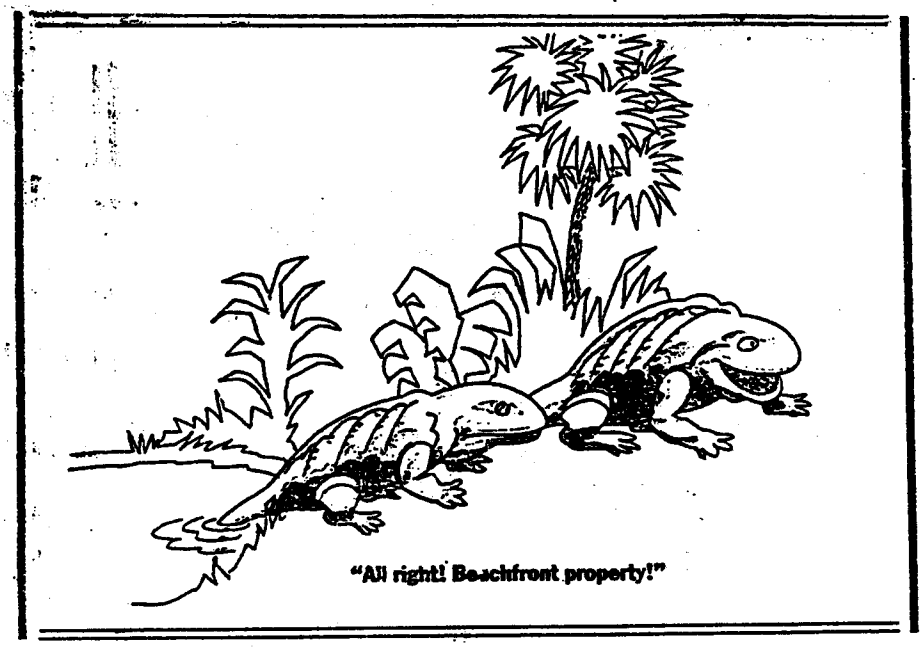
BEAUFORT COUNTY, SOUTH CAROLINA



By

The Beaufort County Planning Board

1992

BEAUFORT COUNTY
COMPREHENSIVE BEACH MANAGEMENT PLAN

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June 2, 1992

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Final Approval by South Carolina Coastal Council
January 15, 1993

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INVENTORY OVERLAY MAPS

* The inventory overlay maps are not included in this document. They are available for inspection at the Beaufort County Planning Board office and the Charleston office of South Carolina Coastal Council. The text material contained on the maps - Appendix 17 - is available for distribution.

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INTRODUCTION

COMPETING DEMANDS

Beaufort County, South Carolina is enjoying unprecedented growth. It has become a popular tourism, resort and retirement destination due to the high quality of life and its beautiful coastal setting, including its wide, clean beaches.

Beaches not only have an aesthetic appeal but along with coastal barriers are an essential part of the county's first line of defense against storms, protecting upland areas by the dissipation of wave energy. A healthy beach serves as a habitat and nesting area for many endangered plant and animal species.

The beaches, dunes, and coastal waters are a uniquely valuable natural resource for the county. They are attractive for a variety of competing uses - residential, commercial, and recreational - and thus are under great pressure for development. But intensive development of sensitive coastal areas can damage those resources and degrade their value for all uses.

In addition, natural forces poses a threat to the beaches and adjacent development. The coastline is dynamic, adjusting and readjusting cyclically and slowly shifting over time. In many places beaches are steadily eroding. A number of scientists believe that the sea is rising and that all of our beaches will be lost in time.

The high ecological value of the beach, and its great allure and fragile nature combined with the dynamic character of the coastline combine to create a challenge for enlightened stewardship.

BEACH MANAGEMENT PLAN INTRODUCTION

The Beaufort County Comprehensive Beach Management Plan was prepared for two purposes:

1) to assist Beaufort County in effectively managing its beaches

2) to comply with the requirements of the South Carolina Beachfront Management Act (BMA) and guidelines developed by South Carolina Coastal Council

In July 1998 the South Carolina Beachfront Management Act was passed. It was subsequently amended in 1990. All beachfront communities - municipalities and counties - are required to develop local plans to accomplish the goals of the Beachfront Management Act. Indeed, this document conforms to the requirements of the BMA. However, the primary function of the

Plan is to facilitate Beaufort County's efficacious management of its fragile beach resources.

STATE BEACHFRONT MANAGEMENT PLAN

The South Carolina Beachfront Management Act (BMA) states that the beach/dune system serves the following functions:

1) It protects life and property by serving as a storm barrier dissipating wavy energy and contributing to shoreline stability.

2) It provides a basis for a segment of the tourism industry that generates about two thirds of the state's total tourism revenue.

3) It provides habitat for numerous species of plants and animals, several of which are threatened or endangered.

4) It provides a healthful environment for the citizens of South Carolina to spend leisure time which serves their physical and mental well-being.

Furthermore, the BMA acknowledges the following:

1) Many miles of South Carolina's beaches are determined to be critically eroding.

2) Development has been sited too close to the beaches and dunes jeopardizing their stability and accelerating erosion.

3) The use of hard erosion control devices such as seawalls, bulkheads, and rip-rap to protect buildings threatened by erosion has not proven effective; and such devices have contributed to the deterioration of the dry sand beach.

4) It is in both the public and private interests to allow the beach/dune system space to accrete and erode in its natural cycle. This space can be provided only by discouraging new construction in close proximity to the system and encouraging the removal and retreat of existing structures.

5) Beach/dune system vegetation is important to the vitality and preservation of the beaches and dunes.

6) Public access to the beaches should be protected and promoted for both South Carolina residents and out-of-state tourists;

7) There is no coordinated policy for post disaster management of the beach/dune system.

8) A comprehensive beach management plan is needed for the entire coast to protect and effectively manage the beach/dune system.

GENERAL MANDATE

CMA and Creation of Coastal Council

The South Carolina Coastal Management Act (CMA) was passed in 1977 pursuant to the Federal Coastal Zone Management Act of 1972. The CMA created the South Carolina Coastal Council (SCCC) and authorized it to comprehensively plan for the state's coastal resources. The agency's charge is to balance economic development and growth with the protection of our natural resources.

Beach Management Act

The Beachfront Management Act of 1988 is an amendment to the Coastal Management Act. It was enacted to specifically address the problems of the beaches. This law requires a long range planning process which is to be implemented through the creation of a state comprehensive plan and local beach management plans. The Beach Management Act was amended in 1990. (The Beach Management Act of 1988 and the amendments of 1990 are referred to herein jointly as "the Beach Management Act", "The Act" or "The BMA".)

REQUIREMENTS OF LOCAL BEACH MANAGEMENT PLANS

Pursuant to Section 48-39-350 of the Beach Management Act, each beachfront community must prepare a local comprehensive beach management plan addressing the ten elements listed below. In addition, local communities are called upon to adhere to the guidelines developed by Coastal Council which detail the measures to be taken to accomplish these elements.

1. A zoning and land use plan consistent with the provisions of the Beachfront Management Act.

2. An inventory of public access points and attendant parking, and a plan for improving access and parking.

3. A detailed strategy for achieving the goal of preservation of public access for all residents of South Carolina.

4. An inventory of erosion rate data and processes.

5. An analysis of erosion control alternatives, including beach renourishment.

6. An inventory of all structures located seaward of the setback line.

7. A post-disaster plan including plans for cleanup, maintaining essential services, protecting public health, and emergency building ordinances.

8. An inventory of and a plan to protect turtle nesting sites and other important habitats of the beach/dune system.

9. A drainage inventory and plan for the area seaward of the setback zone.

10. A detailed strategy for achieving the goals of the Beachfront Management Act by the end of the 40-year retreat period.

Orthophotographic (aerial photographic) maps at a scale of 1" = 100' were furnished by Coastal Council to the county. These maps are the basic unit for mapping and analyzing the elements of the plan. Part of this plan includes a series of maps and mylar overlays to those maps (under "Attachments" in Table of Contents). A number of items are inventoried on the mylar overlays.

Once this Plan is adopted by the Beaufort County Planning Board, it will be submitted to Coastal Council for review and approval. The Coastal Council's management Committee will make the final decision as to whether or not the plan meets the requirements of the Beachfront Management Act. All local plans must be approved and implementation begun before July 1, 1992. The BMA requires that local plans be updated every five years

BEACH NOURISHMENT MONEY

Beach nourishment and dune restoration money is available periodically through a state beach renourishment bond fund. $10 million was used by various local governments to renourish beachfront areas following Hurricane Hugo. It is hoped that funds through various state and federal programs will be available periodically for renourishment projects.

If a local community does not establish a beach management plan then the Council will implement a plan for that community. In that event the community loses eligibility to receive any available state generated or shared revenues designated for beach/dune system protection, preservation, restoration, or enhancement.

SCOPE OF PLAN: BASELINES, SETBACK LINES, SETBACK AREA

The scope of the Beach Management Act is all land from the mean high-water mark of the Atlantic Ocean landward to the 40-year setback line (defined below). Coastal Council's permitting jurisdiction on beaches is the setback zone, that area seaward of the 40-year setback line. This is essentially the same area covered in this plan.

For most beach areas the baseline is the crest line of the primary (seawardmost) dune. If there is no natural primary dune then its location is determined based on existing natural dunes in the area. An average or "ideal" dune line is superimposed on beaches without natural dunes. In beaches located at inlets which are not armored or stabilized the baseline is set at the most landward position of the shoreline in the last 40 years.

The setback line is located landward of the baseline and is established at a distance that is forty times the average annual erosion rate as determined by historical and other scientific means and adopted by Coastal Council. For example, if the erosion rate is two feet per year the setback line is eighty feet landward of the baseline. Theoretically, on erosional areas, in forty years the beach retreat to the location of the present setback line. At a minimum all setback lines are established twenty feet landward of the baseline, including cases where the shoreline has been stable or accreting. The area seaward of the setback line is called the "setback area" or "setback zone".

Baselines and setback lines are established on the basis of data collected at beach survey stations along the coast. Beach profile monitoring stations, marked by a survey monument are located every 1000 feet along developed beaches and every 2000 feet along undeveloped beaches. Beach profiles are surveyed every six months, after significant storms, and in the course of site specific permitting.

The Beach Management Act required that Coastal Council establish final baselines and setback lines prior to July 3, 1991. These lines may not be revised before July 1, 1998 and must be revised by July 1, 2000. After that revision, the lines must be revised periodically in no less than eight years and nor more than ten years after each preceding revision.

The Act requires that any contract of sale or transfer of real property located in whole or in part within the setback zone contain a disclosure statement that the property is or may be affected by the setback line, baseline, and the seaward corners of all habitable structures referenced to the SC State Plane Coordinate System. In addition, the local erosion rate most recently made available for that particular standard zone or inlet zone must be disclosed.

APPEALING BASELINES AND EROSION RATES

Any landowner who believes that he is adversely affected by the incorrect location of a baseline or setback line will be granted a review by the Permitting Committee of SCCC upon submission of substantiating evidence. The landowner may appeal that decision according to provisions of the SCCC Regulations.

COASTAL COUNCIL JURISDICTION AND COMPOSITION

Coastal Council has direct control through its permitting program over coastal waters and tidelands, beaches and dunes landward to the 40-year setback line. It has indirect management authority in the "coastal zone" consisting of the eight counties along the South Carolina coast: Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry and Jasper. The coastal zone includes coastal waters and submerged bottoms seaward to the State's jurisdictional limits, as well as the lands and waters of these coastal counties. In the coastal zone the Council staff reviews for consistency with the SC Coastal Management Program any project requiring/receiving a State permit or Federal license or funding, as well as any Federal projects.

The goals, objectives, guidelines and policies of the South Carolina Beach Management Plan and Coastal Council's published Regulations constitute its criteria for making permit decisions.

SCCC is composed of eighteen members: eight members, one from each coastal zone county appointed by the local county governing body; six members, one from each of the congressional districts of the state elected by the members of the two Houses representing the counties in the districts; and four ex-officio members including two state senators and two state representatives.

OVERVIEW - BEAUFORT COUNTY

ORIENTATION OF BEAUFORT COUNTY

Beaufort County is the second most southerly county along the South Carolina coast stretching nearly 31 miles along the Atlantic Ocean. It measures 691 square miles (442,240 acres) with 570 square miles (370,560 acres) of land and 121 square miles (72,320 acres) of water. This low lying county has many islands, inlets, streams, and marshes. There are 64 major islands and hundreds of smaller islands or hammocks in the county.

See MAP 1 and MAP 2.

DEMOGRAPHICS

The 1990 Census population of Beaufort County was 86,425, including 23,694 on Hilton Head. The county is divided into four Census Divisions with populations as follows:

1) Port Royal Island, including the City of Beaufort, Town of Port Royal, Parris Island Marine Depot, Marine Corps Air Station, and unincorporated areas of the county: 40,710.

2) Bluffton Division, the entire area south of the Broad River, including the Town of Hilton Head, Town of Bluffton, Daufuskie Island, and unincorporated areas of the county: 30,896.

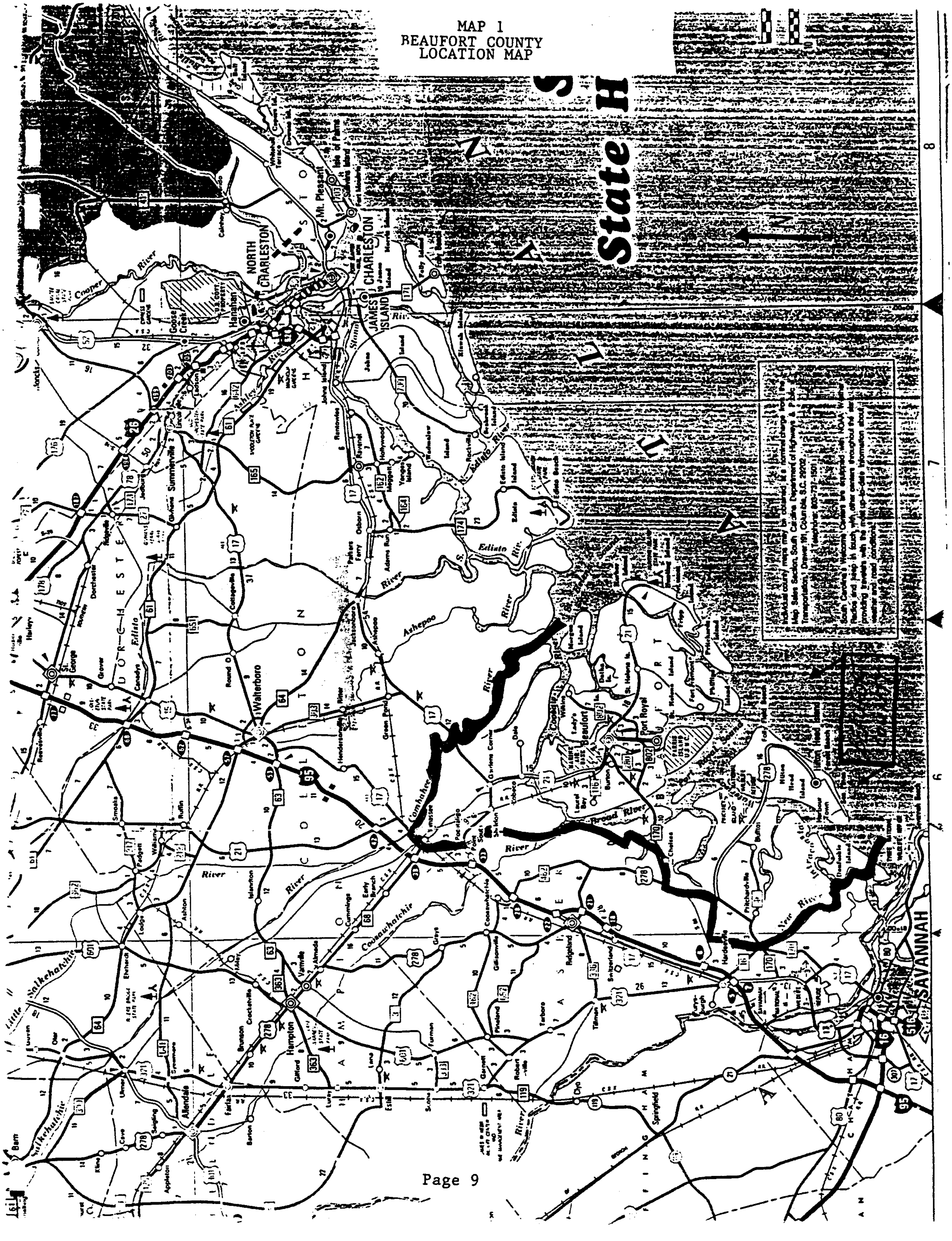
3) St. Helena Division, all land east of the Beaufort River, including Lady's Island, St. Helena Island, and all of the seven barrier islands in the vicinity of Harbor River: 11,625.

4) Sheldon Division, all land north of the Whale Branch River including the unincorporated communities of Dale, Lobeco, Gardens Corner, Sheldon, and Priesters: 3,194.

Of the total county populations, 59,843 (69%) are white and 24,582 (28%) are black. The median age is 30.1.

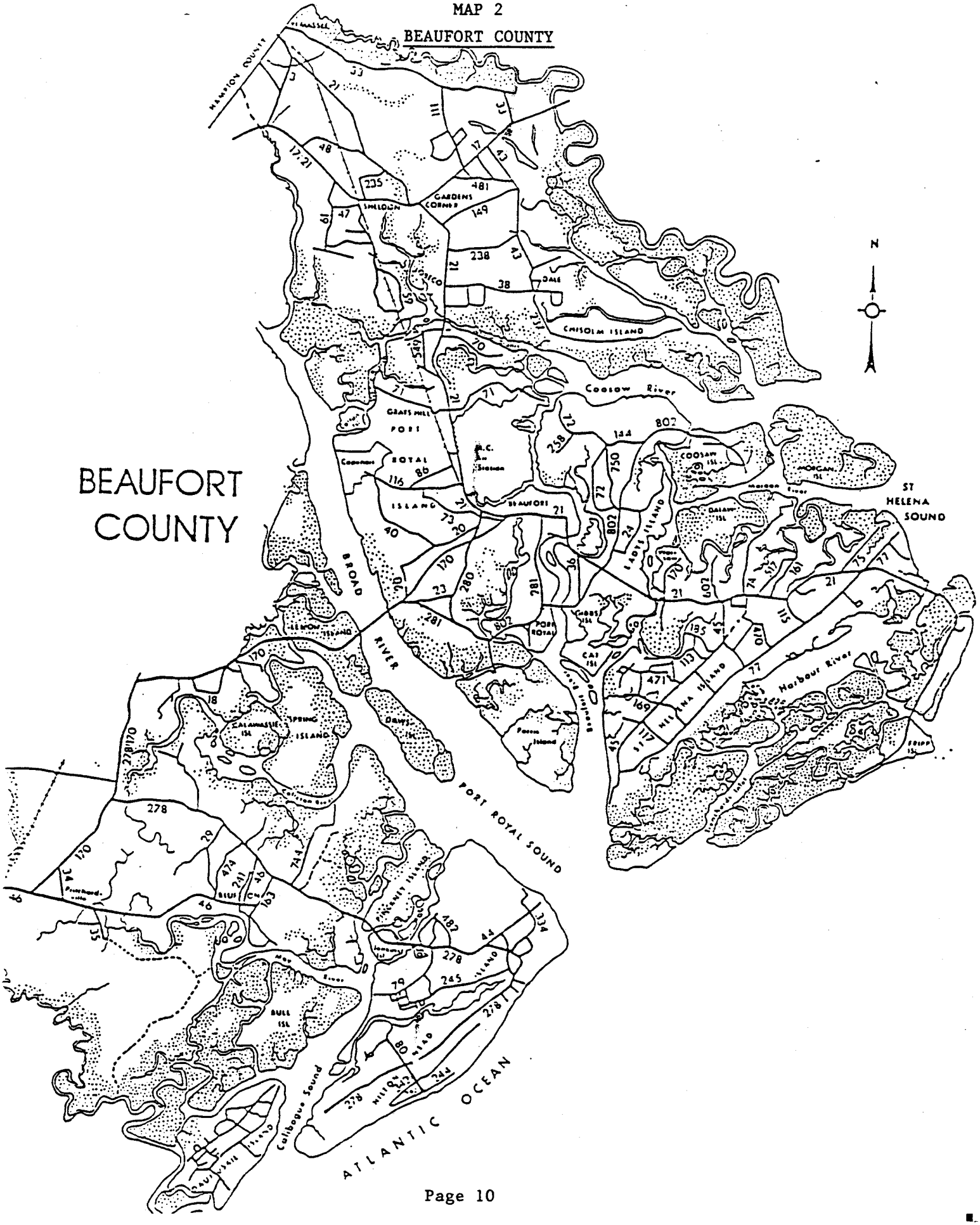
Beaufort County is one of the fastest growing and wealthiest counties in South Carolina. The county population in 1980 was 65,364 for a ten-year growth rate of 32%. Major industries include: Resort and retirement, military, construction, and agriculture and fishing.

MAP 1
BEAUFORT COUNTY
LOCATION MAP



MAP 2

BEAUFORT COUNTY



PHYSICAL CHARACTERISTICS

Beaufort County lies in the Lower Coastal Plain and ranges in elevation from sea level at the shoreline to about 42 feet in the north-central area. Most of the area along the shoreline lies below ten feet in elevation consisting of nearly level lowlands and ridges with slopes generally less than two percent. Flood plains of rivers and streams are subject to frequent flooding as about 90 percent of the soils in the county have high water tables.

Much of the coastal plain was inundated by the ocean during the Miocene Epoch. The sea has risen and fallen a number of times due to the thawing and accumulation of ice during the Ice Age. There have been a number of abandoned shorelines following the ocean's retreat resulting in several terraces in the landscape.

Four of South Carolina's 17 coastal estuarine marshes are situated, in whole or in part, along Beaufort County's coastline. These marshes are a signature element in the local physiography.

COASTAL BEACHES

The County's coast is comprised of nine barrier (or "sea") islands, only four of which are currently accessible by land. These sea islands are dominantly sandy and range from excessively drained to very poorly drained.

All of the beaches in Beaufort County are located on the sea islands and thus are the focus of this plan (with the exception of Hilton Head). Those islands include: Harbor Island, Hunting Island, Fripp Island, Pritchards Island, Capers Island, St. Phillips Island, Bay Point Island, Hilton Head Island, and Daufuskie Island.

Most of the beaches are unstable and many are moving inland at a rate of a few inches to more than a foot each year. In several areas the beaches are enlarging. Erosion is the result of tidal currents and storm and hurricane winds.

The coastal beaches are covered twice daily by the tides, with two high tides and two low tides roughly each twenty four hour period. Typically the beaches are light gray fine sand and commonly have narrow bands of gray to very dark gray fine sand. They contain varying amounts of shells and shell fragments. Fine black minerals are commonly mixed in.

The beaches are gently sloping. An examination of National Oceanic and Atmospheric Administration (NOAA) or United States Geological Survey (USGS) maps reveals that the depth of the water increases only gradually as one moves out to sea. Along most of the beaches in Beaufort County, the depth at one half mile out does not exceed ten feet.

(For more detailed information on the geology of the coastal area see Overview of Beach and Coastal Processes, Erosion, and Coastal Water Conservation sections.)

CLIMATE

The climate in Beaufort County is subtropical with long and rather hot and humid summers followed by short and mild winters. Precipitation is abundant, averaging about 49 inches annually. The prevailing wind is southwesterly at about eight miles per hour. Windspeeds tend to be highest in March. Heavy fog occurs about 37 days annually. The sun is visible about 63 percent of the daylight hours and there are about 110 clear days each year.

Maximum and minimum daily temperatures in the summer are about 90 degrees and 65-70 degrees, respectively. Usually the recorded temperature rises above 100 degree a few days each year. The abundant supply of warm, moist, relatively unstable air produces frequent scattered showers and thunderstorms. There are about 54 thunderstorms in an average year with 16 occurring during July.

The tropical storm season is considered to be the period from July through October. Hurricanes are rare but tropical storms with 50 mile per hour winds occur every two or three years. An occasional tornado occurs in mid to late summer.

Autumn begins warm, humid and showery but becomes relatively dry in October. The first freezing temperatures usually come in mid November but the onset of frost is variable from year to year. The winter is short and mild, and usually rather dry, accounting for only about 20 percent of the average annual precipitation. Average daily maximum and minimum temperatures are about 63 degrees and 38 degrees, respectively, with an average winter temperature of about 50 degrees. There is seldom a measurable amount of snowfall and ice storms are rare.

Spring is a season of rapid transition. There are typically heavy rains in March. April tends to be dry with scattered thunderstorms making their debut for the year (Soil Survey of Beaufort and Jasper Counties).

OVERVIEW - SEA ISLANDS

The eight barrier islands within the unincorporated county (plus Hilton Head) are discussed below in order of geographic position from northeast to southwest.

(For a more in-depth discussion of each island see the Land Use and Zoning Section.)

Map 3 depicts the seven sea islands in Northern Beaufort (north of the Broad River). The dark areas and striped section (of Fripp Island) depict upland areas and the narrow white margin depicts the beach. Map 4 depicts Daufuskie Island which (along with Hilton Head) is the only sea island in Southern Beaufort (south of the Broad River). Note the substantial amount of marsh.

For a view of where the beaches are situated on each island see Maps 13-20 and explanation under Erosion - By Sea Island.

HARBOR ISLAND

Situated in St. Helena Sound, Harbor Island is the northernmost and the smallest sea island in Beaufort County. It is traversed by U.S. Highway 21 and is partly developed. The entirety of the island is a private residential and resort community with no public beach access. Harbor Island has two and a half miles of beach much of which is developed, and erosional. Most of the island is high marsh (hard pan marsh) with relatively little high ground (above 10 feet).

HUNTING ISLAND

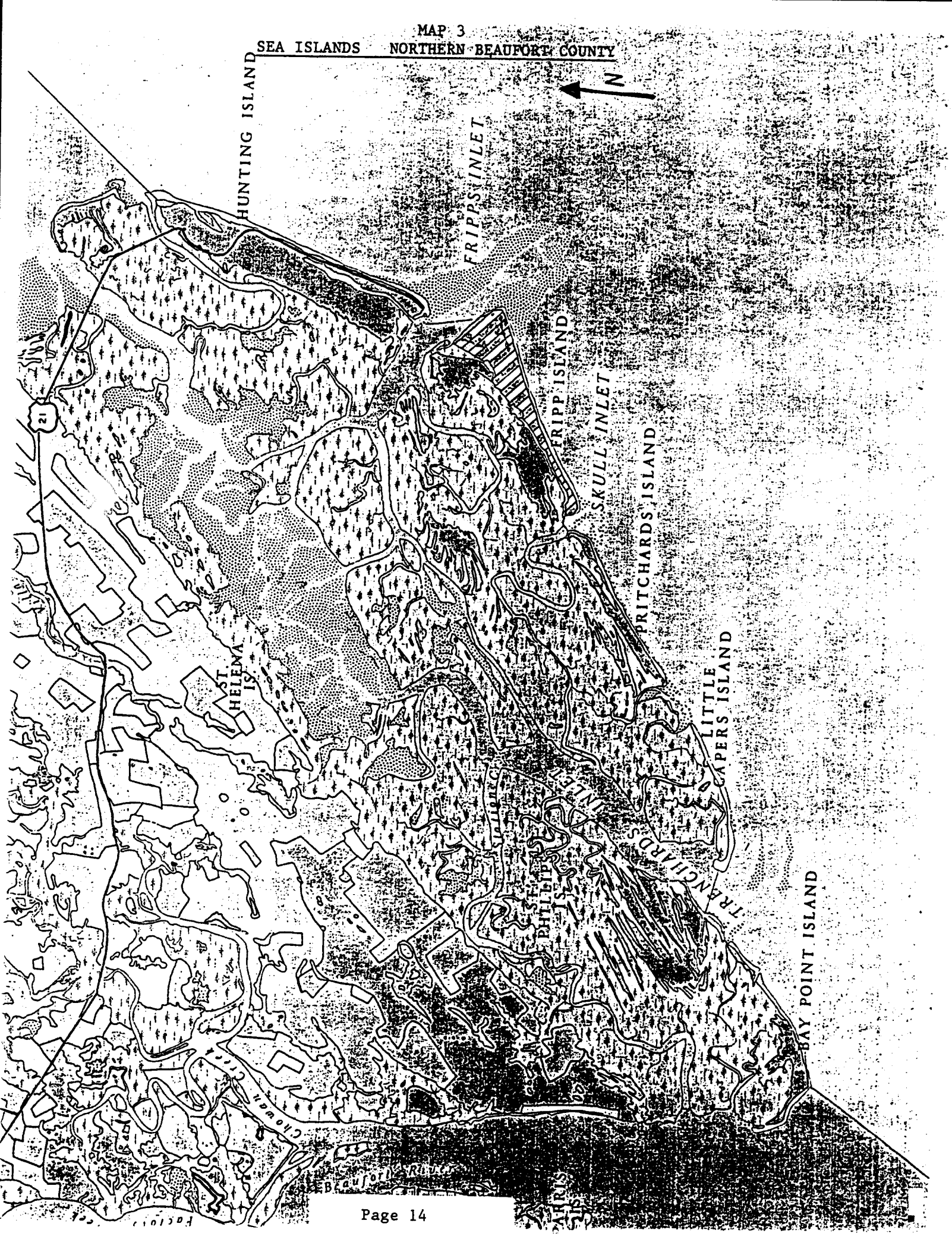
Hunting Island lies just south of Harbor Island in St. Helena Sound. The entire island is owned by the State of South Carolina and most of it is part of the Hunting Island State Park. There are approximately four miles of very wide and beautiful white sand beach which suffers from serious erosion problems. The island is the primary beach facility in Beaufort County and offers the only significant public beach access in the county outside of Hilton Head and Daufuskie Islands.

FRIPP ISLAND

Fripp Island lies south of Hunting Island and is reachable by a bridge over Fripp Inlet. It is bounded on the northeast by Fripp Inlet, on the southeast by the Atlantic Ocean, on the southwest by Skull Inlet and Skull Creek, and on the northwest by Old House Creek. Fripp Island covers a total of 4,500 acres with 2,750 acres of wetlands, and 1,750 acres of highlands. It has been

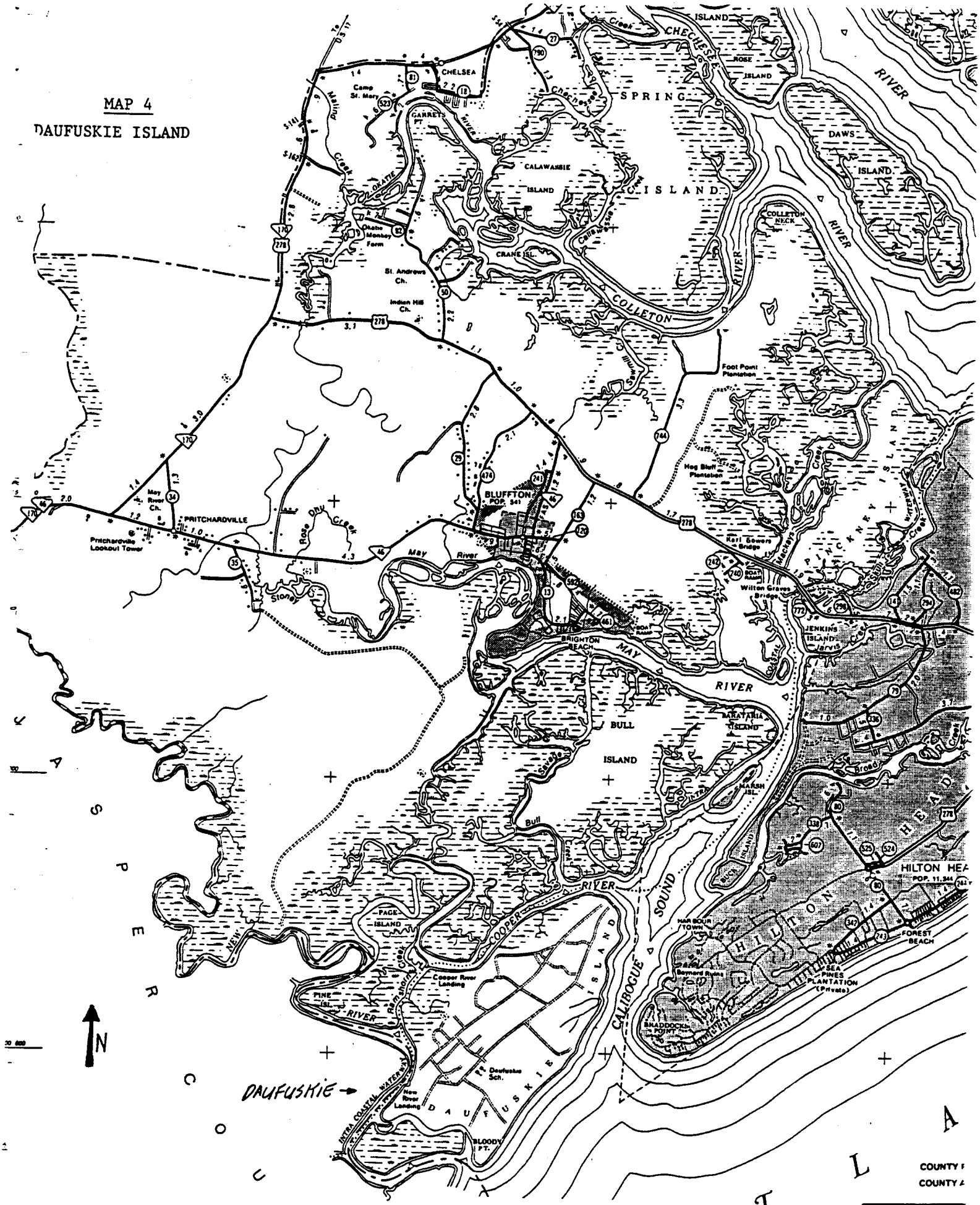
MAP 3

SEA ISLANDS NORTHERN BEAUFORT COUNTY



MAP 4

DAUFUSKIE ISLAND



under development as a private first and second home and resort community for a number of years. The Island's beach is about three miles long and is narrow due to erosion. There is a high tide beach along only one third of its length. There is no public access.

Two goals which are contained in the Fripp Island Plan from July 1989 are:

- "To protect the environment, particularly the beaches, wetland, and wildlife".

- "To prevent pollution and other problems associated with the development of coastal barrier islands"

PRITCHARDS ISLAND

Pritchards Island is southwest of Fripp Island and is inaccessible by land. It is owned by the University of South Carolina and used for education and research purposes. The island has an estimated beach length of 2.5 miles of which approximately half is littered with fallen trees (bone yard). The coast is maintained as a wildlife preserve.

CAPERS ISLAND

Capers Island lies between Trenchards Inlet and Pritchards Island and is accessible only by boat. It is a very narrow island and alternatively depicted as one or two separate island(s). The estimated beach length is 2.5 miles.

ST. PHILLIPS ISLAND

St. Phillips Island is situated in Port Royal Sound between Capers Island and Trenchards Inlet on the southeast and St. Helena Island on the north. It is inaccessible by land. The island is oddly shaped with a series of undulations. The beach is about one mile long and probably undevelopable.

BAY POINT ISLAND

Bay Point Island lies just south of St. Phillips Island at the entry to Port Royal Sound. The island is owned by Prince Faisal Mohammed Al-Saud Al Kabir of Saudi Arabia. It is accessible only by boat with 2.2 miles of white, sandy beach.

DAUFUSKIE ISLAND

Daufuskie Island is the second largest and last in the chain of barrier islands lining the Beaufort County coast. It is separated from the mainland and Hilton Head by the Intracoastal waterway and Calibogue Sound. The island is not accessible by land but the County contracts for ferry boat service to and from the island for the residents and visitors. Large scale resort development is now underway on Daufuskie Island. There is about three miles of highly eroding sandy beach with some public access.

HILTON HEAD ISLAND

Hilton Head Island forms the southwestern boundary of the mouth of Port Royal Sound and with 42 square miles is the largest of the County's barrier islands. Hilton Head was incorporated as a town in 1983 and administers its own planning and zoning ordinances. The island is accessible by land and has been under intensive development as a first and second home, and resort community for about 35 years. There are 14 miles of beach most of which is comprised of white sand and developed. About half is eroding and half is accreting. The Town has been making substantial efforts to acquire additional land for public access.

OVERVIEW OF BEACH AND COASTAL PROCESSES

Much of the information in this section is adapted from a report furnished by South Carolina Coastal Council entitled, "A Review: Coastal Processes Shaping the Coast and Erosion Control Policies".

The geomorphology of the South Carolina coast is a transition between that of North Carolina and Georgia. North Carolina's coast is predominately made up of long, thin barrier islands broken up by a few tidal inlets. Its coast is shaped mainly by wind-generated waves and currents. Georgia's coast is comprised of short, stubby barriers separated by large tidal inlets. Its coast is shaped mainly by tidal-currents. The geomorphology of the South Carolina coast results from a mixture of the wind-generated and tidal-generated forces.

Based upon coastal geomorphology, the South Carolina coast is classified into three zones running from the northern to southern borders of the state, respectively: the arcuate strand (along Myrtle Beach), the cuspate delta (at the mouth of the Santee River) and the barrier island zone (extending from Bull's Bay, north of Charleston, about 100 miles to the Georgia border)

Beaufort County is located in this barrier island zone. See Map 1.

BARRIER ISLANDS

In the barrier island zone a series of barrier islands front the coast. They are called "barrier islands" because they protect the mainland from the effects of sea storms. They average about 4.5 miles in length and are separated from the shoreline by a line of salt marsh which generally increases in width toward the south. Numerous tidal inlets separate the islands. Barrier islands are of two types: beach-ridge barriers and transgressive (erosional) barriers.

Beach-ridge Barrier Islands

Most barrier islands on the South Carolina coast are beach ridge barriers. They are characterized by extensive beach-ridge systems that were formed as the shoreline advanced. The ridges act as partial buffers to erosion. Often there is a maritime forest and wetland sloughs in the interior of the island. These island are greatly affected by the adjacent tidal inlets. Wave refraction and storm protection afforded by the delta of adjoining inlets can cause accretion of sand on the adjacent shoreline resulting in a bulbous end (Fripp Island).

Transgressive Barrier Islands

These islands are of lower relief and typically exhibit higher rates of erosion. They are characteristically straight with a thin margin of beach. Transgressive barrier islands can be the erosional end product of beach-ridge barrier islands. Lacking the storm protection provided by dunes and elevated ridges, transgressive barriers change at an extremely rapid rate. Erosion rates of up to 50 feet per year on at least one island in South Carolina have been documented.

CHARACTERISTICS OF BEACH SAND

Sand is composed of three ingredients (Ballantine, Tideland Treasure):

1) Quartz - translucent grains weathered from granite and transported by ancient rivers

2) Seashells - Calcium carbonate pulverized by the surf into a powder

3) Detritus - Decayed marine plants and animals, plankton skeletons, fecal pellets and bacteria.

Sand is classified according to grain size and the distribution, or sorting, of sizes. These classifications are important when designing beach renourishment projects, because a project which uses too fine or too coarse a sand will not last as long as one using sand that is more compatible with the native material.

According to sand grain size and sorting, three distinct groupings can be seen corresponding to the three zones of the state. The barrier islands are farther removed from their fluvial (river or stream) sediment sources and thus receive relatively little new sand. The sediments in this zone have thus undergone much reworking and are significantly finer than sediments farther north. These fine grained sands pack very well, providing a harder surface over which vehicles could easily drive.

ORIENTATION TO BEAUFORT COUNTY

COMPREHENSIVE BEACH MANAGEMENT PLAN

The Beaufort County Comprehensive Beach Management Plan herein essentially complies with the mandate of the South Carolina Beachfront Management Act and the guidelines promulgated by Coastal Council. If required inventory overlay mylar maps and ordinances are not yet completed, they will be shortly. This plan addresses each of the ten elements according to Coastal Council guidelines. In addition, many other issues and strategies which are deemed to be pertinent to effective management of Beaufort County's beaches are addressed.

The Act specified the elements required but not the methodology. Beaufort County Planning Staff developed its own methodology for this plan while, at a minimum complying with the required elements and output.

This plan focuses upon conservation of the beach system. It addresses land use and matters affecting the physical condition of the beach and adjacent areas. Issues which may be related to the beach in other ways such as boating, swimmer safety, or use of alcohol at the beach, are not addressed in this plan.

ORGANIZATION OF PLAN

Part II - Planning Components comprises the main elements of this document. Most planning component sections contain five major parts:

1) Discussion of the "General Issues"

2) The context for local planning shaped by state legislation, policies, and guidelines. Reference to the Coastal Management Act, Beach Management Act, and Coastal Council guidelines, policies and regulations are referred to in the heading as "BMA/Coastal Council Framework".

3) Discussion of the situation in "Beaufort County" in general

4) Discussion of the situation on each island - "By Sea Island"

5) Official/Recommended "Policies and Actions"

Each of these parts is centered and capitalized.

Capitalized headers are sometimes used to introduce various general subjects within a section, such as CAUSES OF EROSION within the Erosion section. Underlined headers are sometimes used to introduce specific items, such as Melrose Tract preceding

a discussion of the particular issue as it relates to the Melrose Tract of land on Daufuskie Island.

DELINEATION BY PLANNING COMPONENT

The dozen or so components of this plan are rather roughly delineated. There is a good deal of overlap and interweaving among them, e.g. the issue of Erosion comprises Erosion Control Devices and Beach Renourishment; Protection of Endangered Species is closely related to Dune Preservation; and the structures which are inventoried under Development in the Setback Zone and Strategic Retreat could as readily have been listed in the Land Use and Zoning section. Consequently, some of the Policies and Actions, as well as other points, are repeated in various sections. Elsewhere they are mentioned only once although they may be relevant to multiple components of the plan.

It may be necessary to review several sections simultaneously to glean a full picture. For example, the Land Use and Zoning section itemizes parcels and structures in the vicinity of the oceanfront and Development in the Setback Zone and Strategic Retreat lists specific structures which are seaward of or adjacent to the setback line. This need to cross reference would have been reduced if the plan was organized by sea island rather than by planning component. That approach was not taken because it appeared that the plan would be more cohesive if all information was integrated by planning component.

APPENDICES AND OVERLAY MAPS

Generally none or only a few of the appendices are distributed with this plan in the interest of conserving paper. Any of the appendices, however, are available upon specific request.

A series of large orthophoto maps and mylar overlays are included in the plan as attachments. The maps are based on aerial photography at a scale of 1" = 100', and are about 24" x 36" in size, oriented roughly parallel to the shoreline. The maps also show the baseline and the 40-year setback line.

The maps and overlays inventory a number of items, including: structures within the setback, erosion control structures, beach access points and attendant parking, drainage structures and pipes in the setback, endangered species and critical habitats, and overview of land use and zoning. These items are discussed in text form within each Component but no references are made to particular maps herein. The maps and overlays are not distributed with this plan are available for inspection by the public at the office of South Carolina Coastal Council in Charleston and at the Beaufort County Planning Board offices at 1000 Ribaut Road, Beaufort, S.C.

Legend for Overlay Maps

The following code, as prescribed by SCCC, is used on the overlay maps:

(Structure Inventory)

A - Habitable structure less than 5000 square feet in area
B - Habitable structure greater than 5000 square feet in area
C - Recreational structure, such as pool
D - Parking Lots
E - Ancillary Buildings (gazebos, pool houses, garages, etc.)

Number in parentheses after structure code indicates the number of such structures.

1 - Located seaward of baseline
2 - Located seaward of setback line (but landward of baseline)
3 - Located within fifty feet landward of setback line (outside of South Carolina Coastal Council setback zone)

(Parking - Beach Access)

1 - On street parking
2 - Off street parking

(Facilities - Beach Access)

PA - Public access point
1 - Walkover structure
2 - Restrooms
3 - Showers
4 - Lifeguard stations
5 - Handicapped access ramp
6 - Vehicle access ramp

(Miscellaneous)

ES - Endangered species
D2 - Drainage basin

See Exhibit 1 on next page for example of text contained on one particular overlay map.

HILTON HEAD ISLAND

Hilton Head Island is situated in Beaufort County. As an incorporated municipality, however, the Town of Hilton Head prepared its own Beach Management Plan.

Throughout this document the eight county barrier islands are discussed in order of geographic position from northeast to southwest. The ninth, Hilton Head, is not treated here because

EXHIBIT 1

EXAMPLE OF TEXT CONTAINED ON ONE INVENTORY OVERLAY MAP

BEAUFORT COUNTY
BEACH MANAGEMENT PLAN (BMP)
FRIPP ISLAND (Ten sheets: 57-66)

Sheet No. 58
One Overlay
Zoning: PUD 310-1
PUD Land Use Designation: Single Family
Tax District 400, Map 39

STRUCTURES:

Parcel	Structure Inventory	Structure Location
1	A	3
2	A	3
3	A	3
4	A	3
5	A	3
6	A	3
8	A	3
10	A	3
11	A	2
12	A	2
32	A	3
36	A	3

Nearly all of Fripp Island is reveted. Only ten parcels, along about 900 feet of beachfront, all shown on this sheet, are not presently reveted. This includes parcels 36, 33, 32, 1, 2, 3, 4, 5, 6, and 7.

a - Rock revetment

b - Nonreveted section

c - Kingpile groins. There are four kingpile groins at this end of Fripp Island including two shown on Sheet 57.

BEACH ACCESS:

Site	Type of Access	Facilities
2,3,4	Private - Fripp Only	1

See BMP and BMP Key to Maps for additional information

the Town prepared its own Beach Management Plan. It is discussed here occasionally, though, where reference is useful as an example or contrast.

ABBREVIATIONS

The following abbreviations are used in this plan:

- "BMA" = The South Carolina Beach Management Act
- "The Act" = The South Carolina Beach Management Act
- "SCCC" = South Carolina Coastal Council
- "PRT" = The South Carolina Department of Parks, Recreation, and Tourism
- "SCWMRD" = The South Carolina Wildlife and Marine Resources Department

* Please note: Numerous provisions contained in official documents including the Coastal Management Act, Beach Management Act, South Carolina Coastal Council Guidelines and SCCC Regulations are discussed. Generally these provisions are summarized to convey a sense of the purpose. If a reader intends to develop a project subject to the review of any official agency or to take an specific action pursuant to those provisions, he or she should consult the specific document and agency directly rather than relying upon the summaries contained in this plan.

BEAUFORT COUNTY BEACH MANAGEMENT GOALS

The purpose of the Beaufort County Comprehensive Beach Management Plan is consistent with the purpose of the State Beachfront Management Plan in terms of protection and enhancement of beach areas. Toward that end this plan complies with the requirements of the State Plan and addresses a number of additional issues which are pertinent to this purpose but not required. It should be emphasized that the primary purpose of this plan is to be a document to direct Beaufort County policies and strategies to preserve the beach. Secondly, it is executed to comply with the state mandate.

Beaufort County has established the following Goals for its Beach Management Plan:

1) To balance economic development and growth in Beaufort County with preservation of important coastal resources

2) To preserve, restore and enhance Beaufort County's beach and dune system

3) To protect beaches, dunes and native vegetation from potentially destructive human activity

4) To protect and enhance critical beach habitats for endangered and threatened species, and species of special concern

5) To provide for optimal public access to Beaufort County's beaches for residents and visitors to Beaufort County

6) To facilitate environmentally, economically, and technically sound approaches to erosion control

7) To protect and/or relocate structures and facilities along the shoreline threatened by erosion or natural disaster

8) To facilitate a general strategic retreat of development away from the shoreline in order to accommodate landward movement of the sea

9) To have in place a Post-Disaster plan for the protection of life and property, cleanup of debris, and reconstruction, and/or relocation of structures

10) To protect and enhance the water quality in the coastal zone close to the beach areas

11) To achieve the above goals while allowing for reasonable use of private property

12) To maintain a comprehensive inventory of structures, habitats, utilities, access points, erosion rate data,

drainage, and other elements in the beach zone to facilitate planning, and to update information every three to five years

13) Every three to five years, or after a major disaster, to assess the changing conditions along the shoreline from collected data, to review the beach profiles, and to revise the plan as necessary

14) To coordinate with various governmental agencies and private property owners toward these goals

POLICIES AND ACTIONS

It is intended that these Goals be met through the implementation of the Policies and Actions which are listed at the end of each planning section. Policies is operationally defined here to mean: guiding principles which should influence or determine any pertinent decisions made by and actions taken by Beaufort County; and courses of action which are broad in scope, continuous, or indeterminate in time. Actions (Near Term) refers to specific measures which should be implemented or at least commenced by January 1, 1993. Actions (Mid Term) refers to specific measures which should be implemented or at least commenced by July 1, 1994.

Such policies and actions may also be referred to in the accompanying text of that planning section. The text may include additional guidelines which should be considered part of those policies and actions.

* In adopting this plan, the Beaufort County Planning Board officially endorses these Policies and Actions and will seek to have them implemented, and have them implemented in the timeframe called for herein, to the extent practical and appropriate and to the extent that resources permit. Use of the word "will" or similar wording signifies an intended or recommended policy or action and shall not be construed so as to bind Beaufort County or the Beaufort County Planning Board to the action or policy or to render Beaufort County or the Beaufort County Planning Board liable in any manner.

LAND USE AND ZONING

The uses to which land is put is key to the effect upon the beach, both land uses upon/adjacent to the beach and elsewhere. Zoning and attendant development standards are the major tools of local governments in shaping, directing, and limiting land use.

LAND USE AND ZONING - BEAUFORT COUNTY

BEAUFORT COUNTY AREA PLANS

Beaufort County prepares a separate comprehensive plan for each geographic area within its boundaries (except for Hilton Head) including Port Royal Island, Northern Beaufort, Lady's Island, St. Helena Island, Fripp Island, Southern Beaufort, and Daufuskie Island. Planning issues concerning the beaches are discussed in the respective area plans. The six sea islands - Harbor Island, Hunting Island, Pritchards Island, Capers Island, St. Phillips Island, and Bay Point Island - which do not have their own area plans are covered in the St. Helena Island Plan.

OVERVIEW OF ZONING DISTRICTS

Beaufort County instituted county-wide zoning for the first time in April 1990. Most of the areas adjacent to beaches are zoned for low to medium intensity residential uses, consistent with goals and policies established in area plans. Five of the islands - Hunting, Pritchards, Capers, St. Phillips, and Bay Point Islands - are zoned Rural Development District (RDD) in entirety.

The entire island or areas adjacent to beach areas on the other three islands - Harbor Island, Fripp Island, and Daufuskie Island - are zoned Planned Unit Development (PUD). Under a PUD the developer proposes his own land uses, densities, and development parameters under a Master Plan. Once the Master Plan, with any amendments, is approved by County Council its prescriptions constitute the zoning for that land. The particular land uses permitted for each specific PUD are discussed in more detail below.

Rural Development District

Rural Development District (RDD) permits single or multi-family uses up to a density of four units per acre, agricultural uses and institutional uses. No commercial or industrial uses are permitted. The complete zoning district text is contained in

Appendix 5. It is possible that RDD provides for too much density on these environmentally sensitive islands.

Low density single family use in areas adjacent to the beach is desirable in order to provide for greater flexibility in siting buildings. A reclassification to Rural Agricultural District (RAD) should be explored. RAD allows for single family uses at a density of two per acre (minimum one half acre lots), agricultural uses and institutional uses. No multifamily or commercial uses are permitted.

Conservation Preservation District

The marsh and open water areas around each of the sea islands is zoned Conservation Preservation District (CPD). The CPD is designed to protect the most sensitive environmental areas and is generally used to designate areas which are in the public domain. The district permits limited uses, including nature preserves, docks and boat houses, marinas, public utilities, and parks. The complete zoning district text is contained in Appendix 6.

Beach Development (Overlay) District

Two zoning overlay districts also apply to sections of all of the islands - the Beach Development (Overlay) District and the Flood Hazard (Overlay) District.

The Beach Development (Overlay) District was established for the purpose of preserving native vegetation, maintaining dune stability and assuring public access to beaches. Key provisions include:

- Section 4.17.1: "No primary dune shall be leveled, breached, altered, or undermined in any way nor shall primary dune vegetation be disturbed or destroyed, with the exception of construction of boardwalks or similar beach access which have minimal effect on the natural features of the dune."

- Section 4.17.5: "No structure shall be constructed within forty feet landward of the crest of a primary sand dune or seventy-five feet landward of mean high water, whichever is greater, except for beach cabanas of four hundred feet and less on elevated pilings or beach boardwalks on elevated pilings."

This ordinance is an important vehicle for realizing many of the goals of this plan. A number of modifications are in order, however. Recommended amendments are stated throughout the plan under the Actions section.

The complete existing zoning district text is contained in Appendix 1.

Flood Hazard (Overlay) District

The Flood Hazard (Overlay) District was established for the purpose of protecting future development from the effects of rising tidal waters associated with probable future hurricanes. The District consists of that area designated on Official Flood Hazard Area Maps of Beaufort County and is specifically defined by reference to indicated elevation figures measured from mean sea level for each designated flood hazard area. This district affects all of the sea islands.

Section 4.18.4 (A) is a key provision: "Construction of a residential structure (or commercial structure in the case of a commercial business subdivision) on that lot lying within a flood hazard area, shall have as a minimum first floor elevation the level of the 100-year flood or above as designated on official County flood plain maps."

The complete existing zoning district text is contained in Appendix 4.

LAND USE AND ZONING - SEA ISLANDS

There follows a delineation of the specific land uses and zoning provisions for each of the eight sea islands.

HARBOR ISLAND - Land Use and Zoning

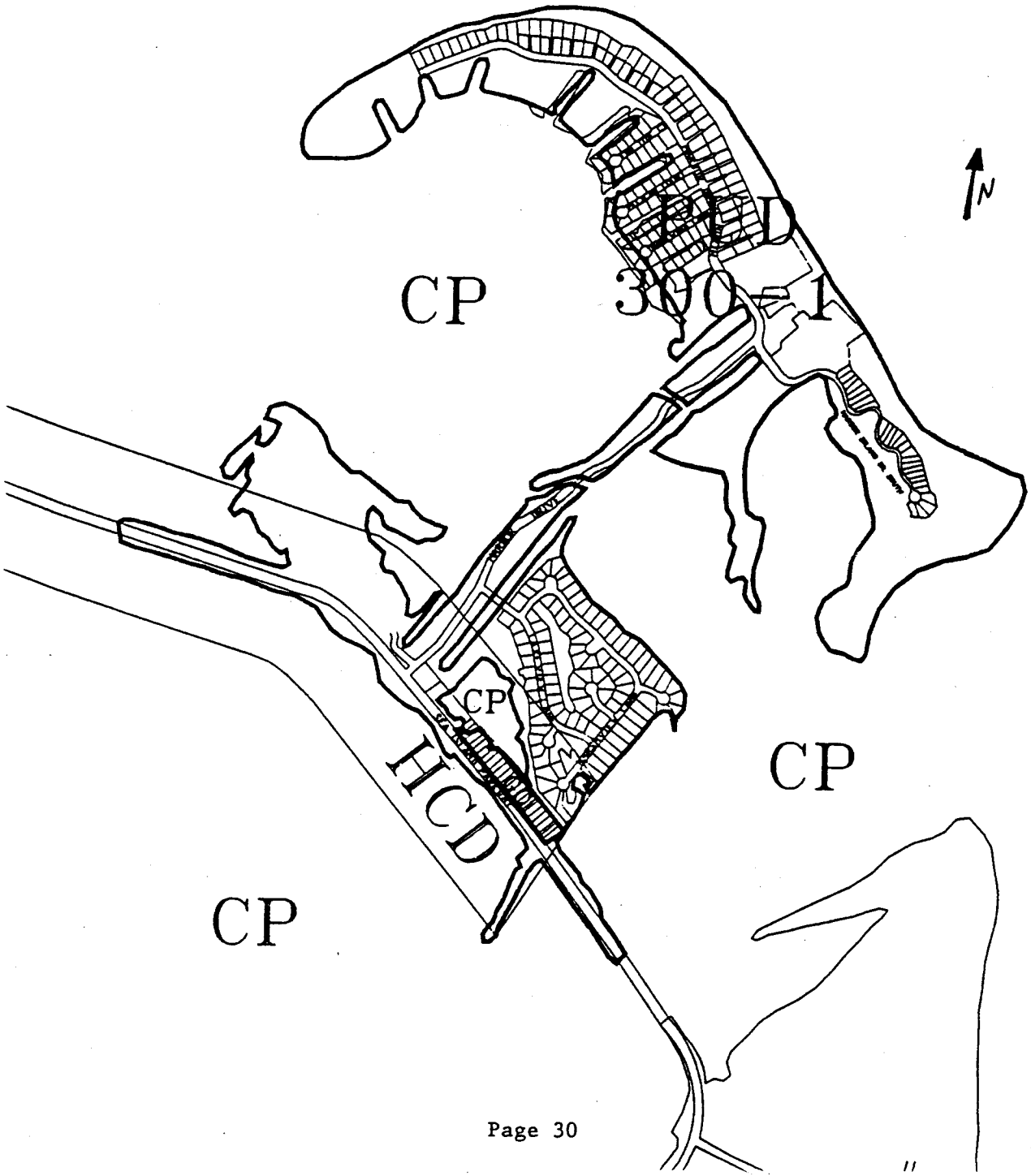
Harbor Island is the northernmost sea island in Beaufort County and is situated in St. Helena Sound. Most of the island is zoned Planned Unit Development including the area along the shore and a section adjacent to U.S. Highway 21. All of the land within the PUD as well as the island road system is in private ownership. There is a security gate at the entrance just off U.S. 21 and only owners, residents and guests are permitted in.

The Master Plan calls for moderate density single and multifamily residential uses and community facilities. A number of platted lots along U.S. Highway 21 lie outside of the PUD. To date Harbor Island is rather sparsely developed relative to the density provided for in the Master Plan. Most of the current development is now occurring on the northern part of the island. See Map 5.

According to the County Assessor's maps, approximately 67 oceanfront parcels ranging in size from .1 acre to .3 acre have been platted for single family residential use along the two-and-one-half miles of the shoreline on Harbor Island. On the northern part of the island there is a double bank of house lots on the seaward side of the road. Between the ocean lots and road there are an additional 19 parcels. These parcels have easements

MAP 5

HARBOR ISLAND



through the intervening lots leading to the ocean. Several large parcels along the shore in the center of the island are designated for multifamily use - villas/apartments - and community facilities including a tennis club and conference area.

HUNTING ISLAND - Land Use and Zoning

Hunting Island lies just south of Harbor Island in St. Helena Sound. It is accessible from U.S. Highway 21. The entire island is zoned Rural Development District and owned by the State of South Carolina. Most of it has been maintained as the Hunting Island State Park since 1938 and is administered by the Department of Parks, Recreation, and Tourism (PRT). See Map 6.

Hunting Island is three miles long and one mile wide including 5,125 total acres with 2,000 acres of upland and 3,125 acres of wetland. The island's features include forest, marsh, lagoon and approximately four miles of beach. All of the beach is preserved for public use. Approximately 750,000 people visit the park annually.

Facilities include day-use beach access, 200 camping sites with water and electrical hook-ups located on the northern part of the island. There are fourteen park cabins available for rental: nine are on the beach and five are just across the road from the beach. They have two or three bedrooms with a sleeping capacity of six to ten.

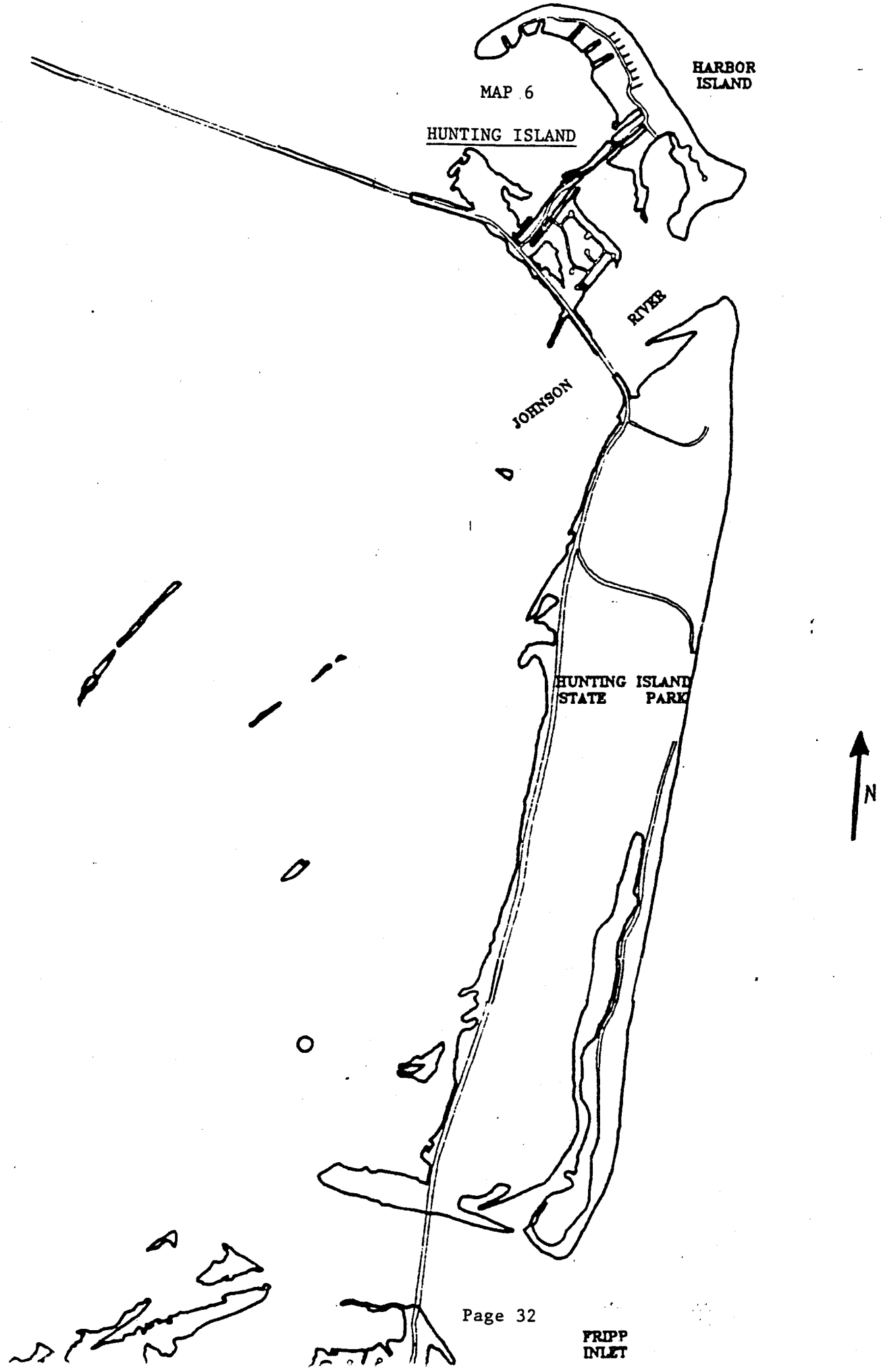
The park is a great public resource for activities in addition to its beach. It possesses the best developed slash pine-palmetto forest in the state and is an outstanding place to observe the South Carolina state tree, the Cabbage Palm, or Palmetto, in its native habitat. There are two nature trails and a marsh boardwalk.

There are wildlife observation points, a fishing pier, two nature trails and a marsh boardwalk. There is a picnic area with three shelters, an interpretive center, a part store. The park's lighthouse built in 1873, is a significant landmark. It was moved to its present location in 1889 to escape beach erosion.

When the park was created in the 1930's a tract of land on the south beachfront was divided into lots and leased for private beach homes. There are now 30 other privately owned cabins interspersed among the fifteen park cabins. Hunting Island officials would prefer that these properties not be in private ownership but it is uncertain whether PRT will attempt to acquire them or renew the leases when they start to expire in ten years.

MAP 6

HUNTING ISLAND



FRIPP ISLAND - Land Use and Zoning

Fripp Island lies south of Hunting Island and is reachable by a bridge over Fripp Inlet. The island includes a total of 4,500 acres with about 2,750 acres of wetlands and 1,750 acres of upland. Of those 1,000 to 1,200 acres are considered to be buildable.

The entirety of Fripp Island is zoned as a Planned Unit Development. It has been under development as a private first, second home and resort community for a number of years. The approved Master Plan specifies a maximum density of 2.56 dwelling units per acre and depicts 177 oceanfront parcels stretching along the entire three miles of shoreline on Fripp Island. Two areas along the shoreline are designated for commercial, multifamily and recreational uses.

800 acres have been developed on the island. In 1989 there were 570 single family dwelling units had been built on Fripp Island. As platted, the number of single family units could reach 1,296 at build-out. In 1989 there were 331 multifamily dwelling units on the island with an estimated 662 units at build-out. If the South Pointe area of the island is developed in the future, the total dwelling units at build-out could reach 2,765. See Map 7.

Commercial activity on the island is limited to one general store, a real estate office, three restaurants, a gift shop, a pro shop, and a few service businesses operated from homes. There is a marina with mooring and docks and privately owned boat storage facilities.

PRITCHARDS ISLAND - Land Use and Zoning

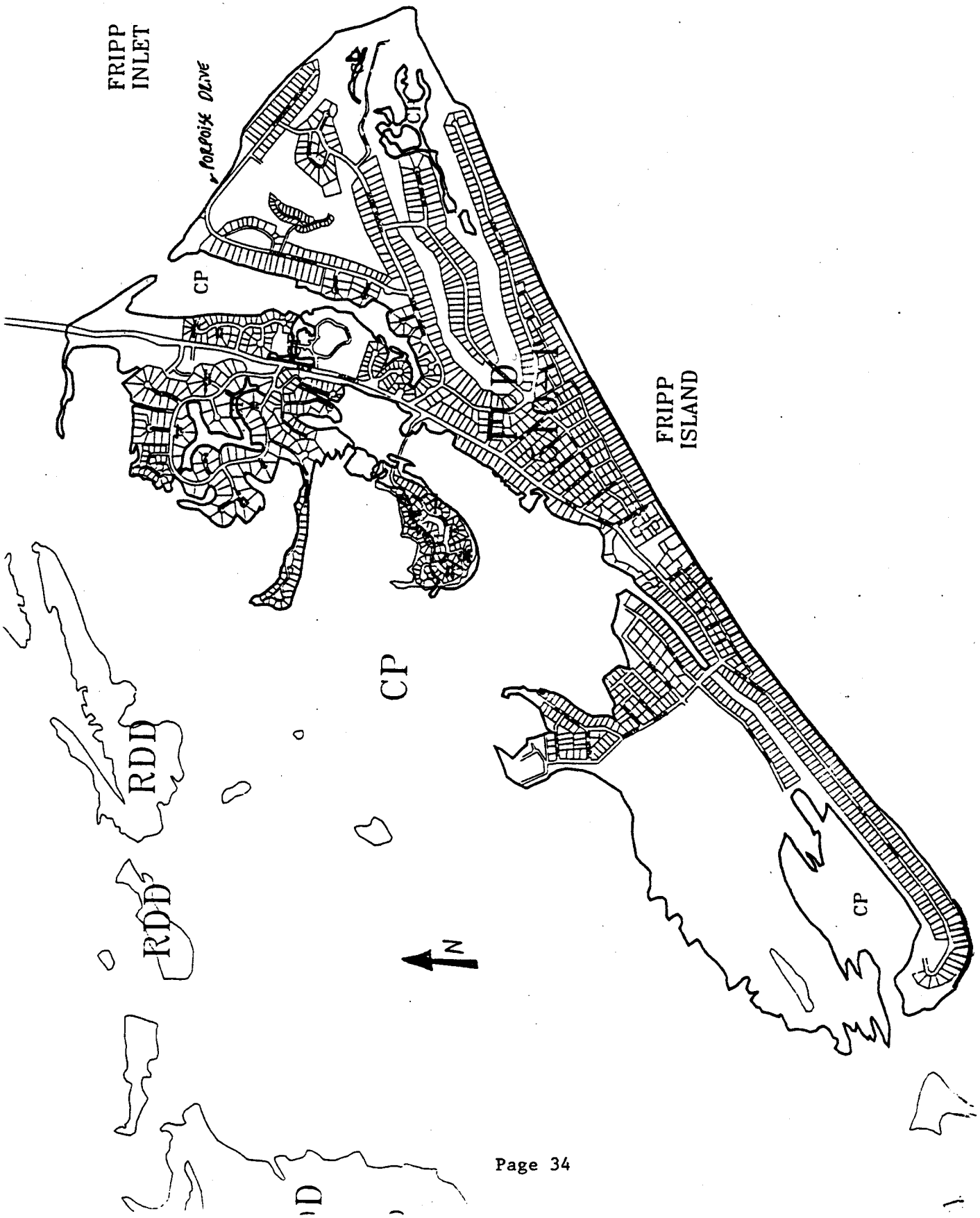
Pritchards Island lies to the southwest of Fripp Island. It is owned in entirety by the Research and Development Foundation of the University of South Carolina and is used for education and research.

The island contains 2,950 acres of which 750 acres are highlands and 2,200 acres are wetlands. There are approximately 900 acres of maritime forest on the island. The two and one half mile shoreline is maintained as a wildlife preserve and no residential buildings have been erected thereon. Pritchards Island is zoned Rural Development District and has been subdivided into two parcels only. See Map 8.

A development concept for the island was announced in 1973 but there have been no further indications of significant development on the island since that time. It is unlikely that any will occur in the foreseeable future: the island is difficult to reach due to the lack of land access and its remote location. There is only one general use road on the island.

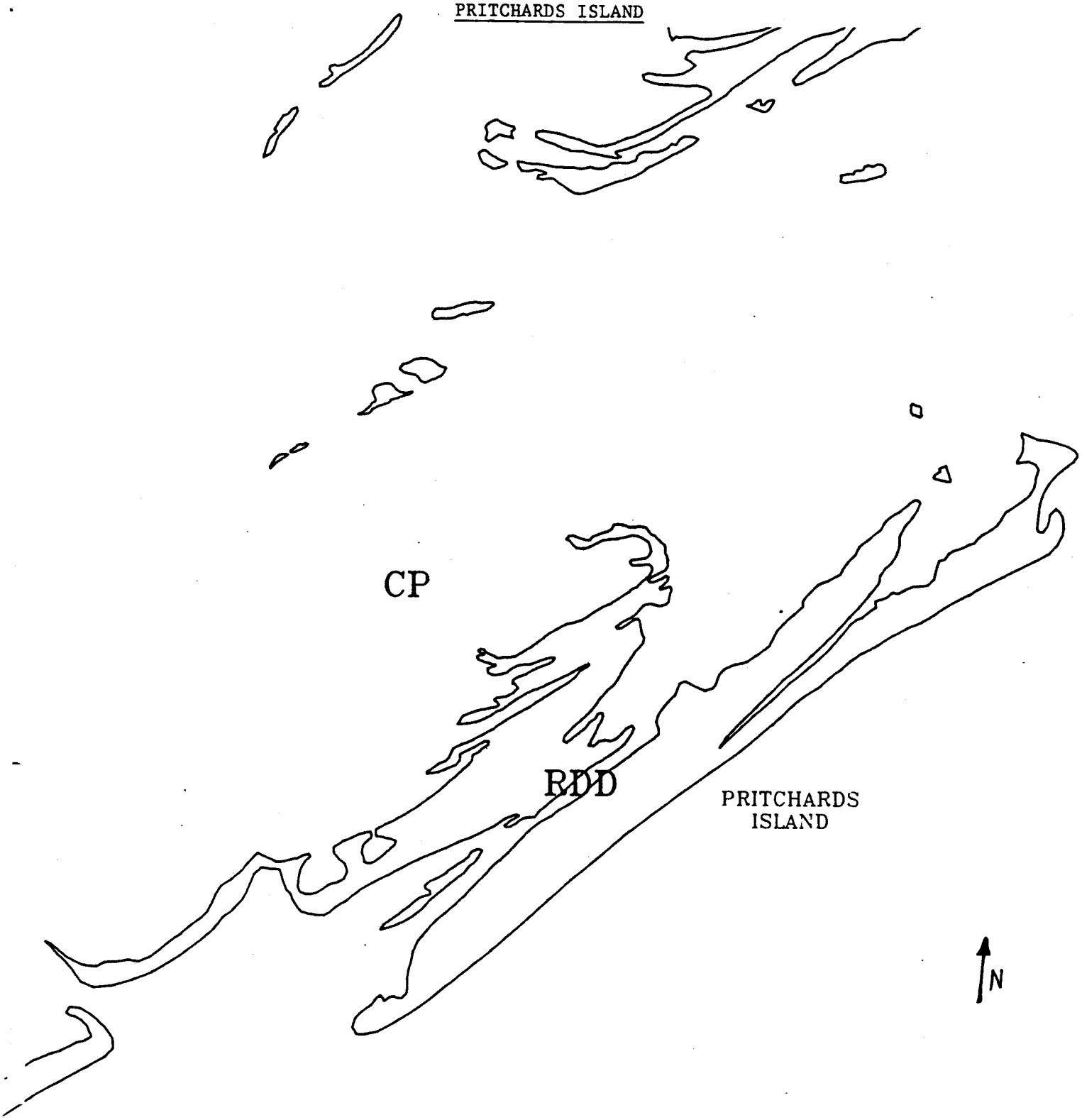
MAP 7

FRIPP ISLAND



MAP 8

PRITCHARDS ISLAND



In May 1992 the Philip Rhodes Research Facility on the island was completed. The building replaced the existing bunkhouse that was used for the loggerhead turtle research program. There are also plans to erect a boat dock on Skull Creek Inlet. The Beaufort County Development Review Board has approved the project subject to the construction of a boardwalk over the sand dunes, the granting of a dock permit from the South Carolina Coastal Council, and approval from the Corps of Engineers regarding impacts to internal wetlands.

CAPERS ISLAND - Land Use and Zoning

Capers Island lies between Trenchards Inlet and Pritchards Island. The island is zoned Rural Development District and has 2,100 acres with 120 acres of upland and 1,980 acres of wetland. It is subdivided into approximately 150 small lots primarily used as fishing camp sites. Most of the lots are situated along the shore and a number of them are assessed as "nominal value due to erosion". Some hold trailers or small cabins. There are a total of three cabins on the island. See Map 9.

It is unlikely that the island will be developed in any significant way due to its remote location and the lack of land access. The shore is about two and a half miles long and is in natural condition.

ST. PHILLIPS ISLAND - Land Use and Zoning

St. Phillips Island is situated in Port Royal Sound between Capers Island and Trenchards Inlet on the southeast and St. Helena Island on the north. The island is comprised of 4,750 acres of which 1,250 (800 according to the County Assessor's Book) are uplands and 3,500 are wetlands.

The island has not been subdivided at all and is owned in entirety by Ted Turner, the media magnate based in Atlanta. It is zoned Rural Development District. There are two structures on the island, both residences, one occupied by Mr. Turner when he visits and one for a worker. The beach is about one mile long and is probably undevelopable. See Map 10.

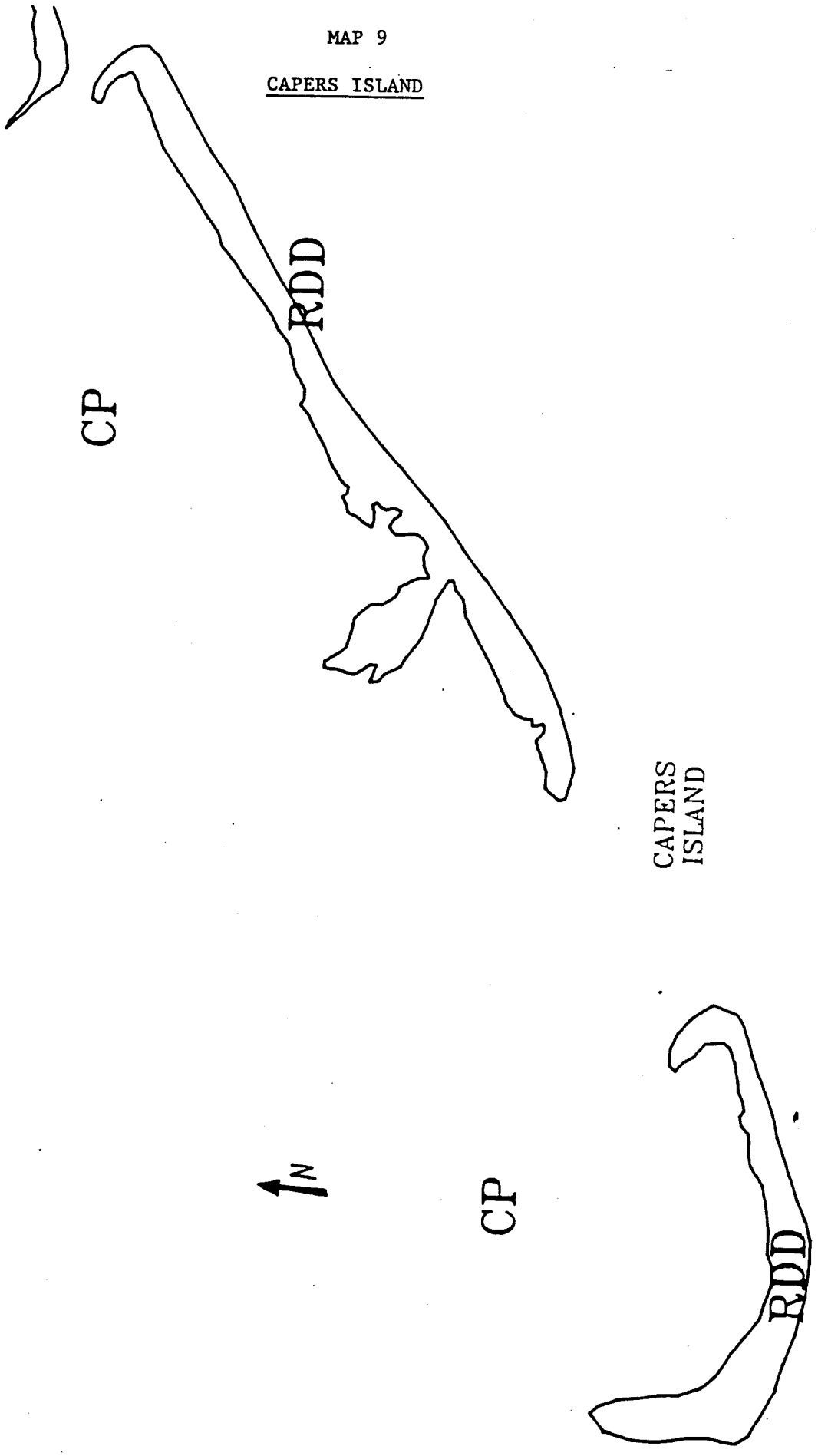
St. Phillips Island is inaccessible by land. Development plans in 1978 called for a 7000 foot bridge to be built from the St. Helena mainland with private funds. That plan has since been abandoned. It is unlikely that any significant development will occur in the foreseeable future.

BAY PT. ISLAND - Land Use and Zoning

Bay Point Island is situated at the entry to Port Royal Sound, at the southernmost tip of St. Helena Island and just south of

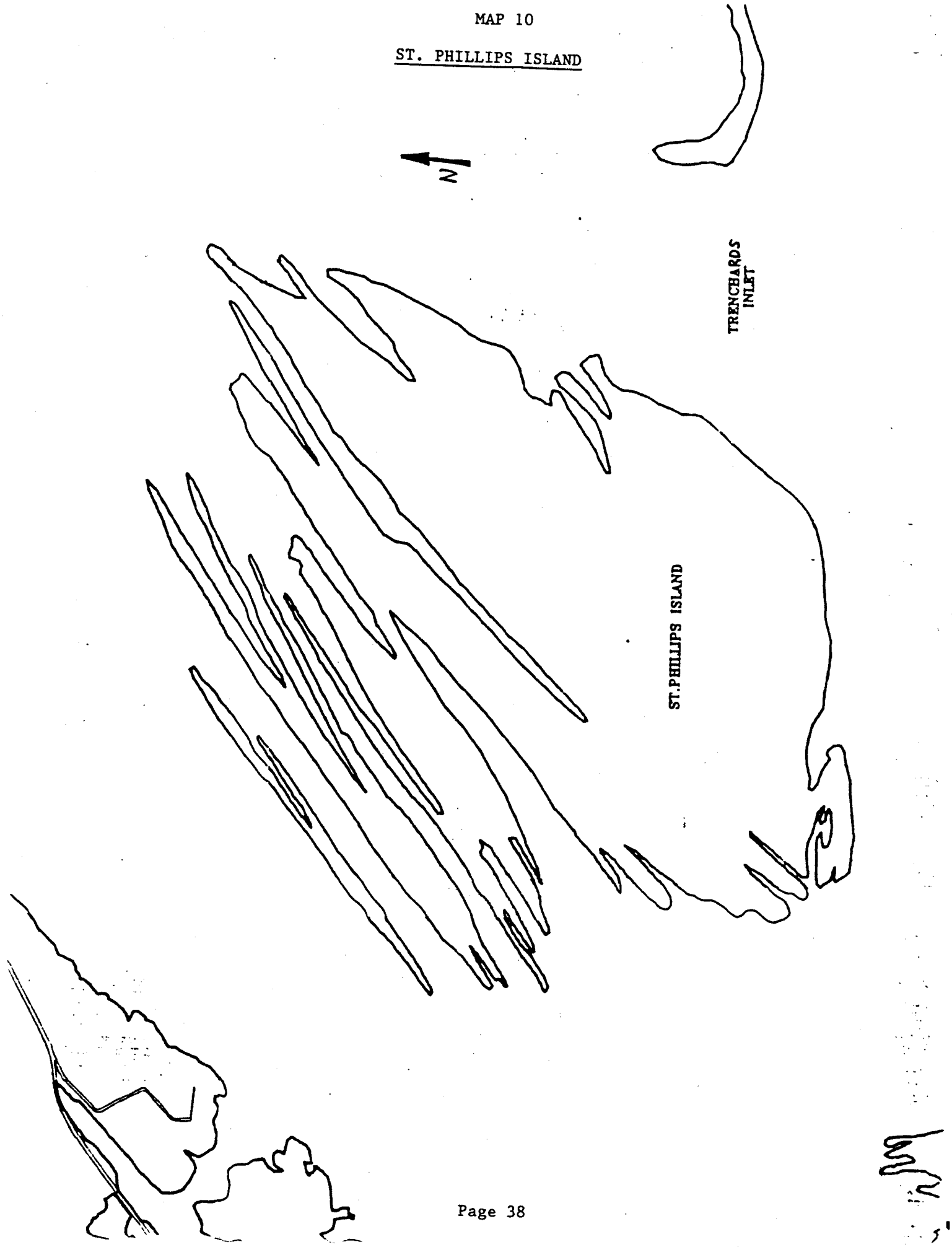
MAP 9

CAPERS ISLAND



MAP 10

ST. PHILLIPS ISLAND



St. Phillips Island It is zoned Rural Development District and contains 1100 acres with 185 acres of uplands and 915 acres of wetlands. The beach is 2.2 miles long. See Map 11.

The island has not been subdivided at all and is owned in entirety by Prince Faisal Mohammed Al-Saud Al Kabir of Saudi Arabia through his company Yamamah Ltd. of Columbus, Georgia. One building (but not the land beneath it) is owned by another party. Faisal purchased the island in August 1984 for $3.5 million. Yamamah Ltd. filed bankruptcy and the island had been listed for sale at $5.9 million.

There is only one building, and no water wells or power lines on the island. The island is reachable only by boat. At low tide, the island is connected to St. Phillips Island. Due to its remote location and lack of land access it is not expected that any significant development will occur on the island in the foreseeable future.

DAUFUSKIE ISLAND - Land Use and Zoning

Daufuskie Island is the southernmost, and second largest, in the chain of barrier island lining the Beaufort County. The island consist of 5,200 acres of uplands and 950 acres of salt marsh. It is five miles long and 2.7 miles wide at its widest point. Daufuskie is separated from the mainland and Hilton Head by the Intracoastal waterway and Calibogue Sound.

The island is not accessible by land but there are several public and private ferries which serve the island (See Beach Access section for details.)

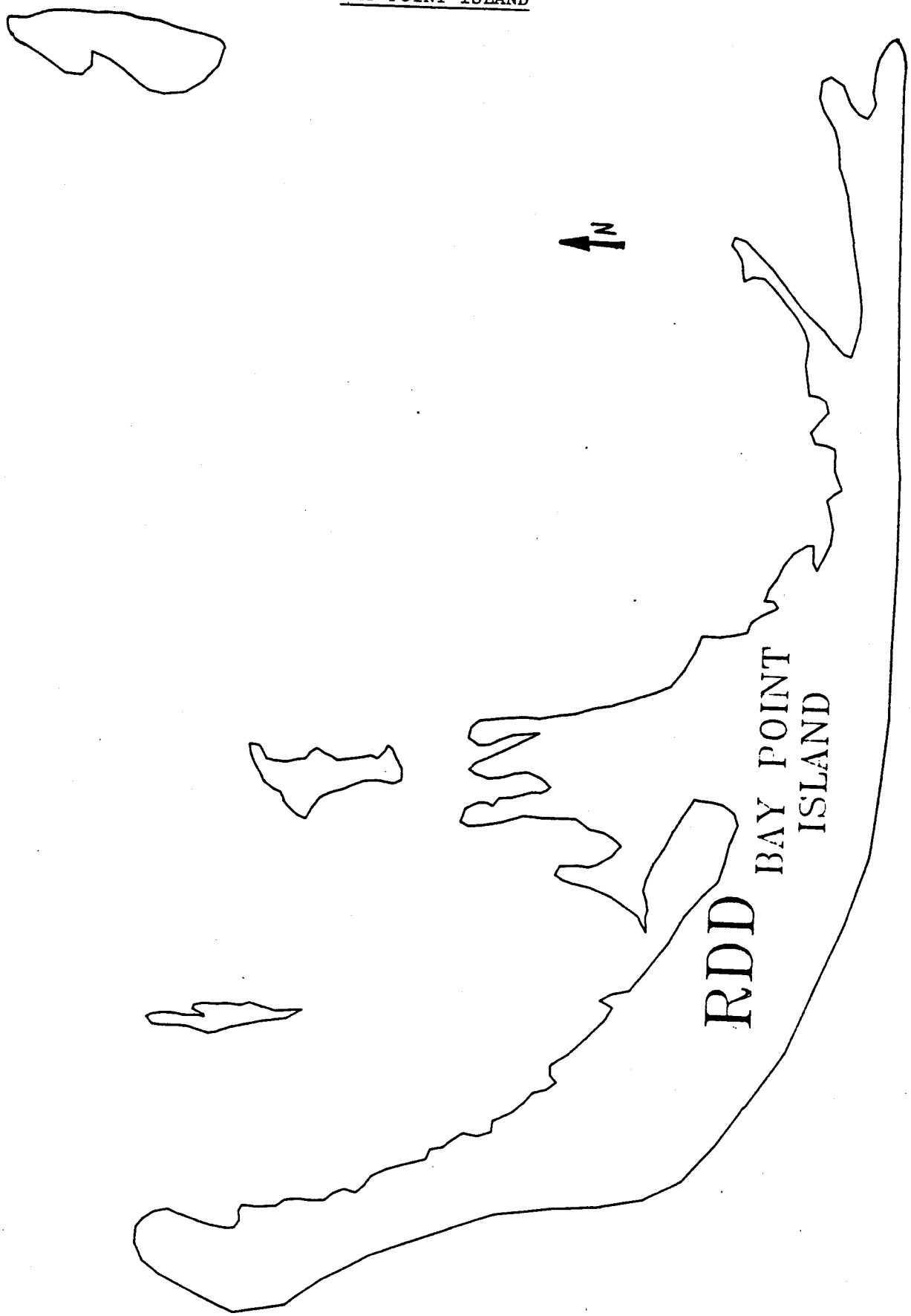
Large scale resort and residential development is now being carried out by several large development companies along the three mile shore on the southeastern part of the island. Prior to development there were only 160 permanent inhabitants. It was estimated (1990) that 132 acres on Daufuskie Island are zoned for general commercial use. Very little land is used for commercial purposes at present.

The Coastal Council setback zone runs through three major development tracts on Daufuskie Island. From northeast to southwest, they are: Melrose, a Planned Unit Development developed by the Melrose Company; Oakridge, a largely undeveloped tract; and the Daufuskie Island Club which is currently being developed by the Melrose Company on land that has generally been referred to as the Bloody Point tract. The Haig Point Plantation is a Planned Unit Development being built in the coastal area to the northeast of Melrose, but it lies outside of the setback area.

Another large PUD constituting 741 acres is located on the Webb Tract of land well inland from the beach area. Most of the rest

MAP 11

BAY POINT ISLAND



of the island is owned by long-standing local families. See Map 12.

Melrose Tract

The Melrose Tract is a 750 acre Planned Unit Development. This is a resort rather than permanent home community. The Master Plan calls for 100 cottage homes, 350 single family homes, and a 52 room inn, The gross density of the project is one dwelling unit per acre. Development is well underway.

There is a 12,000 square foot golf and tennis clubhouse building which includes a pro shop, locker rooms, offices, a lounge and a restaurant. There are two tennis courts with grass banked seating for spectators, a beach club, and horse stables.

Oak Ridge Tract

The Oak Ridge Tract is 532 acres. Plans were developed for 81 single family cluster homes on 27 acres and 199 single family units on 205 acres. The remaining 300 acres was designated for recreational and open space use with a clubhouse, golf course, and beach club planned.

In April 1991 the Oak Ridge tract was listed for sale by its owner, Plantation Land Company, a subsidiary of Halliburton Company. International Paper Realty Corp. of South Carolina allowed a purchase option on the land to expire in the spring of 1990.

Daufuskie Island Club

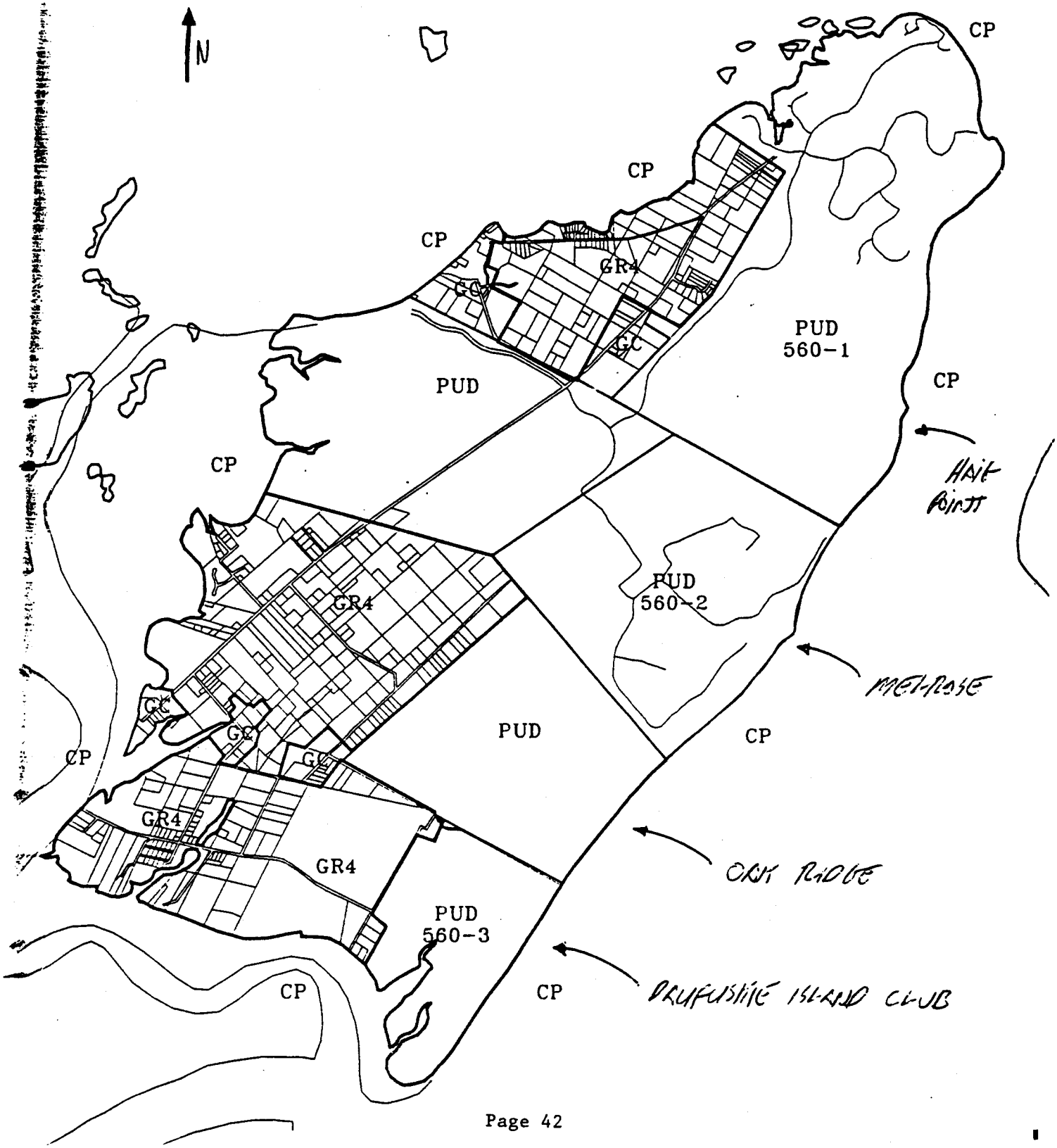
The 540 acre Daufuskie Island Club property is situated on the southern tip of Daufuskie Island. There is about a mile of frontage on the Atlantic Ocean and approximately 3/4 mile of frontage on Mungen River.

The Melrose Company is developing a low density ocean and golf course residential community with 35 two-acre oceanfront estate lots and 64 one-acre fairway sites on the eastern and western edges of the 18-hole golf course in the center of the property. Located roughly in the center of the beachfront is the "Ocean Village" which will include a 35,000 square foot clubhouse with a restaurant, a 68-bedroom guesthouse, 15 cottages, a pro shop, and a beach club with a pool.

Plans call for a four slip community dock and pier on the Mungen River, an 80,000 gallon per day capacity sewer plant to serve the single family home sites.

MAP 12

DAUFUSKIE ISLAND



Haig Point

The Haig Point Tract is situated on Calibogue Sound and the Cooper River. It lies outside of the Coastal Council setback area. The site contains 1,058 acres and is being developed as a Planned Unit Development. Plans call for 474 single family homes on 462 acres and 100 multifamily dwellings on 20 acres. 14 acres are set aside for commercial use. The gross residential density is 0.5 dwelling units per acre. The project includes a clubhouse, beach club, equestrian center, tennis club, and 29-hole golf course.

LAND USE AND ZONING - POLICIES/ACTIONS

POLICIES - Land Use and Zoning

- All land use plans, zoning ordinances and other pertinent county documents will be consistent with the Goals and Policies established in this plan.

ACTIONS (Mid Term) - Land Use and Zoning

- Review the appropriateness of the current zoning classification (Rural Development District) of the five islands - Hunting, Pritchards, Capers, St. Phillips, and Bay Point for possible downzoning to Residential Agricultural District.

ACTIONS (Near Term) - Land Use and Zoning

1) Amend the Beach Overlay District to key it to the baseline and setback lines.

2) Consider establishing varying setbacks for different types of land uses within the Beach Overlay District beyond the existing 40 foot no-build zone (akin to the River Conservation Overlay District)

3) Clarify which uses and conditional uses in the Beach Overlay District may be allowed seaward of the 40 foot no-build line.

4) Investigate establishing vegetated buffers and enhanced landscaping in the Beach Overlay District.

BEACH ACCESS

GENERAL ISSUES

South Carolina claims ownership of all land below the mean high water mark and thus most of the beach, maintaining the intertidal zone in trust for the public. All citizens have a right to use this land. The beach itself may be public but if all of the land between the beach and the public highway is in private ownership, the only way for citizens to reach the beach without trespassing is by boat. Even those who own boats would need a place to dock.

The coastal area is growing rapidly intensifying the issue. Greater population means more demand for beach access and continued development along the shoreline means the potential loss of traditional accessways to the beach.

Parking is critical in planning for access. Other considerations include handicapped access; signage; and the provision of rest rooms, changing facilities, and refreshments.

BEACH ACCESS - BMA/COASTAL COUNCIL FRAMEWORK

The Beach Management Act of 1988 states that the policy of South Carolina is to "preserve existing public access and promote the enhancement of public access to assure full enjoyment of the beach by all our citizens including the handicapped."

It is the policy of the South Carolina Coastal Management Program not to expend public funds for beach erosion control measures including renourishment projects unless the public has full access to those beaches. It would not be fair to use public funds to renourish a beach which was effectively a private reserve. Local governments are required to make efforts to improve public access as a condition for Beach Management Plan approval.

REQUIREMENTS/CRITERIA FOR ACCESS

Coastal Council has developed criteria for determining the accessibility of a beach area, and thus the eligibility for renourishment funds, as follows:

1) There must be reasonable provision for transportation facilities including automobile parking, bicycle racks, public transit, or boat landings. Facilities must be available on a year round basis and fees, if charged, must be nominal and serve only to offset actual costs.

2) The public must have complete access.

3) It must be clear that the public has legal right to use access points. Prescriptive easements and uncertain land claims are not sufficient.

4) All parking must be within 500 feet of the landward-most point of access and must be clearly marked. Consideration of parking beyond 500 feet is made on a case-by-case basis.

5) Access points must be clearly marked with an approved access sign.

6) There must not be a physical barrier, i.e. an inlet or seawall, unless a pedestrian walkway or bridge is provided.

Coastal Council policy links renourishment funds to specific areas of the beach which are determined to offer full and complete access. The distance from the access point which is considered to be accessible depends upon the facilities which are available at the site. If, for example, there is a parking for 6 vehicles, improved surface access, proper signage, and a trash receptacle, then 1/8 mile of the beach in both directions from the access point - 1/4 mile total - is considered accessible. In the event that renourishment funds were available then 1/4 mile of beachfront would be eligible. See Table 1 - Types of Beach Public Access Facilities.

SOURCES OF FUNDS

There are various sources of funds which could be used to purchase and/or develop these beach access sites and/or facilities. These funds could be pursued by Beaufort County, the State of South Carolina, and/or private entities.

Coastal Council will request funds for access improvements through the annual grant request and recommendations for funding developed in conjunction with the South Carolina Department of Parks, Recreation and Tourism. SCCC may also seek funds for public access through the National Oceanic and Atmospheric Administration. Council funds can be used by local entities to develop sites and to match other funds acquired from PRT or other sources.

There follows a review of sources for funding for acquiring and developing beach access sites.

FEDERAL SOURCES

1) 306-A Funds: Section 306-A of the Coastal Zone Management Act has in the past been used to improve public access to beaches. Types of projects which are eligible include land acquisition, walkovers, parking lot improvements, and restrooms.

Table 1. TYPES OF BEACH PUBLIC ACCESS FACILITIES

Type of Facility	Distance on either side of access points which will be considered as Full and Complete Access	Minimum Facilities
Public Access Point	1/8 mile	Trash receptical, walkover/improved surface access, signage, on-street parking for 6 vehicles
Local Public Access Park	1/4 mile	As above, parking for 10 vehicles
Neighborhood Public Access Park	1/2 mile	As above, showers, restrooms, parking for 25 vehicles
Community Public Access Park	3/4 mile	As above, lifeguards, concession, handi-capped access and parking, parking for 75 vehicles
Regional Public Access Park	1 mile	As above, parking for 150 vehicles and greater

2) NOAA: Funds from the National Oceanic and Atmospheric Administration (NOAA) funneled through Coastal Council could be used to purchase and develop new sites.

STATE SOURCES

All of these are administered through the South Carolina Department of Parks, Recreation, and Tourism.

1) Land and Water Conservation Fund: This is a 50/50 competitive matching grant program to acquire and develop outdoor recreation areas. Beaufort County government would be eligible. There is a high demand for available money. In 1990 the fund had about $300,000. No project can receive more than 10% of total available amount.

2) South Carolina Recreation Land Trust Fund: The purpose of this program is to assist in the acquisition of state level recreational sites. Funds to local governments are limited to the hard costs of acquisition only. The maximum funding is $25,000 per project unless the project is of regional scope or statewide significance. It is then eligible for up to 50% of the total site acquisition costs.

3) South Carolina Parks and Recreation Development Fund (PARD): This is a noncompetitive grant program for the planning and development of new parks and recreation facilities or the renovation of existing facilities. Up to 80% of total project costs may be covered. Eligible activities include: planning (master planning, environmental and other studies); construction of facilities (roads, parking areas, facilities, utilities, improvements to natural resource features); and renovation of existing structures.

LOCAL SOURCES

1) General Tax Revenues

2) Local Option Sales Tax Revenues: The newly passed South Carolina local option sales tax could be used for access improvement projects. While it is required that a sizeable portion of these funds be used to roll back property taxes, some of the revenues could be used to fund beach projects.

3) Accommodations Tax: Local governments in counties collecting more than $50,000 annually are required to spend a portion of the accommodations taxes collected on tourism-related expenditures. Beach projects would qualify.

4) User Fees: Charge an entrance fee for use of public parks and beaches.

5) Mitigation Bank: A program could be established whereby Beaufort County would assess a fee for construction within the setback area and use the funds for beach access improvements or other projects.

BEACH ACCESS - BEAUFORT COUNTY

Unfortunately, promotion of beach access is not as central an issue in Beaufort County as in other beachfront communities. Consider the eight sea islands.

The shorelines and all adjacent areas of Harbor Island and Fripp Island are owned and controlled by private parties - developers and property owners' associations. These are gated communities which presently permit no entry to the general public for use of the beaches. It would not be appropriate (nor legal) to compel them to permit beachgoers to move through their property. Hunting Island is owned and operated by the State of South Carolina as a public park and thus complete public beach access is achieved.

The remaining five barrier islands - Pritchards Island, Capers Island, St. Phillips Island, Bay Point Island, and Daufuskie Island are reachable only by boat and it is quite unlikely that bridges will ever be built linking them to the mainland. Given the extensive surrounding marsh systems issuance of environmental permits would be unlikely and for most of the islands the cost would be prohibitive.

Nonetheless, enhancing beach access is a meaningful goal of Beaufort County. There are measures which can be taken.

Beaufort County does not own any beachfront property. The County should investigate acquiring beachfront land on the Trenchard's Inlet Islands to land bank in the event that any of the islands are ever connected to the mainland by roads. Such property could be an appropriate site for public park on the beach with a boat landing or docking facilities. Ferry service might be established. The prospects of bridge development are remote given the diminutive size of most of the islands and extensive intervening marsh systems. Notwithstanding, the long term possibility of bridge construction remains.

BOAT LANDINGS

There are 26 public boat landings scattered throughout Beaufort County. Most have parking areas with the number of spaces ranging from zero to one hundred. People who own boats could launch from a landing and come ashore near the beach on a barrier island. At present the only public boat landing on a barrier island (other than Russ Point Landing on the back side of Hunting

Island and Johnson's Creek Landing on the back side of Harbor Island) is located on Daufuskie Island - the Daufuskie Island Dock and Float. It is owned and maintained by the county. This landing is on the New River about 1/2 mile south of Ramshorn Creek about three or four miles from the beaches.

Beaufort County should explore establishing one or more boat landings on the beach islands. The acquisition of one or two acres of land would be sufficient to accommodate the landing and a small park area. Naturally, no parking facilities would be needed. Admittedly, this approach is of very limited efficacy in providing for beach access to the public. See Appendix 13 - Beaufort County Boat Landings, Fishing Piers, and Bridge Platforms.

Beach Development (Overlay) District

In 1974 Beaufort County Council voted to obtain public beach access via county purchase rather than by requiring that private developers provide it. This policy is incorporated into the Beach Development (Overlay) District whereby parties who develop more than 1000 feet of beachfront are required to grant a limited option to Beaufort County to purchase public accessways to that beach. However, due to the high values of beachfront property and tight county budgets, the county has not acted upon this provision.

If the creation of public accessways to the beach is dependent upon major expenditure of Beaufort County funds it is not likely that this would be achieved. It might be appropriate to require that land for accessways be set aside in new developments if costs and inconvenience to those property owners or developers are minimized. This prospect is of limited reach, however. Virtually all of the Beaufort County beachfront is already developed or inaccessible. The only remaining tract that would be affected by such a provision is the Oakridge Tract on Daufuskie Island.

BEACHES OUTSIDE OF NATURAL BEACH AREAS

There are a number of sand beaches throughout Beaufort County that are not located on the Atlantic Ocean. Some possess natural sand deposits and others have been artificially created by imported sand. Frequently, waterways which are dredged for improved navigation provide sources for such sand. These areas tend to be relatively small beaches and periodic renourishment is required.

Some of these include: Alljoy Beach on the May River near the Town of Bluffton; a beach near the Port of the Town of Port Royal at the confluence of Battery Creek and the Beaufort River; Land's End Beach on the Beaufort River on St. Helena Island; and

beaches on the Coosaw and Morgan Rivers. Where it is physically, administratively, financially, and legally practical, efforts should be made to preserve and enhance these beaches and to establish others.

ALLJOY BEACH

Alljoy Beach is an artificially created, vest-pocket sized, sandy recreational beach area situated on the May River, in Bluffton Township. There is a small landscaped area with a few concrete seats, a trash barrel that is emptied by the residents, and no restroom facilities. It is located near a Beaufort County boat landing.

The Southern Beaufort Subcommittee of the Planning Board has asked the planning staff to investigate the possibility of Beaufort County Council acquiring Alljoy Beach. Residents of the Brighton Beach neighborhood have expressed concerns about the beach, and it was suggested that some of these problems might be resolved through county ownership.

Historically, the beach was used and maintained exclusively by Brighton Beach residents. It is now used by the general public, including people from Bluffton Township, Beaufort County north of the Broad River, and Savannah. Consequently, the residents need help with the management of the beach area. There are complaints about excessive litter, teenage drinking and inadequate policing on the part of the sheriff's department. The beach requires physical maintenance that is beyond the capacity of the neighborhood. Periodically, the County Department of Public Works has trucked in sand and renourished the beach (if it is not renourished, eventually it will completely erode). Otherwise, no public services or facilities are provided.

The residents seem to seek an approach which provides for some county services but retains neighborhood autonomy. It is possible that they would grant a quitclaim deed to Beaufort County. Although, the actual ownership of the beach in unclear due to an old easement granting access to residents of the area and state ownership of the road and land below mean high water.

The Beaufort County Attorney believes that an acceptable "color of title" could probably be obtained if nearly all of the residents of the area signed quitclaim deeds. However, if the county acquires the property, there is some question about potential exposure on the part of the county. The facility would not warrant hiring a lifeguard and yet if there were a swimming accident would Beaufort County be liable?

HARBOR ISLAND

Harbor Island is a private island with a security gate and as such there are limited opportunities for public beach access. All parking lots and garages on Harbor Island are in private ownership. Parking areas not on individual lots are for guests and/or visitors to Harbor Island. During the development of the Harbor Island Master Plan provisions were made by the developer to allow limited public access to the beach.

There is a paved area near the beach on South Harbor Drive just east of the Cedar Reef Villas with space for six cars that is reserved for the public to use the beach. There is a beach access point nearby. According to Nancy Wright, of the Property Owners' Association, the guards at the gatehouse are aware of this and will permit up to six automobiles to pass through for this purpose. Entry into the development for the public, however, is only granted to use this beach access. If any individual is found elsewhere on the island he would be considered a trespasser. Ms. Wright stated that individuals on bicycle or on foot may also enter Harbor Island to use the beach. This has been the policy in practice but it is not codified as such.

Harbor Island should be encouraged to increase the number beyond six, however, by providing additional parking areas or permitting parking on the roads inside the development. Arrangements could also be made for additional parking outside of the PUD by Beaufort County or perhaps by private parking lot operators, allowing for beachgoers to walk through the gate to the beach. Such parking facilities might or might not qualify toward full and complete access as defined by Coastal Council, since it would be located more than 500 feet from the access point.

According to Coastal Council's criteria, even with access limited to only six vehicles, if trash receptacles, walkovers, and signage are provided - either by Harbor Island or by Beaufort County - 1/8 mile of beach on either side of the access point would be considered full and complete access and thus be eligible for renourishment funding. With provision of parking for 10 vehicles this increase to 1/4 mile on either side. However, such an arrangement should not be made in anticipation of qualifying for renourishment funds. 1/4 mile is probably too short a stretch of beach to support a successful project.

There are 12 private dune walkovers/accessways usable by anybody inside of the development. Easements are in place to permit parties to use the walkways which extend over private lots.

HUNTING ISLAND - Beach Access (and general use)

Hunting Island lies just south of Harbor Island in St. Helena Sound. It is accessible from U.S. Highway 21. The entire island is owned by the State of South Carolina and most of it is part of the Hunting Island State Park. There are approximately four miles of white sand beach open to the public. The island is the primary beach facility in Beaufort County and offers the only public beach access in the county outside of Hilton Head and Daufuskie Islands.

The park and beach are very accessible. There are 17 boardwalks/walkovers on the northern end of the beach. Although the entire beach is open to the public, there is no direct beach access in the southern half of the island where the cabins are located, other than for inhabitants of the cabins (see below).

PARKING

There is room for about 1000 cars in the park including both designated spaces and extra spaces alongside the roads. Parking is also provided for buses and other large vehicles at selected locations in the park. The longest walk to the beach from parking areas is about 100 yards so the beach is readily accessible for people who are less mobile, including those in wheelchairs.

USAGE AND FEES

Approximately 700,000 people (+/- 50,000) visit the beach annually, with roughly 550,000 day users, 140,000 campers and 4000 people staying in cabins. In this calculation one person staying in a cabin or at a campsite for seven nights would be counted as seven people; three people renting a cabin or campsite together for one night would be counted as three people. The number of day visitors is estimated based on traffic counts on the island.

Hunting Island is open year round seven days a week from 6:00 a.m. until dark. Visitors may come for the day or rent campsites and cabins for longer stays. All of the sites are available on a first-come, first-served basis except for two sites which are reserved for the handicapped. The fee per night for a campsite is $15 during peak season - April 1 to October 1 - and $11 the rest of the year. The campground is generally full on weekends during the summer but otherwise operates below capacity.

From about April 1 to October 1 day visitors are charged a parking fee of $3 per car and $15 per bus. A season pass costs $25. Outside of those months, there is no charge for parking.

There is no other charge for using the beach; those who walk or ride bicycles to the beach would thus enter for free. But a negligible number do.

CAMPING AND CABINS

There are 200 camping sites with water and electrical hook-ups located on the northern part of the island. There are fourteen park cabins available for rental. Nine are on the beach and five are just across the road from the beach. The cabins have two or three bedrooms with a sleeping capacity of six to ten. All campsites and cabins are situated a short walk from the beach. There are restrooms and concession facilities.

The overall occupancy rate for the year for cabins is 85% but they are used solidly throughout the week from March 1 to November 1. Over 2000 requests for rentals are received during the summer, many of which are probably for weekend or week-long stays. With fifteen weeks/weekends in the summer season only 10% of the applicants (14 cabins x 15 weeks = 210 opportunities) are able to obtain cabins for the week or weekend. The fee is $60-70 per night year round.

Clearly, there is an unmet demand for cabin rental. Park officials would like to build more, probably further away from the beach between the lagoon and US Highway 21.

PRIVATE CABINS

When the park was created in the 1930's a tract of land on the south beachfront was divided into lots and leased for private beach homes. These 30 privately owned cabins are interspersed among the fifteen park cabins which are privately owned and sit on land leased from the department of Parks, Recreation and Tourism. Hunting Island officials would prefer that these properties not be in private ownership and would like to reclaim the lots for future use by the public. However, it is uncertain whether PRT will attempt to acquire them or renew the leases when they start to expire in ten years. Most of the private cabins would not meet park standards; rehabilitation would perhaps cost in the range of $25,000 per cabin.

CAPACITY

In spite of the sizable demand for campsites and cabins during the summer, concern about the capacity of the beach itself to serve the expressed demand would probably be unwarranted. Beachgoers are never turned away. The average visitor would

likely not think the beach too crowded other than on weekends in May and June, the peak season for day users. At that time there may be 5000-8000 people in the park and on the beach. At any rate, Marshall West, the former park superintendent, does not know of anybody ever asking for a refund on the $3 parking fee due to overcrowded conditions.

WHO USES THE BEACH?

One would assume that not many day users would travel over two or three hours to come to the park and beach. Therefore the majority of beach users probably live less than 100 or 150 miles away. It is not known how many of these people are from Beaufort County, but Marshall West ventured a guess that one half could be, including many Marines. Within a given year people might come from 40 states to use the cabins. Probably but a fraction of one percent are from Beaufort County. It is likely that a higher proportion of county residents use the campground but the number is still probably less than one percent.

CONCLUSION

Hunting Island is of critical importance in providing beach access to the public for the region. It appears that the park is successfully fulfilling its function as the major beach resource for Beaufort and the region. For day use there is substantial public access and capacity is probably not an issue. For those wishing to walk or travel a very short distance to the beach and for those expecting a more private setting with fewer people or strictly local residents Hunting Island is not sufficient. Such expectations, however, may not be realistic.

The challenge in preserving access does not appear to be capacity but rather preservation of the physical beach in the face of the continuous onslaught of the sea. A beach renourishment project on Hunting Island was conducted recently. It is expected that large scale renourishment efforts will be needed regularly.

FRIPP ISLAND - Beach Access

Fripp Island is a private island with a security gate and as such there is no public beach access. The island is accessible by a bridge over Fripp Inlet which is owned by the Fripp Island Property Owners Association. The bridge is generally in good condition and is not posted to capacity. All land adjacent to the beach and the island road system is in private ownership. The options for enhancing public access are limited.

The beach is narrow due to extreme erosion. There are 32 beach access points, all along the beachfront, which allow for access to interior lots. There are walkways over dunes where appropriate.

There is no off-street parking on Fripp Island, for beach use or otherwise. This is a problem for property owners as well as for visitors. The property owners are contemplating purchasing land and building off street parking in a few places on the island. The areas contemplated are presently zoned for private dwellings, so rezoning would be required. There are three abandoned lots at the west end of Tarpon Boulevard which are informally used for parking.

As discussed for Harbor Island, Fripp Island could issue a certain number of passes to the general public permitting travel to designated parking areas and the beach area only. Unlike Harbor Island, there is probably no available land immediately outside the development where additional parking spaces could be built.

Given the substantial erosion at Fripp Island, the property owner's association might have an incentive to allow public access in exchange for prospective assistance in renourishing the beach.

PRITCHARDS ISLAND - Beach Access

Given the inaccessibility of Pritchards Island the immediate threats to public access and the opportunities for access are limited.

Beaufort County should investigate acquiring parkland adjacent to the beach and developing a boat landing or dock for public use. This would make the beach accessible to private boaters. A public or private ferry system might be established to bring visitors from the mainland to the beach and park, and to enjoy other resources on the island. Given that the University is carrying out a public function it might cooperate with the county or with Parks, Recreation, and Tourism in such an endeavor.

There is an 11 foot by 22 foot floating dock in Skull Creek. Use of this dock by the public should be investigated.

CAPERS ISLAND - Beach Access

Given the inaccessibility of Capers Island the immediate threats to public access and the opportunities for access are limited.

Beaufort County should investigate acquiring parkland adjacent to a beach and a boat landing or dock for public use. This would

make the beach accessible to private boaters. A public or private ferry system might be established to bring visitors from the mainland to the beach, park, and other resources on the island.

Most of the shoreline of the island is subdivided into approximately 150 small lots which are primarily used as fishing camp sites. Perhaps several of these lots could be assembled for public purchase. Given that a number of them possess "nominal value due to erosion", the owners might donate the lots.

There are no walkover/access public structures on Capers Island.

ST. PHILLIPS - Beach Access

Given the inaccessibility of St. Phillips Island the immediate threats to public access and the opportunities for access are limited.

Beaufort County should investigate acquiring parkland adjacent to a beach and a boat landing or dock for public use. This would make the beach accessible to private boaters. A public or private ferry system might be established to bring visitors from the mainland to the beach, park, and other resources on the island. The owner, Ted Turner, has been responsive to various public causes. Perhaps he would cooperate with Beaufort County in this endeavor.

There are no public dune walkover or access structures on St. Phillips Island.

BAY PT. ISLAND - Beach Access

Given the inaccessibility of Bay Point Island the immediate threats to public access and the opportunities for access are limited.

Beaufort County should investigate acquiring parkland adjacent to a beach and a boat landing or dock for public use. This would make the beach accessible to private boaters. A public or private ferry system might be established to bring visitors from the mainland to the beach, park, and other resources on the island.

The island has many historical and natural resource features which would enhance its use as a park facility. Given that the island has been offered for sale and the financial situation of the owner, an opportunity may be presented.

There are no public dune walkover or access structures on Bay Point Island.

DAUFUSKIE ISLAND - Beach Access

The island is not accessible by land but unlike the four Trenchard's Inlet islands there is regular ferry service provided by various parties (see below).

There has been some discussion about developing a County-owned recreation area on the island. However, no action has been taken.

DAUFUSKIE ISLAND PLAN

Assuring adequate public beach access is a stated goal of the 1985 Daufuskie Island Plan. The Plan recommended that the County Council exercise its option to acquire two new public beach access points and parking areas in the Oak Ridge and Melrose Tracts. It advocated acquiring additional areas for parking in the Bloody Point Tract (now the Daufuskie Island Club).

In the Daufuskie Plan three areas were proposed for public beach parking areas:

1) an area between Oakridge and Bloody Point Tracts (see Daufuskie Island Club, below)

2) an area between Melrose and Oakridge Tracts (see Melrose Tract, below)

3) an area close to the Bloody Point Cemetery (see Bloody Point Tract, below)

These goals are being met in part. The first area is developed and open to the public; the second area could potentially be opened if the county chose to develop an existing easement; and the public will be granted partial access to the third.

TRANSPORTATION TO/FROM AND ON DAUFUSKIE

There is limited transportation available to and from the island. The County contracts for ferry boat service to and from the island for its some 160 inhabitants and occasional visitors. The county and state government pay for one ferry trip for members of the general public at no charge each Monday and Friday. The Beaufort County School District also contracts for ferry boat service for all middle school and high school students to travel to and from the Hilton Head Island schools. Haig Point and Melrose operate their own ferry boats for their workers and residents of the developments and visitors.

In mid-May of 1991 the State Highway Department approved a grant

of $25,000 to provide an additional 60 round trips to Daufuskie Island from Hilton Head Island in 1991. When school is not in session the County ferry will run three days a week instead of the present two days a week. The funds will also allow for an additional 13 trips on weekends and five on holidays.

Improved access to ferry service for the general public should be explored, especially on weekends. A more significant obstacle is ground transportation on the island. There is some distance to travel to beach areas and no regular service by van, taxi, car rental, or bicycle/moped rental.

Daufuskie Island Club

There is one beach access road maintained as an easement along and inside the eastern boundary of the Daufuskie Island Club property, next to the Oak ridge tract. This two lane dirt road constructed within a 100' easement runs down to the beach from Pappy's Landing Road, a public way, and there is informal space for about 60 cars close to the beach in unpaved areas amidst the trees. In this section there is a sun shelter, gazebo, walkway with wheelchair capacity leading to the beach and an access way for emergency vehicles. Parking space could be expanded by cutting some trees. This entire access road and public area was developed at private expense by the Melrose Company.

According to Coastal Council guidelines this would be considered a "Local Public Access Park" and providing for full and complete access 1/4 mile in either direction. If there is no signage in place, however, it would need to be installed. See Table 1.

The development of restroom and shower facilities is encouraged since this site is several miles away from the dock and any other public domain.

Bloody Point Cemetery

The new access road is available to the public seven days a week, 24 hours a day. The road also leads to the Bloody Point Cemetery and the Mungen River.

A covenant on the land allows visitors to go to the Bloody Point Cemetery located near the southwestern tip of the Daufuskie Island Club property about 800 feet beyond the terminus of the baseline. The cemetery is right on the Mungen River and only 100 yards from a sandy beach area on the river. This beach area winds around a short distance to join the ocean beach. Visitors to the cemetery, and those wishing only to use the beach, could perhaps use the beach without difficulty on an informal basis.

Up to six vehicles will be permitted at one time to visit the cemetery 24 hours per day by picking up one of six passes at the gate. The passes will be available without charge and visitors can remain as long as they wish. There is also a private boat dock near the sandy area. Subject to authorization boats from the mainland might tie up here and walk a short distance to the beach. There are no plans to install any facilities at this part of the tract for public use.

Since this area is outside the beach zone and there is no improved surface access, this would not officially be considered a public access point.

Oak Ridge Tract

It would appear that the existing public access point on the border of the Daufuskie Island Club and Oak Ridge tract would satisfy much of the demand for beach access. Nonetheless, establishment of access within Oak Ridge, in the future when a development plan is formulated is encouraged. Alternatively, the owners of Oak Ridge might sell or donate land adjacent to the existing access point for expansion of parking or erection of restroom/shower facilities.

Melrose Tract

An easement was given for public beach access on a strip of land along and inside the entire southwestern boundary of the Melrose Tract from School Road, a public way which runs along the northwestern boundary of the property, to the beach. There is an area that could potentially be used for parking about halfway down the easement.

Beyond this area is a trail leading to the beach. The section adjacent to School Road is wooded and power lines run along the easement. In order to make it usable the county would need to cut trees and install a road. Given the tight placement of the power lines there might not be room for a two lane road, unless the road were to extend onto the adjacent Oakridge tract. Alternatively, the entire easement could be developed as a walking trail if parking was established at School Road.

CONCLUSION

Provision of public beach access on Daufuskie is being addressed, albeit with some limitations. As an island accessible only by boat that is undergoing development, Daufuskie may serve as a model or frame of reference for potential future development on other islands in the vicinity of Trenchard's Inlet.

BEACH ACCESS - POLICIES/ACTIONS

POLICIES - Beach Access

1) Private beach communities that do not promote access should pay the full cost of any beach management/nourishment project in that community.

2) In the event that Federal or State monies are available through Coastal Council to acquire beachfront property, seek to obtain such funds.

3) Preserve and enhance existing sand beaches outside of Coastal Council beach zones.

ACTIONS (Mid Term) - Beach Access

1) Work with Fripp Island community to formally establish provisions for limited public access.

2) Investigate establishing parks, docks, boat landings, and/or ferry service to Pritchards, Capers, St. Phillips, and Bay Point Island which would be usable by the public. Given the historical features of Bay Point Island, it might be especially suitable for a public park.

3) Seek to expand ferry service to Daufuskie Island to regular hours and weekends. Make information about ferry service available to the public.

4) Seek to establish program for ground transportation on Daufuskie Island from embarkation points to beaches through public or private means. Contact PUD developers and property owner's associations about prospective public use of overland transportation vehicles.

5) Investigate development of easement for beach access inside Melrose Plantation on Daufuskie Island.

6) Investigate acquisition and development of public parkland adjacent to the beach on Daufuskie Island.

7) Seek to expand restroom facilities at Daufuskie Island boat landing.

8) Seek to develop restroom and shower facilities at Daufuskie Island Club access site.

9) Seek to establish new sand beaches throughout the county outside of Coastal Council beach zones in both estuarine rivers and in freshwater wetlands and lakes.

10) Explore establishment of mitigation fund whereby any construction within the setback area would be assessed a fee with monies to be used for access improvements or other purposes such as renourishment.

11) Examine potential funding sources for acquiring Atlantic Ocean beachfront property, determine which island(s) are most suitable for potential public use, and develop strategy to effect actual acquisition.

ACTIONS (Near Term) - Beach Access

1) Explore revising the Beach Development Overlay District to require developers of new beachfront projects to provide public beach access according to certain parameters.

2) Coordinate with Harbor Island community to foster greater use of limited public access provision. Post sign in designated area stating that it is for public beach parking. Encourage Harbor Island to increase the number beyond six vehicles.

3) Coordinate with the Melrose Company to establish signage at the Daufuskie Island Club access site if none exists.

4) Create a policy for which facilities, if any, are to be provided by Beaufort County at beach areas to meet criteria of public access, including parking, trash receptacle, walkovers, signage, restrooms, shower facilities, lifeguard stations.

5) Seek to acquire Alljoy Beach at no cost/low cost if this is determined to be administratively practical and would not expose Beaufort County to significant legal exposure.

EROSION

EROSION - GENERAL ISSUES

NATURE OF EROSION

The beach is a dynamic system, continually changing and shifting. During the winter strong winds and stormy weather produce powerful ocean waves which pound the beach, erode the sand and redeposit it onto offshore bars. In early spring milder waves and winds wash over the beach returning the sand, bringing a wider beach. Ideally, the summer accretion and winter erosion balance each other and the beach retains the same width over the course of the years. However, in many cases the erosional part of the cycle prevails and the beach slowly washes away ("How to Build a Dune").

Erosion is a natural process. It becomes a problem mainly when it threatens buildings that are positioned too close to the beach. Much of the development along the shore in the last several decades has taken place on what is actually a temporary position of the shoreline. Over the long term a landward and upward movement of the barrier beaches has occurred with beaches and sand dunes shifting. See Figure 1.

GLOBAL PERSPECTIVE

The erosion occurring along South Carolina's beaches is not unique to this area. It has been estimated that the shorelines in the United States lose on average between one and three feet of beach per year due to natural causes. The U. S. Army Corps of Engineers, concluded that there are 20,000 miles of eroding shoreline in this country, nearly 3,000 of which are classified as critically eroding.

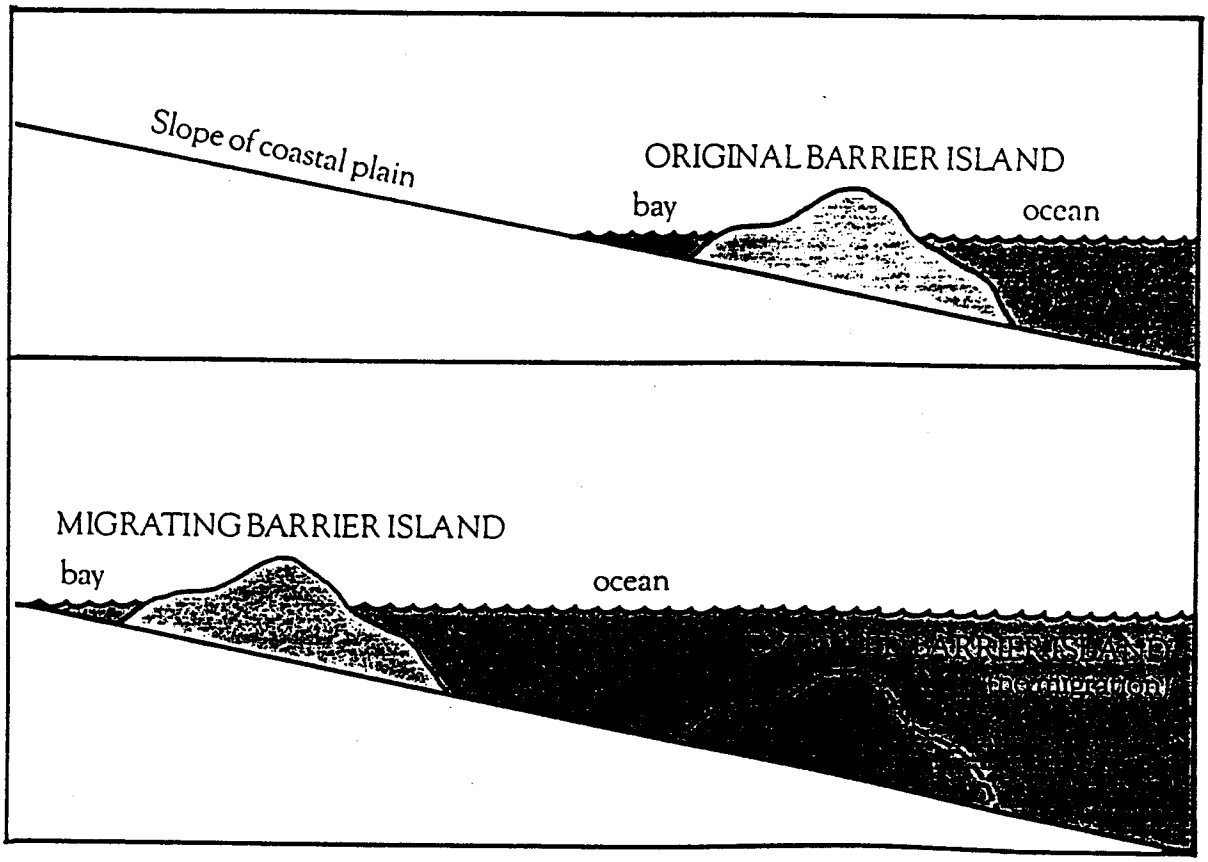
Some scientists claim that 70 percent of the world's sandy beaches are slowly falling into the sea. Some assert that beaches are merely a temporary phenomenon resulting from the last Ice Age. They theorize that sand was pushed up from the sea bed against the coast when sea levels rose 10,000 years ago, and that now that sand is slowly retreating back into the sea.

CAUSES OF EROSION

Erosion is caused by both natural phenomena and human activities. There are many natural causes including: waves, winds, currents, rain, depletion of sediment supply, burrowing by organisms, storms, and rise in sea level.

FIGURE 1

MIGRATION OF BARRIER ISLANDS



Island Migration: As sea level rises, ocean waves break higher up on shore, eroding the beach and dunes and depositing layers of sand farther and farther inland. In time sand begins to cover the marshes behind the island, island vegetation takes root, and a new beach and sand dune area evolves in the direction of the mainland. Thus, the entire island re-evolves parallel to its former position.

Inlets and Shoals

The erosion or accretion of any coastline is generally controlled by the natural movement of wind and water along the beach and in the nearshore zone. Under the action of nearshore currents, waves, and winds, sediments are moved along the beaches. This mass transport of sand on the coast results in the net erosion or accretion of a particular segment of the coastline.

The tidal inlets separating islands act as natural boundaries fostering diversity of natural processes. Along with their offshore shoals, tidal inlets are a major factor controlling the stability of the beaches. The inlets and shoals affect the direction and magnitude of waves which are the primary energy source redistributing sediment.

Storms may speed up the process, but the overall shoreline configuration is controlled by the inlets. The movement of sand at tidal inlets, either being furnished to or withdrawn from beaches, is key to predicting changes in shorelines. Erosion problems can to a degree be broken down into discrete manageable compartments, according to the arrangement of inlets. Adjacent beaches may interact with each other, one eroding and losing sand to another accreting beach which picks up the sand.

For further description of the dynamics of erosion see Figures 4 and 5 which depict the movement of sand around inlets and shoals at Fripp Island and the discussion under Fripp Island - Erosion.

Wave attack

In South Carolina, as elsewhere in the United States, the primary cause of beach erosion is wave attack during minor as well as catastrophic storms. Research has revealed that, in general short, steep waves tend to erode the beach while longer, lower profile waves add sand to the beach.

Storm Surge

Storm surge is a rise above normal water level on the open ocean along the coast due to the action of wind stress on the water surface. During a hurricane, storm surge is accentuated as a result of reduction in the atmospheric pressure. The generation of storm surges gives hurricanes the ability to pile up great quantities of water against the coastline.

Hurricanes and Northeasters

Two general categories of storms strike the coastal region of South Carolina. These are tropical storms or hurricanes, and extratropical storms, commonly referred to as northeasters. Although hurricanes are by far the more severe storms, their lower rates of occurrence make them less significant than

northeasters in terms of continual shoreline change. The probability of a hurricane-force tropical storm striking the South Carolina coast is about 4%, or one in every 25 years.

Northeasters occur much more frequently, usually in the winter. If they coincide with high new moon or full moon tides the effect is serious. They generally last longer than a hurricane, sometimes for several days, and the continued pounding can remove large amounts of sand and harm structures.

Hurricanes are storms of tropical origin with a cyclonic wind circulation (counterclockwise in the Northern Hemisphere) of 74 miles per hour or higher. They occur in the North Atlantic about seven and a half times per year, most often during August, September and October. The hurricane winds, along with storm surge, also cause serious erosion (SCCC Report on Coastal Processes).

The protection of an area from storms depends upon the following factors:

- sand volume in the beach profile
- elevation of the primary dune, upland area, and/or armoring device if present (seawall, revetment, rip-rap, bulkhead)
- condition of armoring device if present
- setback of the building
- elevation and structural integrity of the building and its foundation

Sea level rise

One of the most important yet subtle geologic agents of shoreline erosion is the slowly rising level of the ocean. Sea level has been steadily rising since the end of the last glacial epoch, approximately 14,000 to 18,000 years ago. It is estimated that along the east coast of the United States the sea has been rising about a half a foot per century over the last 3000 years.

Many scientists believe that the increased use of fossil fuels has caused a buildup of carbon dioxide and other 'greenhouse' gasses. The result may be an increase in temperature on earth, causing sea level rise due to thermal expansion of the oceans and melting of the polar ice caps.

Sea level rise over this century has been documented. A 1983 study by the U.S. Environmental Protection Agency predicted a one foot rise in sea level over the next thirty to forty years and approximately three foot rise during the next century (SCCC Report on Coastal Processes),

MAN MADE CAUSES

Beach erosion is to a great extent the result of human activities including damming of rivers, erection of seawalls, groins/breakwaters, and jetties, offshore dredging, beach sand mining, boat wakes, certain farming practices, and surface water runoff.

EROSION CONTROL DEVICES

There is a natural exchange of sand between the beach and dune. Seawalls (and revetments, rip-rap, and bulkheads) reduce the sand supply from the dunes to the beach and interrupt the natural spread and sand sharing system among the barrier islands. Waves strike the wall and the downward force scours the beach in front of the wall.

Erosion is strongly linked to coastal development. A seawall erected by a property owner hoping to protect his own threatened property may prove ineffective and only exacerbate erosion problems on other property. A wide community approach is necessary. The natural processes that shape the coast and its beaches, including sand supply and local currents, are highly complex and generally defy simple, piecemeal solutions.

Inlet and harbor management practices can impair natural sediment supply. Jetties can deprive downdrift beach/dune systems of their natural sand supply; the damming of rivers stops the flow of upstream sediments which build up shorelines.

RESPONSES TO EROSION AND THE BEACH MANAGEMENT ACT

There are three ways of responding to beach erosion and migration: shoreline armoring, beach nourishment, and strategic retreat.

The Beach Management Act states that the use of armoring in the form of seawalls, revetments, rip-rap, and bulkheads, has not proven effective in protecting against erosion. The BMA rejects construction of such new erosion control devices and adopts retreat and renourishment as the basic state policy toward preserving our beaches.

The Act states that "erosion is a natural process which becomes a significant problem for man only when structures are erected in close proximity to the beach/dune system. It is in both the public and private interests to afford the beach/dune system space to accrete and erode in its natural cycle. This space can be provided only be discouraging new construction in close proximity to the beach/dune system and encouraging those who have erected structures too close to the system to retreat from it."

Strategic retreat will eventually become the only option in the long term if sea levels rise as predicted.

MEASURING EROSION

Twice a year, the beachfront profile stations will be surveyed by Coastal Council. By comparing these surveys each season and over the years a long term view of beach movement at that particular point along the coast is obtained. This information will be used to locate baselines and to establish erosion rates.

Coastal Council uses a particular methodology prescribed in the Beach Management Act for measuring a beach. The beach begins at the most seaward dune crest or seawall and extends to low tide wading depth. The volume of sand contained in a one foot slice of the beach can be compared with other beach sections. See Figures 2 and 3. A healthy profile for a South Carolina beach, shown in the middle diagram contains about 100 cubic yards per linear foot (cy/ft). What constitutes a healthy volume varies by location according to grain size, wave energy, and beach slope.

When seawalls or revetments replace sand dunes the volume may be as low as 50 cy/ft (upper diagram). This beach is considered to have a "sand deficit" of about 50 cy/ft (the deficit from a healthy profile). Other beaches with a volume in the range of 150 cy/ft are considered to have a "sand surplus". Generally this is due to sand bars attached to the beach at low tide.

Erosion rates are measured by linear feet of shoreline retreat per year. Where slope and width of the beach profile are known the linear measure may be converted to a volumetric erosion rate, such as 4cy/ft/yr. This index gives a measure of the annual maintenance requirement if a renourishment project is planned for the beach. (Kana, Conserving SC Beaches).

EROSION - BEAUFORT COUNTY

Beach erosion is a significant problem in Beaufort County. The Beach Management Act severe restricts hard erosion control structures while encouraging approved soft approaches. Otherwise, one might have envisioned a future condition of wide scale armoring of the county's beachfront. Fortunately, a different path will be taken.

There are several small dams on inland creeks built to create ponds, but there are no significant dams on rivers or creeks in Beaufort County which would impede the transportation of sediment to the estuary.

Although eroding some of the barrier islands in Beaufort County are more stable than barrier islands elsewhere on the South

FIGURE 2

BEACH PROFILES - NORMAL, DEFICIT, AND SURPLUS

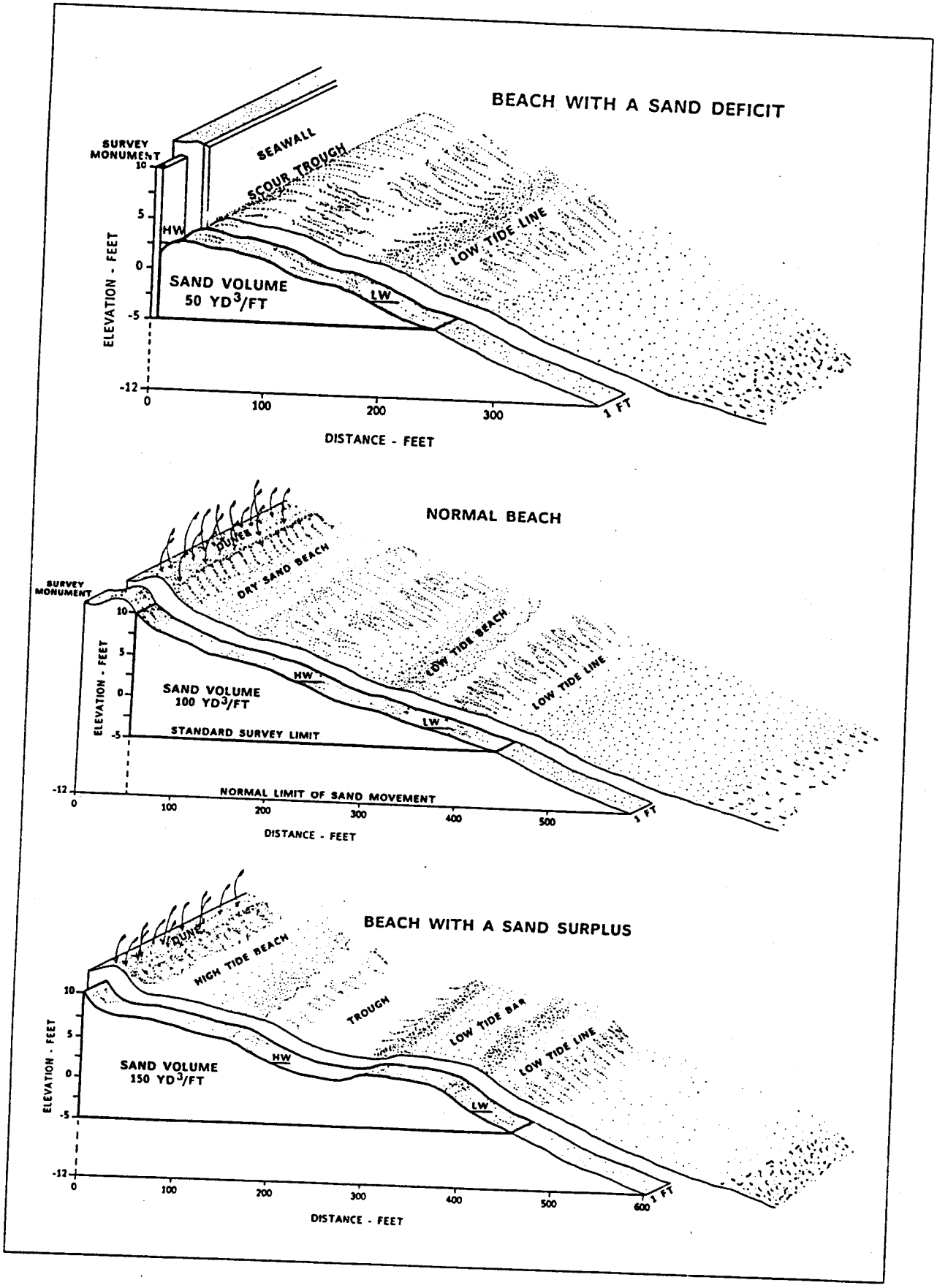


FIGURE 3

ANATOMY OF THE BEACH PROFILE

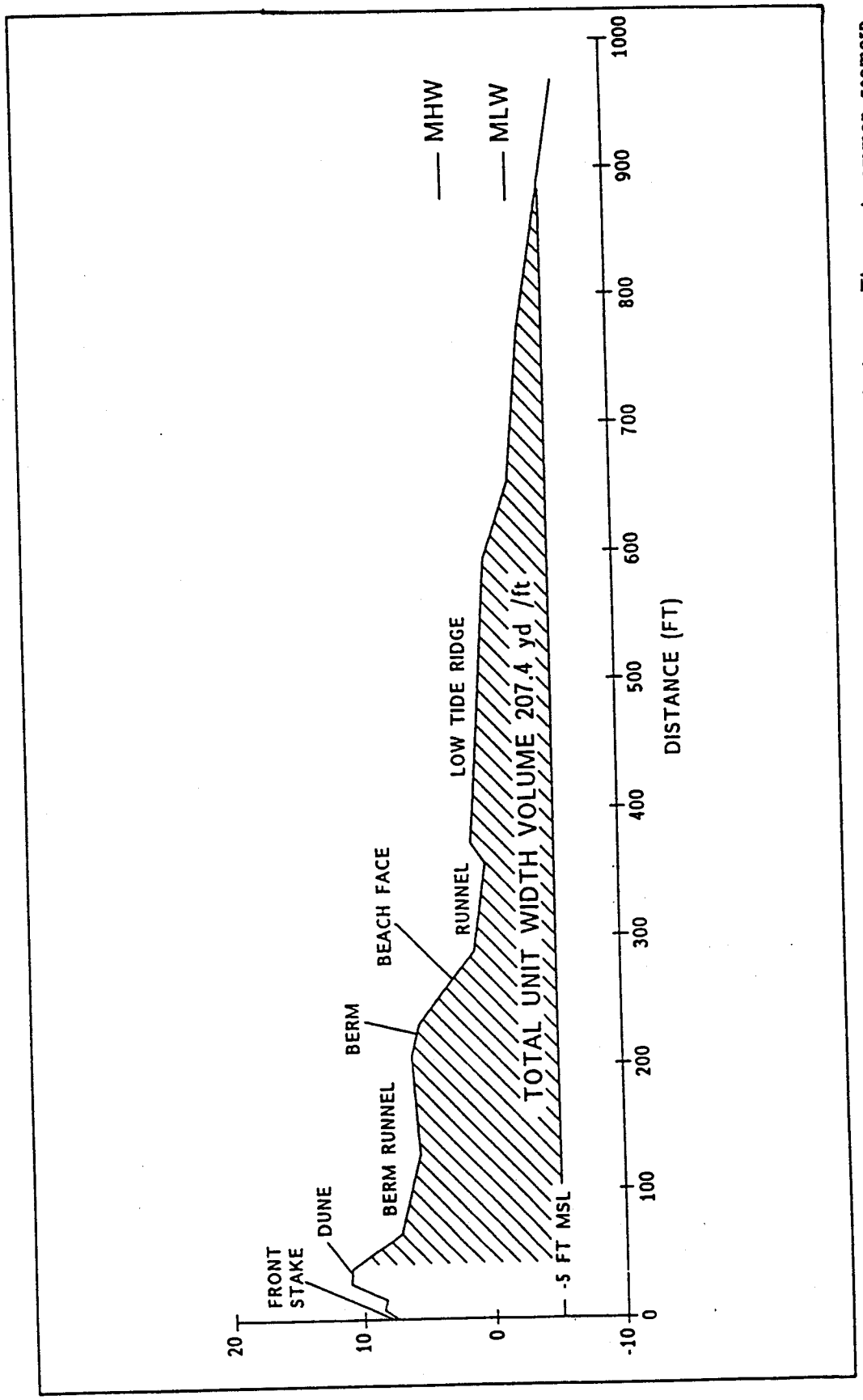


FIGURE 3. Beach profile illustrating the reference cross-section used in the computation of sediment budgets. The most common geomorp features are labeled. Note vertical exaggeration is 10:1. This example contains a substantial surplus of sand in the berm and along the low-t beach. A normal, healthy profile in South Carolina along a straight beach will contain about 100 yd^3/ft seaward of the dune crest.

Carolina coast. Here they tend to be shorter, wider, lacking in open lagoons on the landward shoreline and bounded by larger tidal inlets. The inlets channel floods efficiently and the width and lack of open lagoons adds a measure of protection against breaches across the islands.

Most of the barrier islands in Beaufort County are beach-ridge (see Overview of Coastal Processes section). Capers and Bay Point are transgressive islands and thus considered to be extremely unstable. They are characterized by low relief and the absence of any well developed beach ridge system. Significant short term variations in their shorelines can be expected.

Table 2 lists eighteen South Carolina beaches identified in the state Beach Management Plan that are endangered by erosion. Hunting Island, Fripp Island, and Daufuskie Island are included.

EROSION - SEA ISLANDS

LOCATIONS OF BEACHES AND SETBACK ZONE

See Maps 13 - 20 for locations of survey monuments on each sea island. They are set every 1000 feet along developed beaches and every 2000 feet along undeveloped beaches. Although, it appears that there are not yet any monuments established on the undeveloped beaches in the county.

The location and range of the beach, and similarly the scope of the baselines and setback lines are roughly coterminus with the areas on the maps marked, "S", "Iu", and "Is", or areas marked "Lines set". The beach monuments do not necessarily extend the full length of the beach and setback zone.

- "S" refers to standard erosion zone. A standard erosion zone is a segment of shoreline which is subject to essentially the same set of coastal processes, has a fairly constant range of profiles and sediment characteristics, and is not directly influenced by tidal inlets or associated inlet shoals.

- "Iu" refers to an inlet erosion zone which is not stabilized by jetties, terminal groins, or other structures. An inlet erosion zone is a segment of shoreline along or adjacent to tidal inlets which are directly influenced by the inlet and its associated shoals.

- "Is" refers to an inlet erosion zone which is stabilized by jetties, terminal groins, or other structures.

HARBOR ISLAND

Harbor Island has one mile of developed open coast, all of which is classified by SCCC as stable or accretional. See Map 13.

TABLE South Carolina beach nourishment requirements--estimated 10-year project needs (1990s).

Locality	Length (ft)	Volume (cy)	Unit Cost	Total Cost	Cost/ft	Method (Source)
North Myrtle Beach	35,000	665,000	6.50	4,322,500	123.50	DR/TR (E/AS)
Briarcliff/Horry County	10,000	210,000	8.50	1,785,000	178.50	TR (E)
Myrtle Beach*	25,000	250,000	7.00	1,750,000	70.00	TR (E)
Surfside/Horry County	15,000	277,500	7.50	2,081,250	138.75	TR (E)
Garden City	13,500	513,000	5.00	2,565,000	190.00	DR/TR (E/AS)
Huntington Beach*	5,000	100,000	4.00	400,000	80.00	TR (AS)
Pawleys Island	15,000	570,000	3.50	1,995,000	133.00	TR (AS)
DeBordieu Island[1]**	8,000	356,000	5.00	1,780,000	222.50	TR (E)
Isle of Palms	4,000	120,000	2.50	300,000	75.00	TR (AS)
Sullivans Island	2,500	117,500	2.50	293,750	117.50	(TR (AS)
Folly Beach/FB Park**	20,000	1,840,000	5.00	9,200,000	460.00	DR (E/AS)
Seabrook Island[1] (south beach)	6,000	738,000	2.50	1,845,000	307.50	DR (E)
Seabrook Island (north beach)	12,000	168,000	3.00	504,000	42.00	Inlet Relocation
Edisto Beach	15,000	645,000	5.00	3,225,000	215.00	DR/TR (E)
→ Hunting Island**	16,500	3,300,000	2.50	8,250,000	500.00	DR/TR (E/AS)
→ Fripp Island[2]	12,000	1,080,000	2.50	2,700,000	225.00	DR/TR (E/AS)
Hilton Head Island**	35,000	2,940,000	4.50	13,230,000	378.00	DR (E)
→ Daufuskie**	9,000	594,000	2.50	1,485,000	165.00	TR (AS)
Contingency	26,500	1,516,000	4.80	7,288,500	275.04	
[54 mi]	285,000 ft	16,000,000 cy	$4.06/cy	$65,000,000	$228.07/ft	

DR = dredge. TR = trucks. E = external source. AS = accreted shoals. [Source: Coastal Science & Engineering, Inc., March 1990]

*Maintenance nourishment only; no initial requirement.

**High erosion rates in these areas suggest groins/breakwaters should be considered.

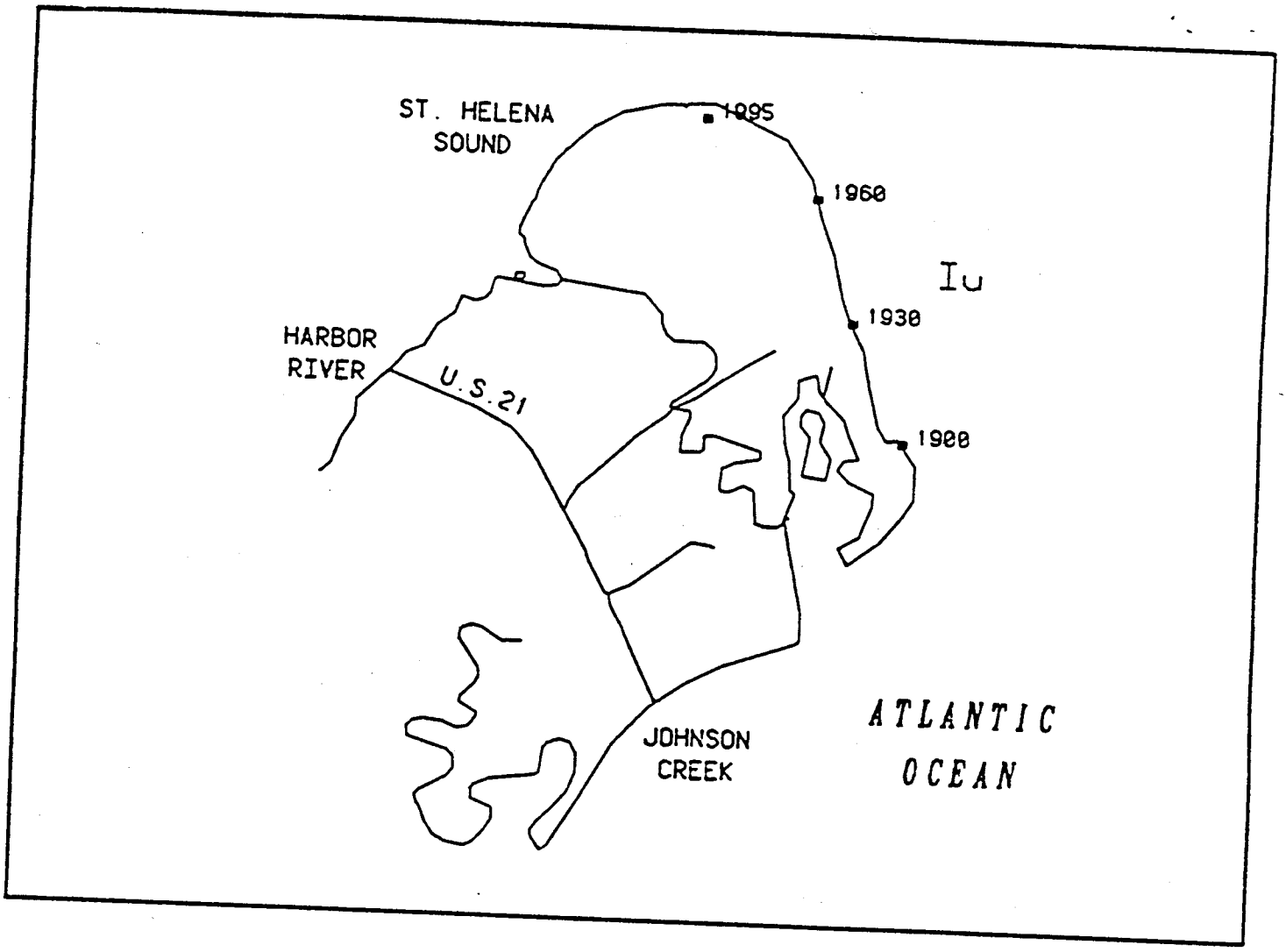
[1]In construction, March 1990.

[2]A larger scale dredging project involving 1,500,000 cy at a cost of $4.5 million has been proposed by CSE to develop a longer term solution.

MAP 13

HARBOR ISLAND - BEACH RANGE

Harbor Island
Beaufort County



South Carolina beachfront jurisdictional lines approved - 9/15/89
reference orthophotographs: #77 through 80
monument numbers refer to the SCCC beachfront monument network

HUNTING ISLAND

Hunting Island has experience serious erosion problems along the entire length of beach. It is most unfortunate that Hunting Island, the primary public beach in Beaufort County and indeed in the region, is so threatened. Along with Folly Beach in the northern part of the state, Hunting Island is considered to have the worst erosion in South Carolina.

See Map 14 and Table 3 for erosion rates.

Erosion is a long standing problem on the island. The Hunting Island Lighthouse which dates from 1875 replaced an 1859 structure that was destroyed by erosion. The 1875 lighthouse was relocated to its present site in 1890 due to an eroding shoreline.

The highest sand loss - 25 feet annually - occurs along the northern 2/3 of the island. According to Kana, the beach has a sand deficit of 38cy/ft and 80% of the beach incurs an annual loss of 18cy/ft/yr (see Figure 2 and discussion above for explanation of volumetric sand deficit).

Most of the sand that is removed migrates to the sandbar at Fripp Inlet just south of Hunting Island. If the oceanfront keeps eroding there will probably continue to be a usable beach until Johnson Creek and adjacent marshland is breached. Before that point, though, many public facilities on the island will be destroyed if they are not relocated. Prior to a recent renourishment there was no high tide beach, high water was at the tree line and a building was nearly lost.

A footnote on Table 2 which is excerpted from the state Beach Management Plan suggests that installation of groins or breakwaters should be considered to forestall the high erosion rate on Hunting Island. New groins and breakwaters are conditionally permitted by Coastal Council.

FRIPP ISLAND - Erosion

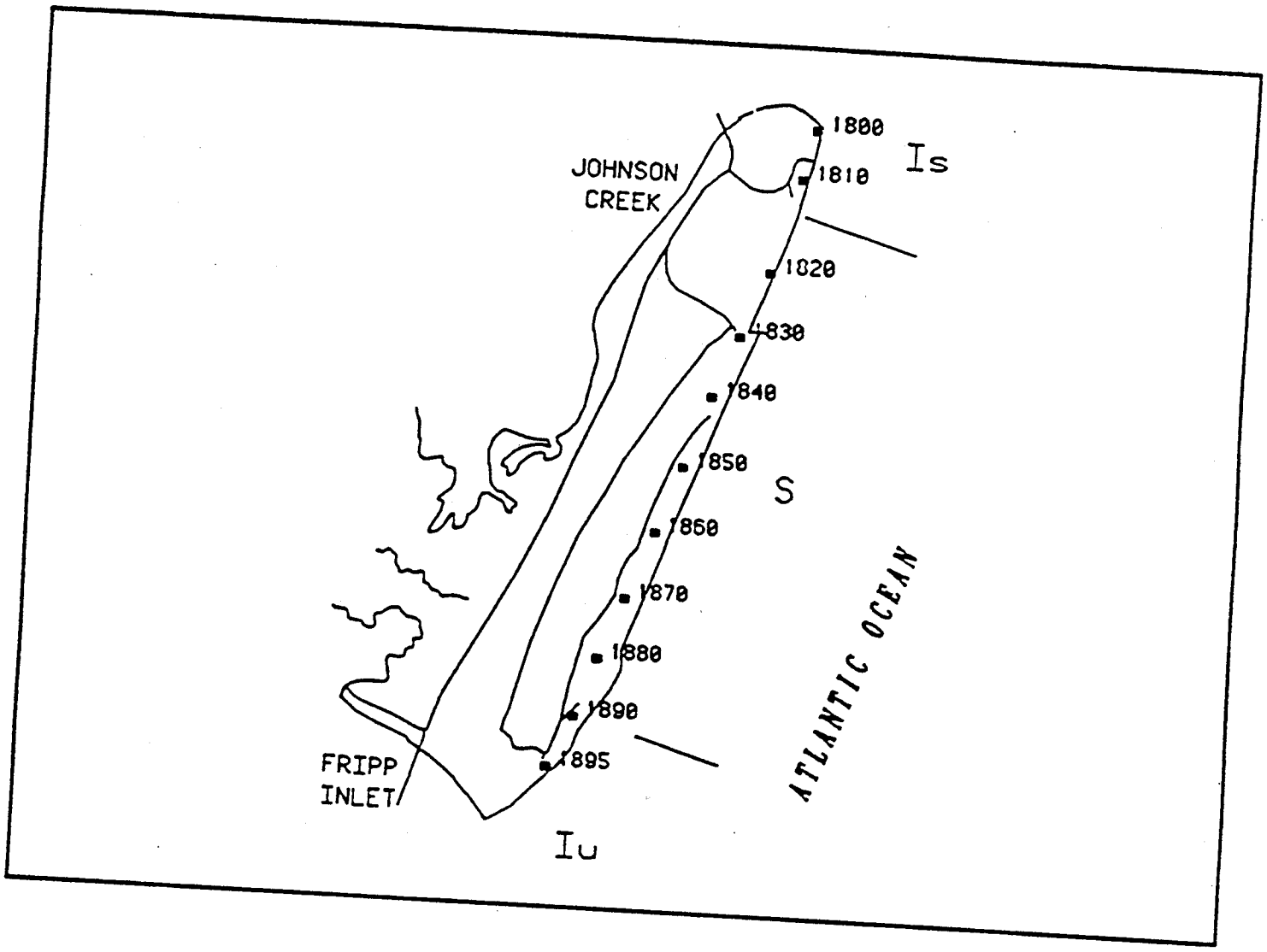
Fripp Island has 3 miles of developed open coast. All of the island has been classified by SCCC as stable or accretional based upon the 40 year frame of reference. However, at high tide about two thirds of the length of the beach is under water. See Map 15.

However, according to Kana, about 12,000 feet of shoreline in the center of the island has an initial volumetric deficit of 45 cy/ft. Annual erosion is estimated at 5cy/ft/yr in that zone (see Figures 2 and 3 and discussion above for explanation of volumetric sand deficit).

MAP 14

HUNTING ISLAND - BEACH RANGE

Hunting Island
Beaufort County



South Carolina beachfront jurisdictional lines approved - 3/16/90
reference Beaufort County orthophotographs: #122, 137, 152
monument numbers refer to the SCCC beachfront monument network

TABLE 3

EROSION RATES - HUNTING ISLAND

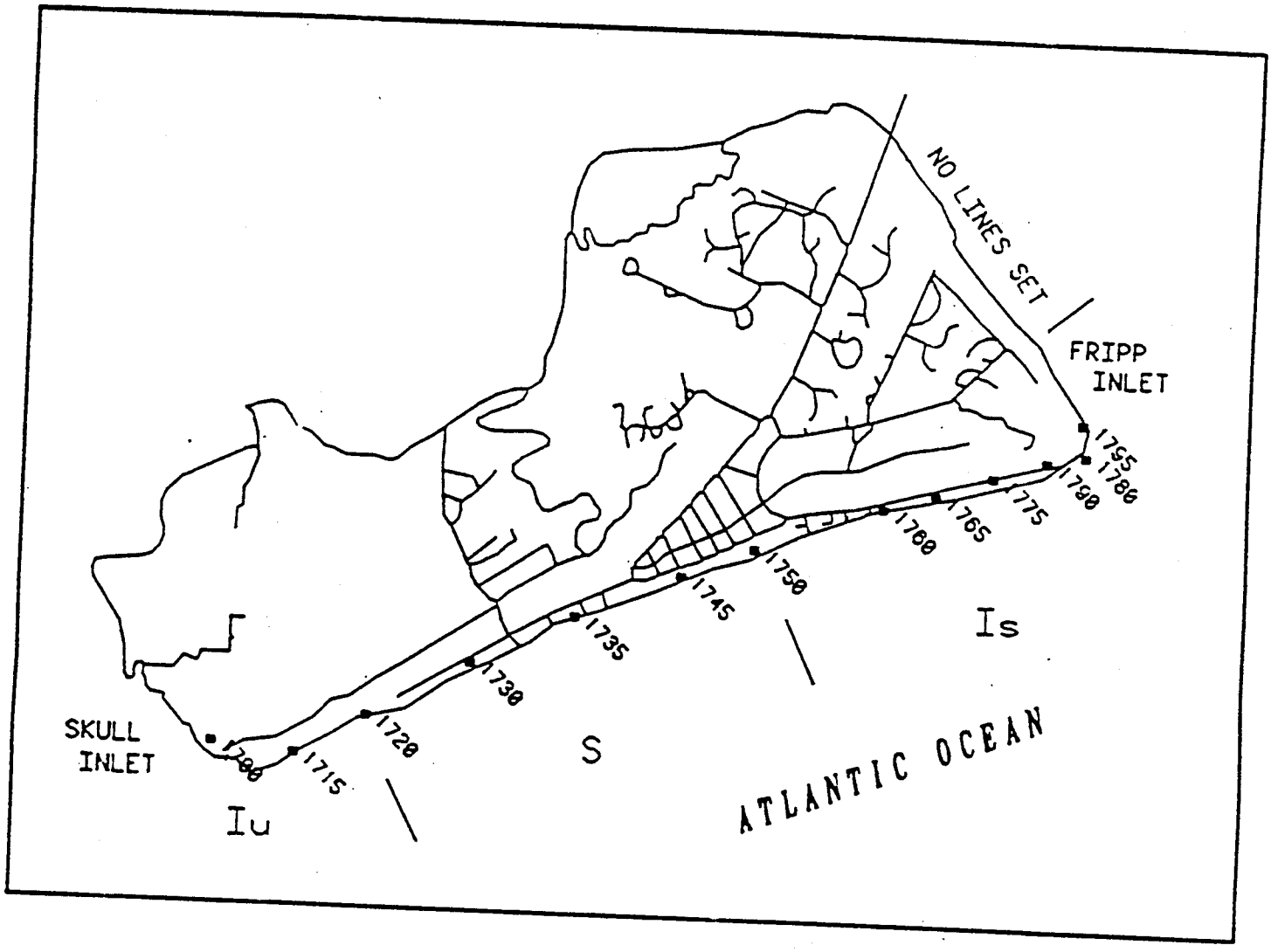
MONUMENT	SHORELINE CHANGE RATE (ft/yr)
1800	-7
1810	-7
1820	-12.3
1830	-15.5
1840	-14.5
1850	-13
1860	-12
1870	-10
1880	-6
1890	0.0
1895	+2.

Negative sign indicates beach loss

MAP 15

FRIPP ISLAND - BEACH RANGE

Fripp Island
Beaufort County



South Carolina beachfront jurisdictional lines approved -12/15/89
reference orthophotographs: #57 through 65
monument numbers refer to the SCCC beachfront monument network

SHORELINE ASSESSMENT

In February 1989, the Fripp Island Public Service District retained Coastal Science & Engineering, Inc. (CS&E) to prepare a shoreline assessment and erosion analysis of Fripp Island.

According to CS&E, the central section of the beachfront consisting of roughly 9000 feet of shore (about 2/3 of the total beachfront extending from approximately Tautog Lane off Marlin Drive to 486 Tarpon Boulevard) is erosional. This is designated "Reach 2" in Figure 4. The north and south ends, at Fripp and Skull Inlets, 5000 feet ("Reach 1") and 2000 feet ("Reach 3"), respectively, are accretional.

Reach 1 at the north end of the island has sections with a sand surplus and deficit. CS&E calculated that in Reach 2, there is a deficit in the range of 50-70 cubic yards per foot for a total of 450,000-630,000 cubic yards along that stretch. Reach 3 at the south end of Fripp possesses a slight surplus of sand because it receives sand from Reach 2. However, since it is reliant upon sand from Reach 2, if Reach 2 is not renourished during the next decade the south end will also erode.

SAND DISTRIBUTION

CS&E concludes that Fripp Island has an overall positive sand budget but the sand is distributed unfavorably along the island with respect to the existing development. The surplus of sand at the north end of the island might be naturally redistributed toward Reach 2 but that is not likely to occur for 15-20 years.

Erosion on Fripp Island is primarily controlled by the semi-attached inlet shoal at the north end of the island, called the New Haven shoal. It contains over 2 million cubic yards of sand and is exposed at low tide. It redirects waves in such a way that it increases erosion along Reach 2 and shelters a zone leeward (toward the side toward which the wind is blowing), promoting the buildup of a broad high-tide beach in Reach 1. Reaches 1 and 3 are the only high tide beaches on the island. Reach 1 is the only section with significant dunes. There are hummocks or smaller dunes in Reach 3 (Coastal Science & Engineering Report).

See Figure 5 depicting shoal movement on Fripp Island. Inlet shoals cause a buildup in their leeward side and erosion along adjacent beaches as they migrate shoreward and attach to the beach. Once this sand supply attaches to the beach, the sand will start spreading to adjacent beaches which were formerly eroding. Fripp Island is considered to be in Stage 2. It is suggested that in at least ten years stage 3 will be reached and the sand will begin shifting back to the center of the Island. Therefore Reach 2 is expected to be erosional for at least ten more years.

FIGURE 4

EROSION MODEL OF FRIPP ISLAND

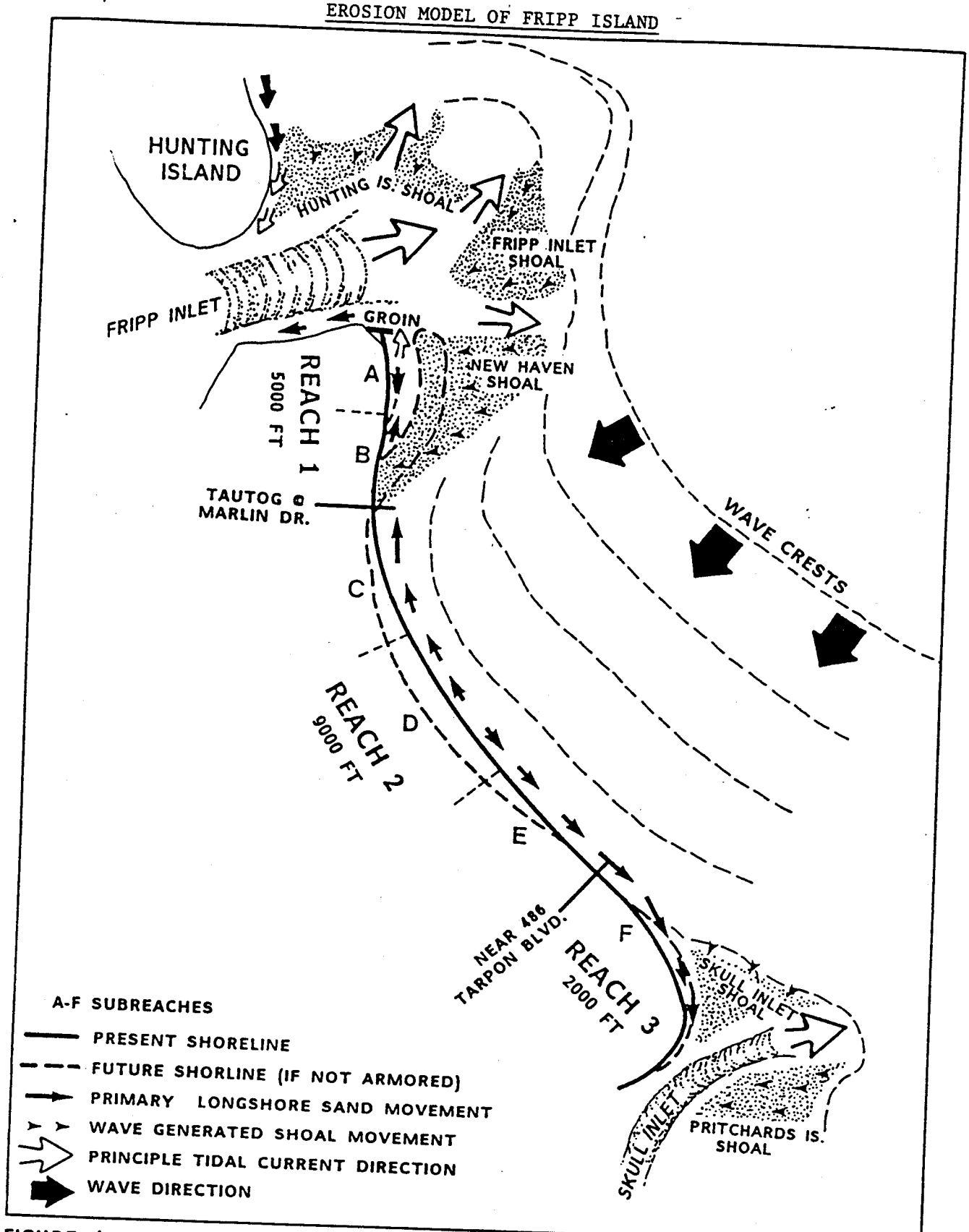


FIGURE 4 Conceptual model of erosion and coastal processes affecting Fripp Island's shoreline in 1989. Reach 1 is in the lee of New Haven shoal and is gaining sand. Reach 2 is the central armored area of the island that lacks a high-tide beach. Reach 3 is the south spit that has been stable to slightly accretional. Boundaries between the reaches are approximate. NOTE: PERSPECTIVE IS NOT TO SCALE.

FIGURE 5
SHOAL MIGRATION MODEL - FRIPP ISLAND

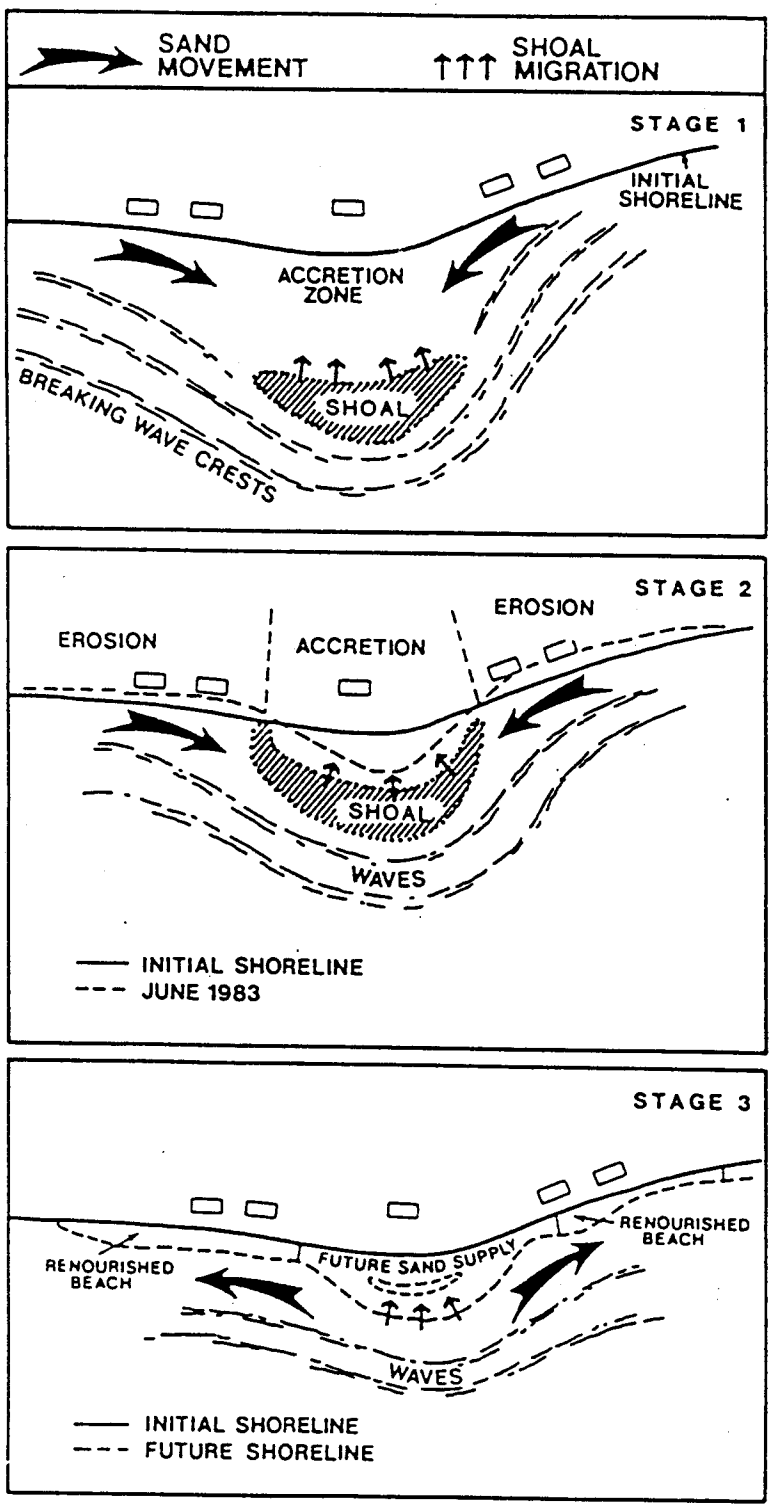


FIGURE 5 Diagram illustrating the effects of onshore shoal migration near tidal inlets. Stage 1 (onshore shoal migration) causes wave bending, erosion along adjacent beaches, and accretion in the lee of the shoal. Stage 2 is bar attachment showing erosion continues because of the unnatural bulge in the shoreline. Stage 2 reflects the situation on Fripp Island at the time this report was prepared. Stage 3 is erosion of the new bulge and redistribution of sand up and down the beach. The bulge at the north end of Fripp Island owes its existence to this process.

REVETMENTS AND SEAWALLS

About 95% of the shoreline is lined with erosion control devices, principally sloping rock revetments. The remaining 875 foot section is now being reveted. See Erosion Control Devices Section.

Fripp Inlet

A number of lots on the east end of the island (in Fripp Inlet, outside of the scope of the above discussion) have already been lost to erosion and Porpoise Drive was breached. See Map 5. A revetment was constructed to forestall further erosion here.

It appears that erosion along Porpoise Drive is proceeding slowly. In the event of a major hurricane, lots on the shore would be threatened. Probably 10-18 foot dunes would be needed to protect these lots.

ALTERNATIVE RESPONSES

Coastal Science & Engineering, Inc. investigated a number of beach restoration alternatives for the island ranging from doing nothing to large scale renourishment.

Do-nothing alternative

If nothing is done there could be irreversible damage in the event of a northeaster or certainly a hurricane of the magnitude of Hugo. There would likely be severe damage to the seawall, homes, roads and infrastructure on Fripp. Lack of a high tide/high dune beach along much of the island increases vulnerability to storms. Properties in both accretion zones, nonetheless, remain exposed to storm surges unless higher dunes are constructed. Wide beaches and setbacks alone are not sufficient to prevent damage during major storms.

As the beach lowers there are fewer hours in the day available for beach recreation. And as erosion continues the revetment becomes more exposed and vulnerable due to the diminished ability of the eroded beach to absorb storm waves before they strike the revetment. Beach nourishment is an effective way to counter this threat.

Small scale, frequent nourishment alternative

To create and maintain a minimal 50 foot wide high tide beach along eroding areas would require initial nourishment of about 500,000 cubic yards and periodic renourishment of about 60,000 cubic yards per year. Probably the most cost effective approach would be to obtain the sand by scraping the New Haven shoal and

transporting the sand by truck. Ten year costs are estimated to be around $2.7 million.

The advantage of this approach is the lower cost. The disadvantage is that it does not eliminate the primary cause of erosion nor protect against inundation and storm surges. Sand placed in Reach 2 will erode back to the ends of the island. As long as the New Haven shoal exists, even if scraped down, it will continue to cause severe wave refraction and erosion in the center of the island. This alternative is not favored by CS&E.

Large scale infrequent nourishment alternative

This is considered the most viable solution. A large portion of the New Haven shoal, upwards of 1.5 million cubic yards of sand would be dredged and pumped to all needed areas. The goals of this approach would be to restore a high tide beach a few hundred feet wide; establish high dunes; and reduce the shoal sufficiently to restore southerly sand transport.

This alternative is designed to move the island toward stage 3 of the shoal erosion model depicted in Figure 5. The objective is to realign the shoreline to effect better exchange of sand along the island. Estimated costs are $4-6 million. Little or no maintenance would be required and the nourishment would probably last beyond ten years.

PRITCHARDS ISLAND

According to SCCC the inlet zone at the southwest end of the island has an erosion rate of -11.54 ft/yr. Along the central portion of the island, the erosion rate ranges from -8.69 to -11.54 ft/yr. The inlet zone at the northeast end has an erosion rate ranging from -7.65 ft/yr to accretional. See Map 16.

CAPERS ISLAND

Capers is classified as a transgressive island (see explanation above). According to SCCC the erosion rate on Capers Island is -25 ft/yr. Significant short term variations in its shoreline can be expected. See Map 17.

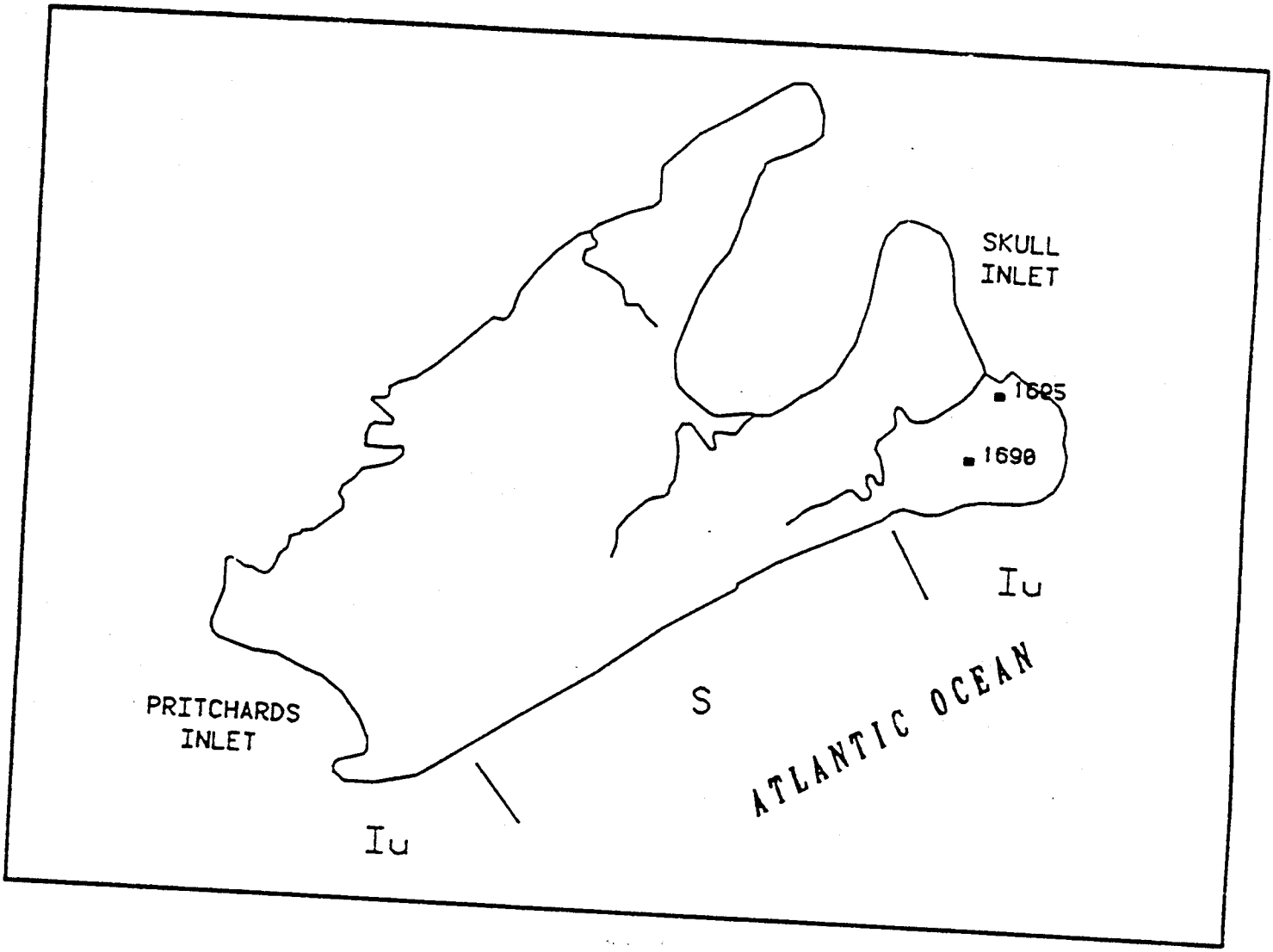
ST. PHILLIPS ISLAND

According to SCCC the erosion rate for St. Phillips Island is -4 ft/yr. See Map 18.

MAP 16

PRITCHARDS ISLAND - BEACH RANGE

Pritchards Island
Beaufort County

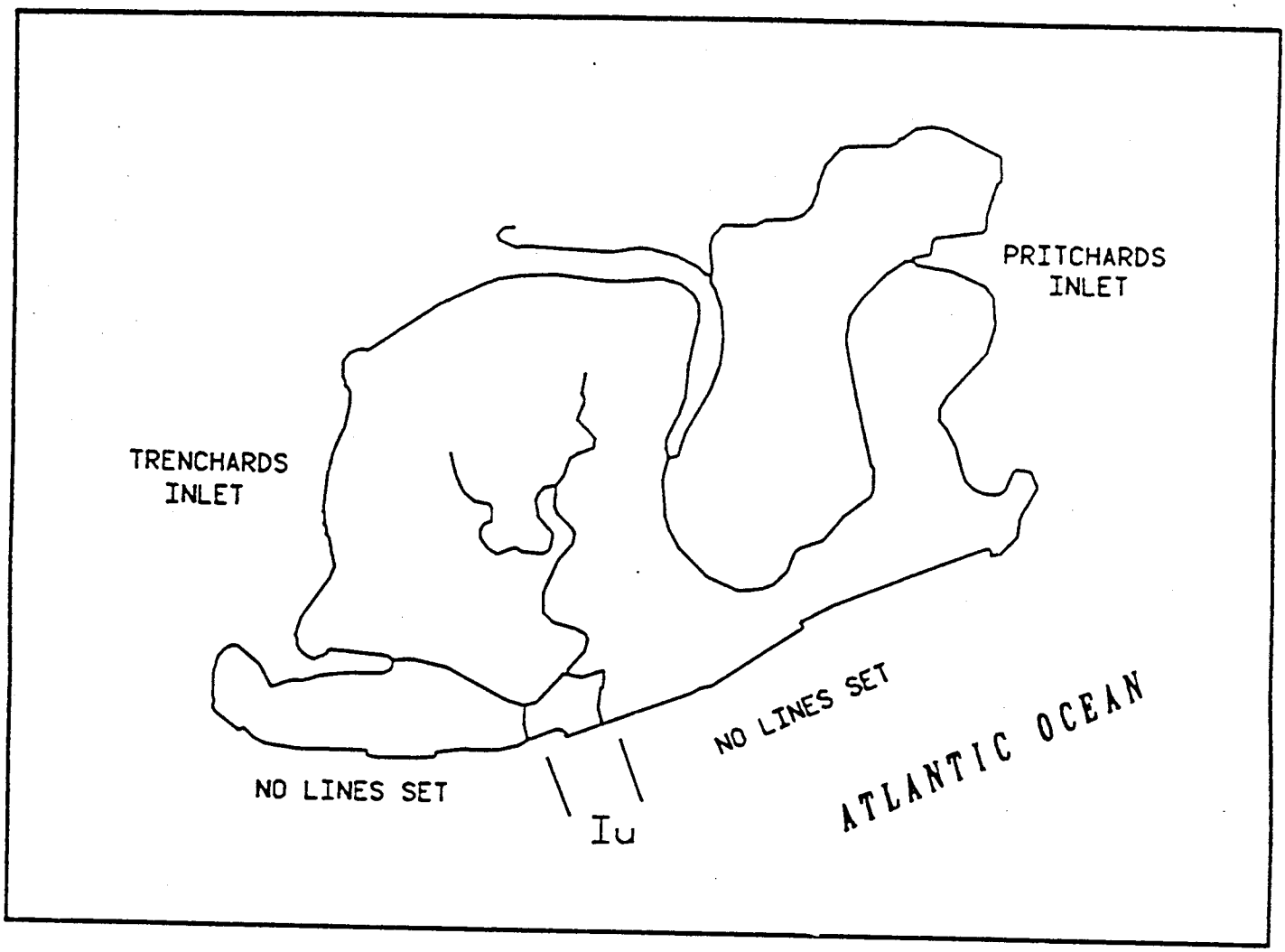


South Carolina beachfront jurisdictional lines approved - 3/16/90
reference Beaufort County orthophotographs: #167, 168, 185
monument numbers refer to the SCCC beachfront monument network

MAP 17

CAPERS ISLAND - BEACH RANGE

Little Capers Island
Beaufort County

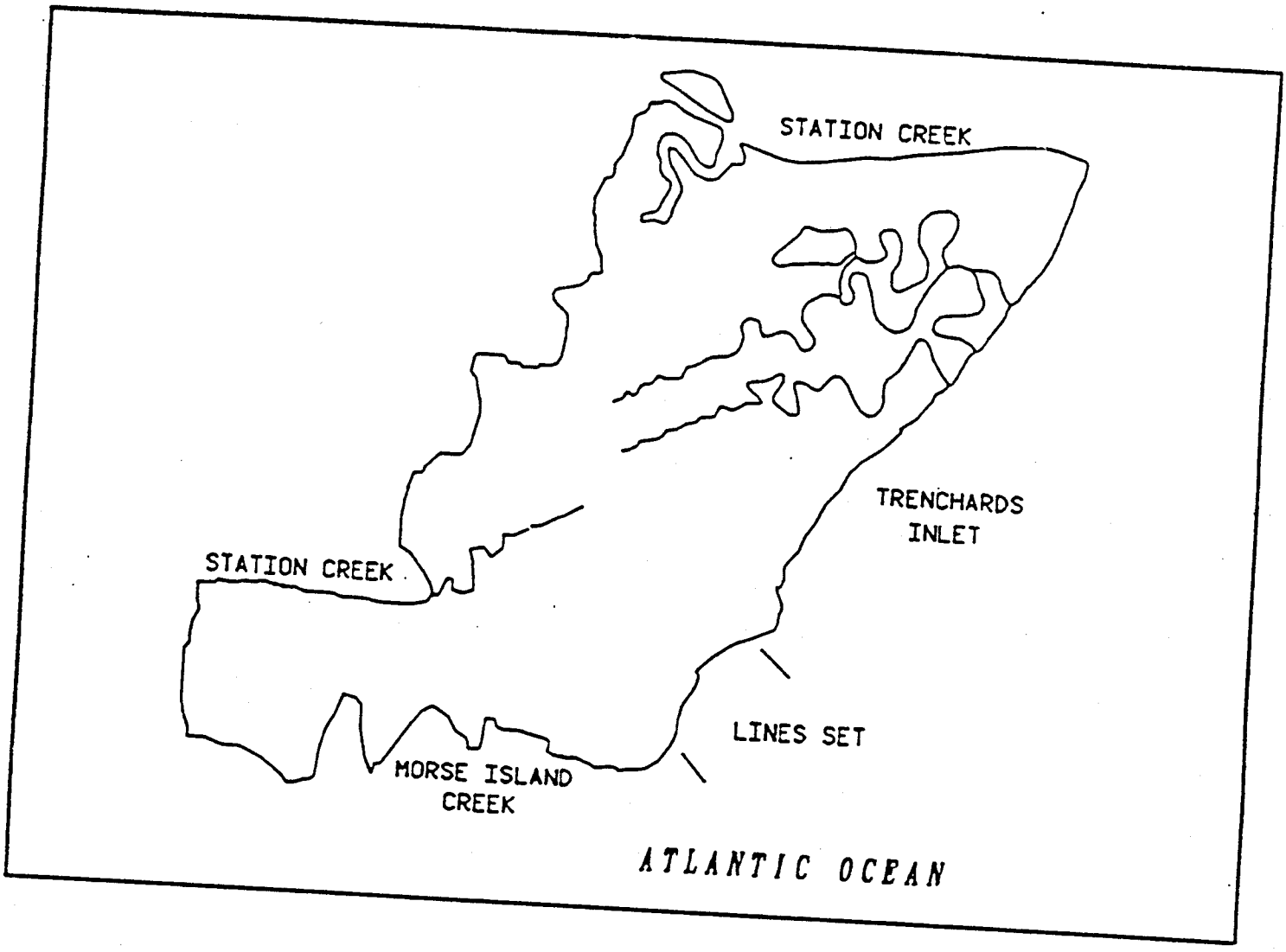


South Carolina beachfront jurisdictional lines approved - 3/16/90
reference Beaufort County orthophotographs: #189
monument numbers refer to the SCCC beachfront monument network

MAP 18

ST. PHILLIPS ISLAND - BEACH RANGE

St. Phillips Island
Beaufort County



South Carolina beachfront jurisdictional lines approved - 3/16/90
reference Beaufort County orthophotographs: #183
monument numbers refer to the SCCC beachfront monument network

BAY POINT ISLAND

Bay Point is classified as a transgressive island (see explanation above). According to SCCC the downcoast portion of the island is accretional. Along the upcoast portion of the island, the erosion rate varies from -18 to -25 ft/yr. Significant short term variations in its shoreline can be expected. See Map 19.

DAUFUSKIE ISLAND - Erosion

Daufuskie Island is one of 18 beaches in South Carolina considered to be endangered by erosion. See Table 2.

There are two miles of developed open coast, nearly all of which experiences well above a foot of retreat per year. See Map 20 and Table 4 for erosion rates at each SCCC monument. According to Kana, about 9000 feet along the central part of the island have a deficit of 30 cy/ft and an annual volumetric erosion rate of 4 cy/ft/yr.

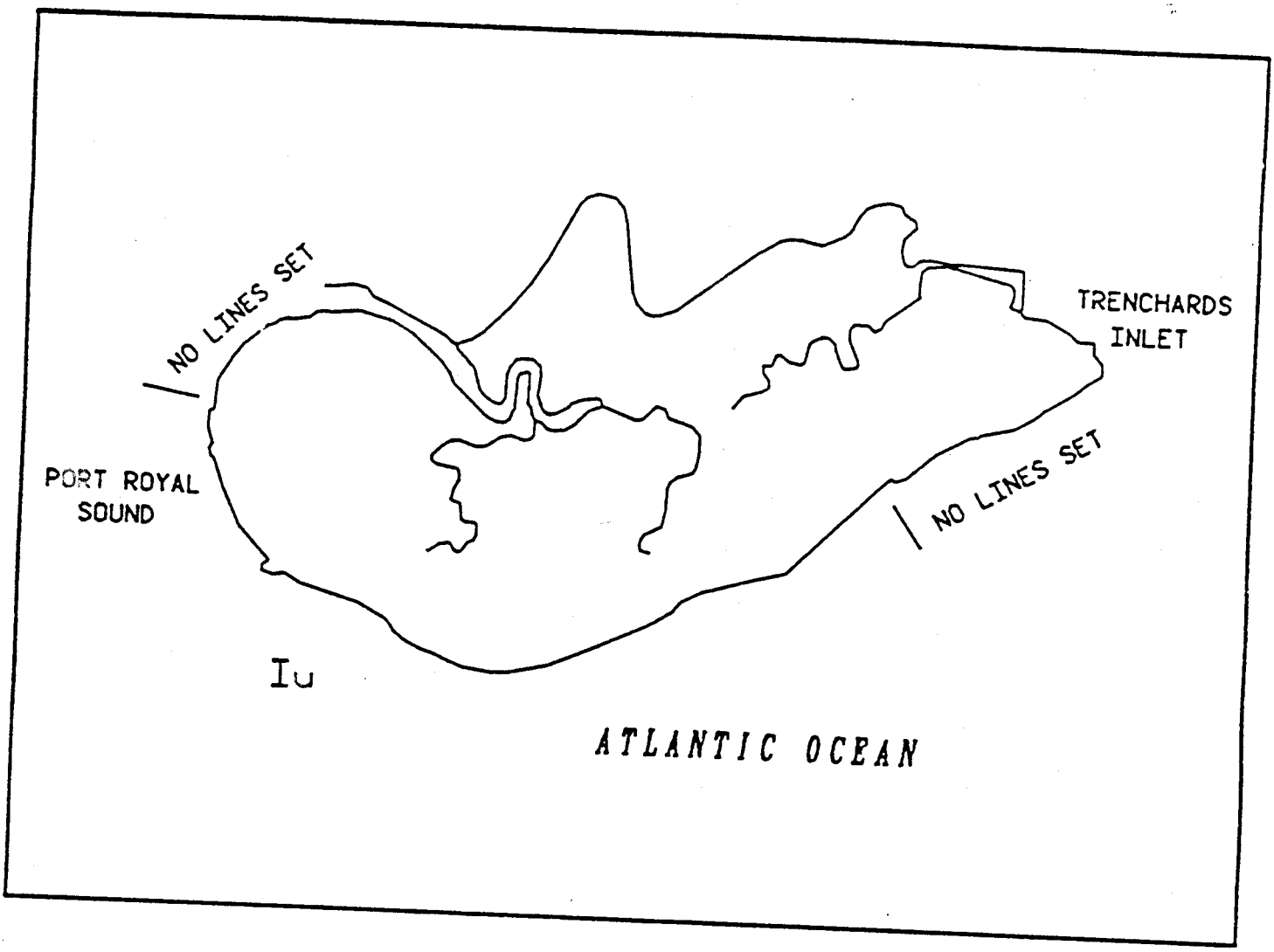
If the beach were to be renourished, the total fill requirement over ten years would be about 66 cy/ft. The appropriate borrow source might be the low tide shoals along the oceanfront that are part of the delta complex of Calibogue Sound. Prospectively, landbased equipment or draglines could be used to excavate and place the sand at an approximate cost of $2.50/cy (Kana).

A footnote on Table 2 which is excerpted from the state Beach Management Plan suggests that installation of groins or breakwaters should be considered to forestall the high erosion rate on Daufuskie Island. New groins and breakwaters are conditionally permitted by Coastal Council.

MAP 19

BAY POINT ISLAND - BEACH RANGE

Bay Point Island
Beaufort County

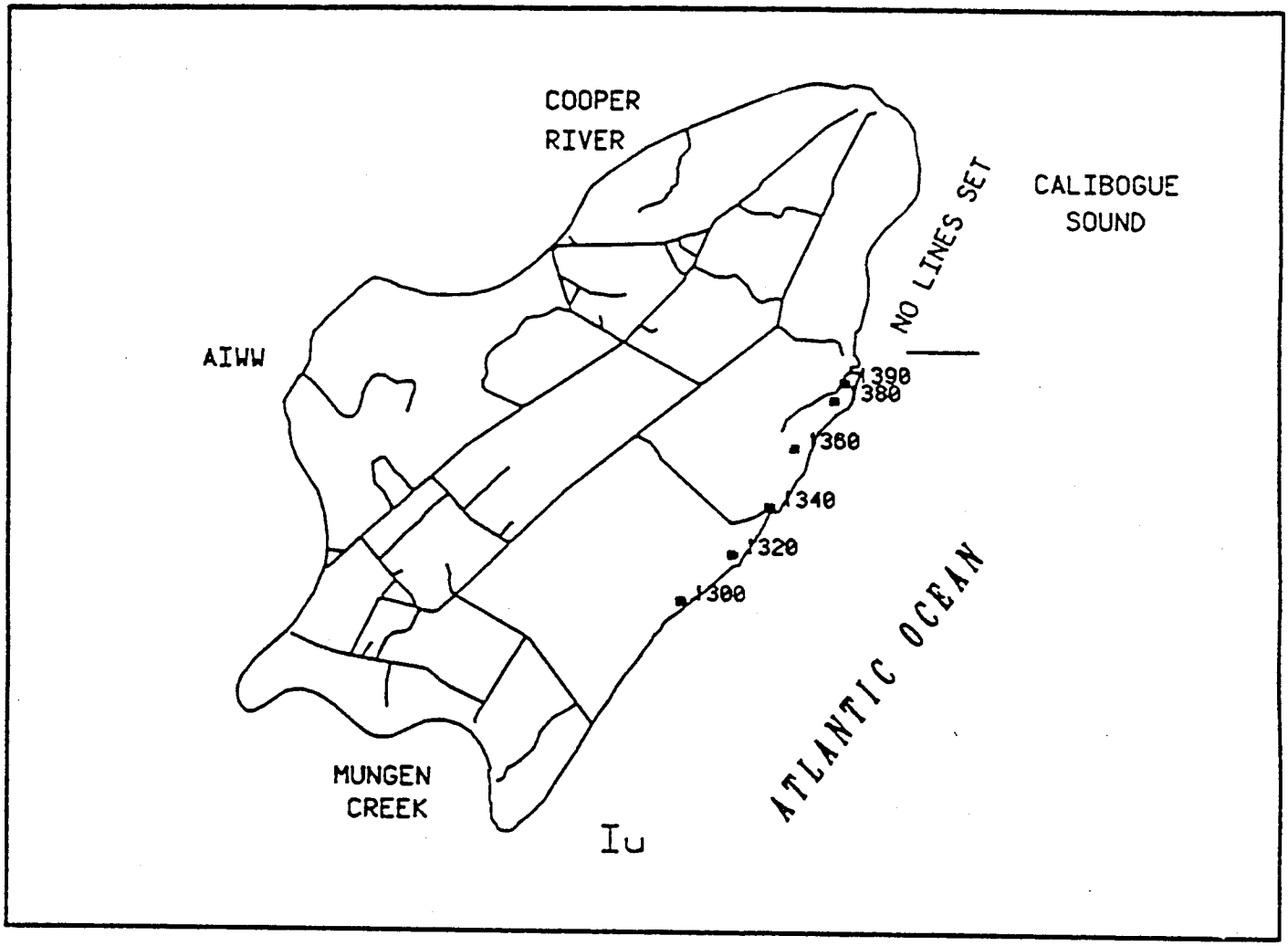


South Carolina beachfront jurisdictional lines approved - 3/16/90
reference Beaufort County orthophotographs: #199
monument numbers refer to the SCCC beachfront monument network

MAP 20

DAUFUSKIE ISLAND - BEACH RANGE

Daufuskie Island
Beaufort County



South Carolina beachfront jurisdictional lines approved - 4/20/90
reference orthophotographs: #1 through #10
monument numbers refer to the SCCC beachfront monument network

TABLE 4

EROSION RATES - DAUFUSKIE ISLAND

MONUMENT	SHORELINE LOSS (ft/yr)
1380	
1360	-0.7
1340	-5.2
1320	-9.0
1300	-11.1
1165	-10.1
1167	-5.0
1170	-4.2
1172	-4.2
1175	-3.7
1177	-3.8
1180	-4.0
1182	-4.2
1185	-4.8
1186	-5.8
1187	-6.2
1188	-7.1
1189	-7.6
1190	-8.4
1191	-7.8
1192	-6.6
1193	-6.2
1194	-5.7
1195	-5.0
1196	-4.3
1197	-3.1
	-1.4

EROSION - POLICIES/ACTIONS

A number of policies and actions pertinent to beach erosion are stated in Erosion Control Devices and Beach Renourishment sections.

POLICIES - Erosion

1) Promote beach nourishment, dune preservation, and strategic retreat as appropriate responses to beach erosion

2) Strongly discourage the use of hard erosion control devices as inappropriate response to beach erosion.

3) In an emergency situation or as a very short term measure, sandbags are appropriate for use to shore up the beach.

4) Educate the public about the nature of beach erosion through dissemination of literature, public forums, and other means. Key parties to keep lines of communication open regarding beach erosion include: public utilities, real estate brokers, developers, title and trust firms, insurance companies, lenders, consumer protection groups, architects, engineers, media, residents and property owners on the beach.

5) In highly eroding zones land use regulations should provide for only those uses that can readily adjust to retreat of the shoreline - primarily recreational uses and open space.

6) Acquire updated information and data bases from Coastal Council about beach erosion, baselines and setback lines for general planning purposes; adjust/update land use plans and ordinances consistent with that information.

ACTIONS (Mid Term) - Erosion

1) Explore no cost/low cost acquisition of undeveloped areas in potential beach erosion areas, including donations and grants of easements.

2) Explore creation of a Special Beach Preservation Tax District for the purpose of levying special taxes on property in that district and directing the funds toward beach management projects within the district.

EROSION CONTROL DEVICES

EROSION CONTROL DEVICES - GENERAL ISSUES

See discussion in Erosion section.

EROSION CONTROL DEVICES - BMA/COASTAL COUNCIL FRAMEWORK

The Beach Management Act states that it is the policy of South Carolina to "severely restrict the use of hard erosion control devices to armor the beach/dune system and to encourage the replacement of hard erosion control devices with soft technologies as approved by the Coastal Council which will provide for the protection of the shoreline without long-term adverse effects."

SCCC REGULATIONS FOR EROSION CONTROL DEVICES

* Coastal Council will not permit any new erosion control devices - seawalls, revetments, rip-rap, or bulkhead - seaward of the setback line (subject to conditions stated below). However, groins, jetties, and offshore breakwaters will be conditionally permitted.

Erosion Control Devices (other than groins, jetties, and breakers)

1) No new erosion control structures or devices are allowed seaward of the setback line except to protect a public highway which existed on June 25, 1990.

2) No erosion control structures or devices may be incorporated into a habitable structure

3) Existing erosion control devices may not be enlarged, strengthened, or rebuilt but they may be repaired and maintained in their present condition. If the structure is destroyed it must be removed at the owner's expense as follows:

During these years	Percent damaged constituting destruction
June 25, 1990 to June 30, 1995	80%
July 1, 1995 to June 30, 2005	66-2/3%
After June 30, 2005	50%

4) Existing erosion control devices damaged beyond that threshold must be removed at the owner's expense.

Groins and Jetties

1) Groins shall be constructed so that they can be altered or removed if they cause undesirable effects

2) Jetties shall be designed to provide for public recreational fishing where feasible

Groins can stabilize beaches by trapping the sand moving along the shore but they may take it away from adjacent stretches of the beach.

Offshore Breakwaters

- They must be removed if there are harmful impacts

Breakwaters absorb wave energy before it reaches the shore but also change deposit patterns of sediments, which tend to accumulate behind them.

EROSION CONTROL DEVICES - SEA ISLANDS

HARBOR ISLAND

There are no erosion control devices on the island.

HUNTING ISLAND

The only erosion control device on the island is a wooden groin at the northern end. Most of it covered by sand.

FRIPP ISLAND

There are terminal groins located at both ends of the island, at Skull Inlet and Fripp Inlet. There are four kingpile groins at the western tip of the island, above Skull Inlet. These are the only groins seaward of the setback line. They have been effective in trapping sand and preserving this corner.

About 95% of the shoreline is lined with erosion control devices, principally sloping rock revetments. Ten property owners seek to erect rock revetments on their beachfront lots along 875 feet of shoreline, the only nonreveted section. Their purpose is to bridge the unarmored section between revetments to the north and south. Coastal Council is not willing to approve the revetments, pursuant to the restrictions of the Beach Management Act. This case is now being debated in the courts. Judge Kemmerlin granted the property owners temporary permission to build this final revetment but they were required to post a $100,000 bond to pay for the removal in the event they ultimately lose the court case. It is now under construction.

CS & E determined that the seawall is sufficient to protect against minor storms (more frequent that 10-year storms) but that a storm with the intensity of Hurricane Hugo would destroy most, if not all, of the seawall. CS & E noted some deficiencies in structure, height, settlement, and discontinuity of wall type. Gradual lowering of the beach, in certain places, will reduce the structural integrity of the seawall. The north and south sections of the wall have been seriously damaged by winter storms in recent years.

In part due to restrictions such as those affecting erosion control devices Fripp island property owners originally lobbied to be excluded from the state's Beachfront Management Act in 1990. They are now supporting a bill before the legislature to exempt Fripp Island from the Act.

The seawall is essentially privately financed at a cost of $20,000 to $50,000 per lot. Restrictions in the Beach Management Act may affect efforts to improve the walls.

PRITCHARDS ISLAND

There are no erosion control structures on Pritchards Island.

CAPERS ISLAND

There are no erosion control structures on Capers Island.

ST. PHILLIPS ISLAND

There are no erosion control structures on St. Phillips Island.

BAY POINT ISLAND

There are no erosion control structures on Bay Point Island.

DAUFUSKIE ISLAND - Erosion Control Devices

There are no erosion control devices at the Daufuskie Island Club and do not appear to be any at Oakridge.

Melrose Tract

There is a two mile long seawall constructed of treated lumber. It starts beside the seventeenth hole and runs above ground for about a mile until a point roughly 300 feet north of the Melrose Inn, where it continues underground for approximately one more mile. The seawall ends roughly 300 feet south of the northern baseline terminus.

EROSION CONTROL DEVICES - POLICIES/ACTIONS

POLICIES - Erosion Control Devices

1) Promote beach nourishment, dune preservation, and strategic retreat as appropriate responses to beach erosion

2) Strongly discourage the use of hard erosion control devices as inappropriate response to beach erosion.

3) Support Coastal Council in implementation of its regulations and policies restricting erosion control devices.

4) In an emergency situation or as a very short term measure, sandbags may be an appropriate method to shore up the beach.

BEACH RENOURISHMENT AND PRESERVATION

GENERAL ISSUES

Renourishment is a worthy technique used to rebuild eroding beaches. It increases the width of the dry sand beach providing a larger recreational area, increases storm protection, and is aesthetically attractive. Over $8 billion has been spent on nourishment projects along 400 miles of U.S. coastline in the last few decades.

Beach renourishment is a relatively new approach. Ten years ago the Army Corps of Engineers was still recommending installation of sea walls and jetties as effective methods to control erosion. Today, most coastal engineers and geologists believe that these devices exacerbate the problem.

In a renourishment project sand is culled from a separate source, transported to the beach, and placed. The sand should be sculptured to match the contours and slope of the natural beach. See Figure 6.

PERIODIC RENOURISHMENT

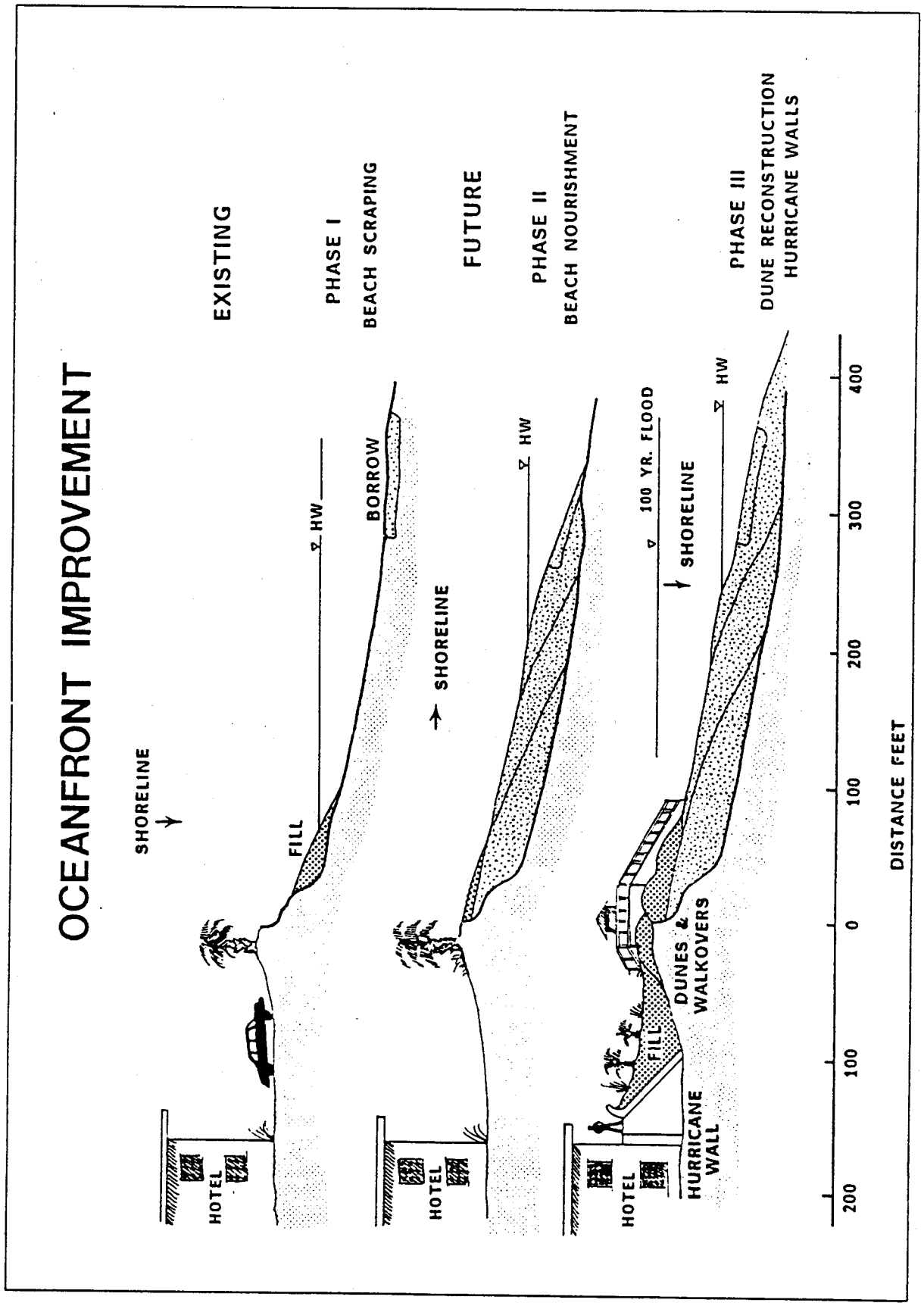
Renourishment should not be considered a one-time response. It must be done over and over again. Eroded beaches have an initial sand deficit (Figure 2) and an annual loss. Renourishment will add enough sand to replace the initial deficit and cover subsequent losses of sand for a number of years. Periodic renourishment is necessary as long as the beach is erosional for any new sand will erode as long as the beach is subject to erosional forces.

Predicting the outcome of a renourishment is difficult. Undertaking such a project is a gamble. All of the new sand could be lost in a subsequent hurricane. While some projects around the country have performed well others have completely failed.

Once a beach is renourished much of the sand may be lost the first winter due to cyclical factors, only to be naturally replaced at a later time. In the normal cycle of sand movement, short and choppy high energy winter waves move dry sand from beaches and deposit it on offshore sand bars. In the summer the process is reversed with longer, low energy waves picking up wet sand from the bars and returning it to the beach.

Stability of the beach after a renourishment is enhanced if the project encompasses long stretches of shoreline. Evidence shows that success of beach nourishment is directly related to the length of beach being renourished. This is also cost efficient due to the expense involved in mobilizing equipment.

FIGURE 6
ANATOMY OF A BEACH RENOURISHMENT PROJECT



SOURCES OF SAND

Sand can be retrieved from upland or submerged sources. It is often preferable to glean sand from an upland source in order that it not be removed from the existing sand distribution system.

Nonetheless, many projects use sand from the ocean, either near shore shoals and bars or from the ocean floor. Ancient beaches lie under the mud of the sea bottom off the South Carolina shoreline. Dredging sand from these sources should be done thoughtfully for by changing that marine environment there could be long term adverse effects on benthic (bottom dwelling) organisms like shrimp ("Searching for Sand under the Ocean Floor").

Sand scraping should be completed during winter months to minimize environmental impacts and allow quick recovery of beach habitats.

COST

Beach nourishment is less expensive if there are adjacent accreting area from which to borrow sand. However, it is Coastal Council policy that fill not come from adjoining beaches or nearshore bars. Where sand is readily available on nearshore bars the cost may be $1 to $2 per cubic yard depending upon the size of the project. Trucking sand in from an inland source or using more distant offshore source (utilizing a hydraulic dredge and pipelines) may cost from $5 to $10 per cubic yard depending upon size of the project (March 1988 prices).

Given a choice between trucking sand in from an inland source or using an offshore source (other than a nearby shoal or bar), the former approach will probably be more economical with small projects; the latter will likely be more cost effective for large projects due to the capital costs.

In order to evaluate the benefits of a nourishment project, the value of potential losses must be factored in. Therefore, in addition to providing dry sand beaches for recreational purposes, renourishment projects are especially important for developed beach communities, notably Fripp Island, Harbor Island, and Daufuskie Island. Such communities are also better able to afford the high costs.

RENOURISHMENT - BMA/COASTAL COUNCIL FRAMEWORK

SCCC REGULATIONS ON BEACH NOURISHMENT

Coastal Council has permitting authority for any beach

renourishment project. During its review the following are considered:

1) The borrow material must be suitable for the beach

2) There must not be significant potential adverse affects to borrow areas

3) Dredging in borrow areas must not be in conflict with spawning or migratory patterns of significant estuarine or marine species. Nourishment must be scheduled in order not to interfere with nesting and rearing activities of significant species

4) SCCC's detailed dredging requirements must be adhered to

5) The project must have a minimum projected life of ten year.

FUNDING FOR RENOURISHMENT

Presently there is no firm State source of funds for beach nourishment. The state has provided money to local governments in the past on a 60%/40% basis. Coastal Council will allocate funds as they become available in accordance with whatever restrictions or priorities the General Assembly attaches. Many renourishment projects include a combination of financing sources - federal, state, and local, as well as private. Appendix 10 lists potential funding sources for beach nourishment projects.

FUNDING CONSIDERATIONS

In order for a community to be eligible to receive funding from the Beach Restoration Fund it must have an approved beach management plan.

Potential projects are evaluated and ranked according to the following general considerations:

1. Environmental impact of project

2. Public recreational benefit

3. Expected useful life of project

4. Protection benefit of project

5. Extent of support for project

Other considerations include: technical feasibility, cost, and availability of adequate funding for future renourishments.

Beach Management Act guidelines state that Coastal Council may establish an additional criterion to awarding communities which promote strategic retreat and limit building sizes to less than 5000 square feet. Therefore the Beach Overlay District should be amended to comply. This measure is somewhat moot since Coastal Council already implements this provision.

APPLICATION PROCESS FOR FUNDING PROJECTS

Beach restoration projects follow a cyclical pattern subject to availability of funds. Coastal Council announces when applications are to be submitted. Applications are submitted to Coastal Council. They are reviewed by the staff and then considered by the Administration and Finance Committee of Coastal Council where input from the applicant and the public is considered. The committee ranks the projects and makes a recommendation to the Coastal Council. The execution and administration of the project is coordinated by the Coastal Council.

Projects that are not funded during the initial cycle will be eligible for consideration in the next cycle. Communities will have an opportunity to update the applications for subsequent cycles if there are any changed conditions.

ADJUSTING BASELINES

Baselines and setback lines may be adjusted after a renourishment project subject to Coastal Council guidelines.

RENOURISHMENT - SEA ISLANDS

HUNTING ISLAND

In March 1991 a $2.8 million renourishment was carried out at Hunting Island. A ten foot deep 100 acre pond was dredged from a shallow shoal two miles offshore. Over one million tons (or 750,000 cubic yards) of new sand was pumped through a pipeline onto the shore. Bulldozers spread it evenly four and a half feet deep along 7,500 feet of beach in the day use and south beach areas of the park. This project is expected to last for five years provided a hurricane or strong northeast winds don't wash it away.

In addition to enhancing recreational value the sand will allow for new nesting areas for sea turtles, and habitats for shorebirds and ghost crabs. In order not to impede turtle nesting the sand was just deposited on the beach and not compacted. Sand fencing will be installed to bolster the existing dunes and fill in gaps between them.

Hunting island's beach was last renourished in 1980 when 1.4 million cubic yards of sand was pumped from the interior of the island at a cost of $364,000. That project lasted about five years. Between 1968 and 1980 three other renourishment projects brought in more than 3.5 million cubic yards of sand.

Half of the project cost was covered by the state's general fund and half by the Department of Parks, Recreation and Tourism. In order to raise its share of the cost PRT sold some of its property in Columbia. One would hope that PRT will not need to sell off other public lands on a regular basis in order to preserve this wonderful public realm.

FRIPP ISLAND

In spite of the severe threats of erosion and risks to expensive property, the Fripp Island property owners are uncertain if they will carry out any beach renourishment project. (See Erosion section.)

DAUFUSKIE ISLAND

One half mile of beachfront at the beach access site in Daufuskie Island Club would be eligible for renourishment funds. However, it is unlikely that such funding would be forthcoming. One criterion for funding from Coastal Council is the chance of success and the likelihood of a successful project for such a short reach of beach is not high. Therefore, efforts should be made through expansion of this site and/or establishment of new sites to create a more extensive contiguous stretch of publicly accessible beach.

BEACH RENOURISHMENT - POLICIES/ACTIONS

Most of the policies stated below are meaningful only if Beaufort County is involved in renourishment projects whether through permitting (not presently done) or administering projects, or applying for funding for projects.

POLICIES

1) Beaufort County acknowledges that Hunting Island State Park is an exceptionally valuable resource for residents of, and visitors to, the county, region, and state. Beaufort County encourages the General Assembly; the Department of Parks, Recreation, and Tourism; and South Carolina Coastal Council to continue to renourish the beach as needed.

2) Beaufort County will coordinate with the legislative delegation to assure that funds continue to be available for renourishing the beach of Hunting Island State Park.

3) Beaufort County will coordinate with Parks, Recreation, and Tourism to assure that any beach nourishment projects at Hunting Island State Park are conducted in concert with Beaufort County in order not to damage other county islands and waterways.

4) Beaufort County recognizes the importance of maintaining a dry sand and ecologically stable beach. The beach affords habitat to a variety of species, protection for upland development and space for recreational activities.

5) Beaufort County will maintain contact with Coastal Council to insure that in the event funds are available for local beach nourishment projects, funds are obtained for qualifying local projects.

6) Given the high value of potential losses from erosion to developed beach communities, including Fripp Island, Harbor Island, and Daufuskie Island, those communities should be high priorities for renourishment projects provided commensurate public access is made available.

7) Where public funding is involved, a renourishment project should be tied to public benefit, primarily public access.

8) On beaches where there has been evidence of significant turtle nesting activity, beach renourishment projects should take place outside of the nesting season - between November 1 and May 14. Renourishment material should be suitable for turtle nesting if possible. Sand spits and offshore sandbars should not be used as borrow sources if they are designated as a critical habitat area.

9) In selecting borrow sources the following considerations should apply:

   a) Upland sources of beach compatible sand, hauled to the site by truck, conveyor, or other appropriate means are preferable to offshore sources.

   b) Offshore borrow sources whose use will not adversely affect the marine environment or the county shoreline by exposing it to increased wave energy may be appropriate.

   c) Beach scraping from the low tide beach using land-based equipment, may be appropriate provided other borrow sources cannot be used and provided the scraping will not adversely affect the county shoreline.

10) Where a renourishment project is implemented on Beaufort County beaches, an ongoing maintenance program should be established and carried out.

ACTIONS (Mid Term) - Beach Renourishment and Preservation

1) Seek to expand existing public access on Daufuskie Island in order that a large expanse of the beach become eligible for renourishment funding from Coastal Council.

2) Explore various avenues for financing renourishment projects.

ACTIONS (Near Term) - Beach Renourishment and Preservation

1) Amend overlay district to limit buildings within the setback (landward of the no-build line) to 5000 square feet.

2) Deliberate amending existing Beach Development Overlay District to provide for approval by Beaufort County of renourishment projects.

3) Amend beach ordinance to regulate vehicular traffic upon beaches and dunes.

DUNE PRESERVATION AND ENHANCEMENT

GENERAL ISSUES

Sand dunes are helpful in counteracting erosional tendencies. The dunes function as a sand savings account, providing extra sand when the erosional forces remove sand from the beach. Without this sand reserve, the waves may rush upland. Even low dunes of two to three feet in height can forestall beach erosion. Healthy sand dunes also provide a buffer between wave attack and beachfront development.

HOW DUNES ARE CREATED

Dunes are created when decaying spartina grass or other plant material washes up onto the beach in rows. Rain and tides keep the grass damp and it serves as a mulch encouraging the germination of seeds which arrive by the winds or surf. The decaying grass yields nitrogen and other essential elements for the plants to grow. As certain hardy plants, such as sea oats or panic grass, grow their blades catch airborne sand. Grains pile around the shoots and are anchored by the spreading roots. New sprigs continue to pop up catching more sand. Eventually shrubs and trees colonize the dunes (Ballantine).

Primary dunes are those nearest the ocean. They accrete and erode in a cyclical fashion. Secondary dunes, those landward of the primary dune are not as dynamic as the primary dunes and generally have thicker plant growth.

BUILDING DUNES

It is in the property owner's benefit to maintain healthy dunes, restore eroded or damaged dunes to their natural state and to build new sand dunes where feasible.

The purpose in building a dune is to assist nature without completely replacing it. The dune should be fit into the natural dune pattern, allowing room to adjust to the dynamics of the area. In places where erosion rates are high and beaches are narrow dune building projects are probably infeasible.

An effective way to build and stabilize a dune is to cover it with vegetation. The plantings help to trap the wind blown sand and the roots bind sand particles. Very few plants can survive the harsh environment of wind blasts, salt spray, and sand accumulation. Nutrients are scare, droughts are severe and heat waves are frequent. Three particular types of grasses are well suited to this environment due to their extensive roots and ability to germinate in the dunes. They include: American Beachgrass, Bitter Panicum, and Sea Oats ("How to Build a Dune").

Installing a snow fence aids the process by trapping sand and discouraging people from walking across the new plantings. A snow fence should be 4 feet high and mounted to pressure treated 2x4 fence posts.

See Appendix 11, "How to Build a Dune" for more details on plant types, planting tips, sand fencing, and dune placement.

DUNE PRESERVATION - BMA/COASTAL COUNCIL FRAMEWORK

SCCC REGULATIONS

Coastal Council regulations and guidelines protect sand dunes as follows:

1) The destruction of beach or dune vegetation seaward of the setback line is prohibited unless there is no feasible alternative. It must be demonstrated that the project cannot avoid the sand dune through relocation, realignment, reduction in size, or through other measures. When there is destruction of such vegetation, mitigation via the planting of new vegetation is required.

2) New construction is not permitted on the primary sand dune

3) Where dune alteration occurs construction must be elevated at least two feet above grade, if possible.

4) Dunes that are destroyed or damaged during construction - other than those dunes or sections of dunes lying in the footprint of the structure - must be restored to their original contours and revegetated.

5) All dune building, restoration, and re-vegetation must be done in accordance with the "How to Build a Dune pamphlet available from Coastal Council.

6) Sand dunes designated as critical habitat areas by the South Carolina Wildlife and Marine Resources Department must not be altered without a permit or certification from Coastal Council.

7) Construction of fences, lighting, trash receptacles, sidewalks, and signs must not alter sand dunes and dune vegetation.

8) No leveling of dunes is allowed as part of landscaping project.

9) Walkways over dunes must be made of wood, conform to the contour of the dunes, have a maximum width of six feet, and not exceed one per lot (unless a hardship would result in

which case a walkway should not be located within fifty feet of another walkway on the same lot)

Figure 7 shows the design for dune walkovers recommended by the Town of Surfside Beach, South Carolina.

DUNE PRESERVATION - SEA ISLANDS

HARBOR ISLAND - Dune Preservation

The property owners association is strict about protecting seaoats given their role in fortifying sand dunes. There are no sandfences on the island.

DUNE PRESERVATION - POLICIES/ACTIONS

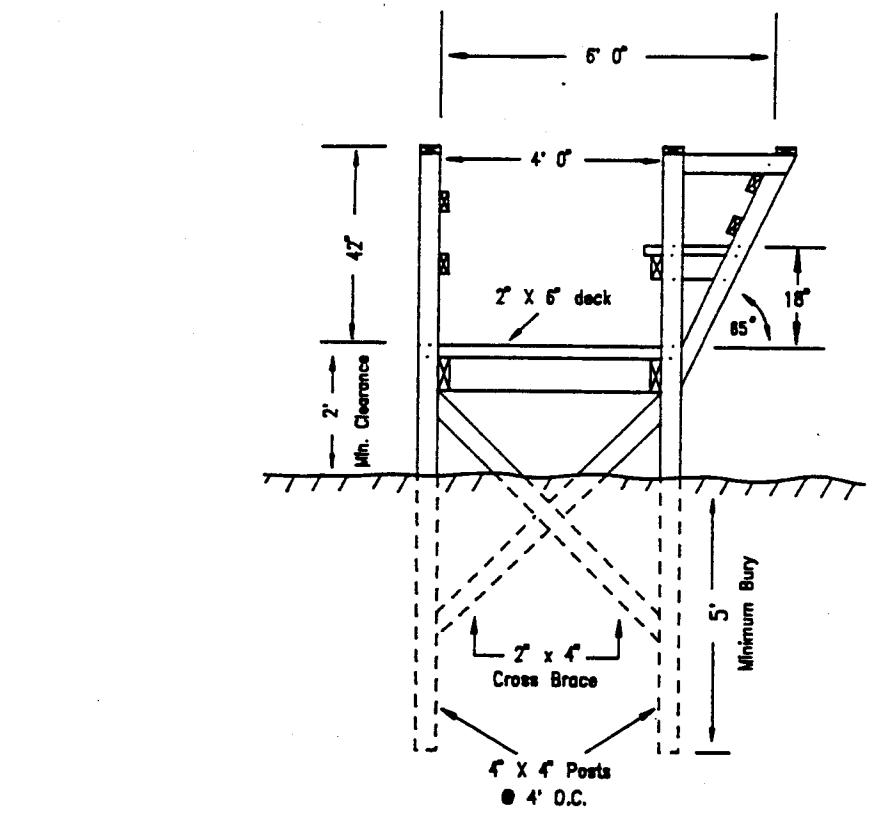
POLICIES - Dune Preservation

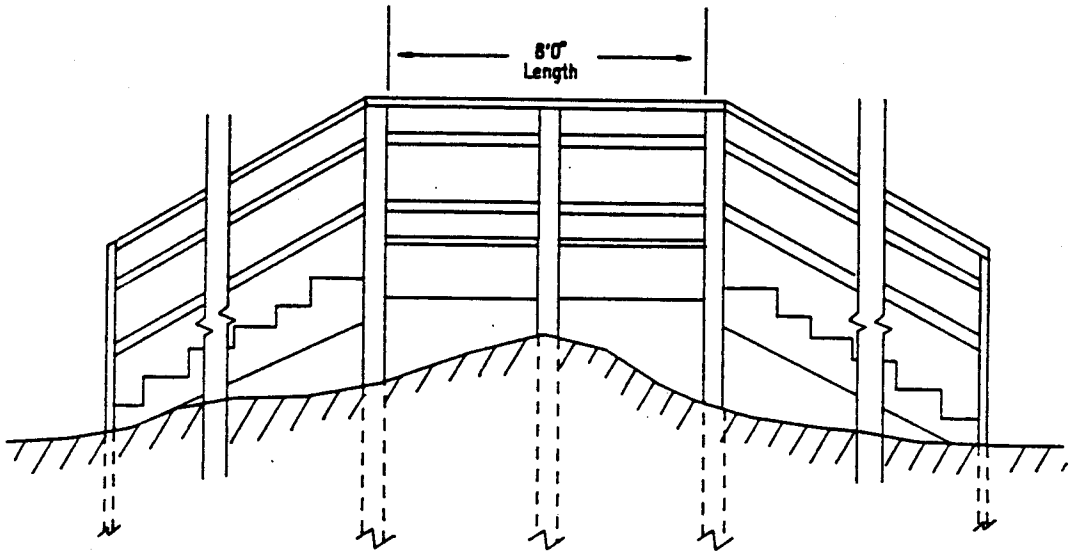
- Dune construction, restoration, re-vegetation, fencing, and walkover/deck construction should be carried out according to the guidelines in "How to build a Dune" pamphlet (Appendix 11).
- Construction of new sand dunes on beachfront property by public or private parties is strongly encouraged.
- When beach renourishment projects are undertaken, the simultaneous creation of sand dunes, if none exist, is encouraged.

ACTIONS (Near Term) - Dune Preservation

- Amend Beaufort County Ordinance, Regulation of Beaufort County Public Beaches - Appendix 2 - to provide for the protection of sand dunes.
- Encourage beachfront property owners to obtain from Coastal Council and post along the beach a "Please Keep off Dunes" sign.

FIGURE 7
MODEL DUNE WALKOVER DESIGN





NOTES: All Wood Products to be Wolmanized, 0.25 pcf Retention
All Nails and Fasteners to be Hot Dipped Galvanized
See Town Engineer for Detailed Design

DEVELOPMENT IN THE SETBACK AND STRATEGIC RETREAT

Strategic retreat entails the following objectives for development in proximity to the beach:

1) Regulating reconstruction of structures severely damaged or destroyed

2) Providing for relocation of existing development

3) Providing for setbacks of new development

STRATEGIC RETREAT - BMA/COASTAL COUNCIL FRAMEWORK

The BMA requires beachfront communities to develop a policy of limiting the size of buildings in the 40 year setback zone and encouraging building siting away from the beachfront.

It is expected that if the coastline continues to migrate landward, even those structures that are located landward of the present setback line, will eventually lie within the setback zone, as the lines are reset in the future.

COASTAL COUNCIL REGULATIONS

Coastal Council applies the following restrictions to development in the setback area.

New Structures

Construction of new habitable structures is allowed seaward of the setback line provided:

1) The structure does not exceed 5000 square feet of heated space

2) The structure is located as far landward on the property as practicable

3) No part of the building is seaward of the baseline or over the primary dune

4) Additions to existing structures together with the existing structure must not exceed 5000 square feet of heated space

Rebuilding

Replacement or rebuilding of habitable structures over 5000 feet between the baseline and setback is permitted provided:

1) The total square footage of the replace structure seaward of the setback line does not exceed the total square footage of

the original seaward of the setback line

2) The linear footage of the replace structure parallel to the coast does not exceed the original linear footage parallel to the coast

3) The replaced structure is no farther seaward than the original

4) The structure is moved as far landward as practicable

5) Reconstruction does not occur seaward of the baseline with exception of certain situations which are detailed in the BMA

Development Seaward of the baseline

The only development which SCCC allows (subject to certain conditions) seaward of the baseline include:

1) Wooden walkways no wider than six feet - this is the only structure allowed seaward of the baseline without a SCCC permit.

2) Wooden decks - they should be no larger than 144 square feet.

3) Fishing piers - they must be open to the public.

4) Golf courses provided that: they are located as far landward as practicable, no dunes are damaged, and measures are taken to protect the primary dune from foot traffic.

5) Landscaping

6) In addition, the SCCC Permitting Committee considers applications for special permits when the property owner would have no reasonable use of his property or when an overriding public benefit can be demonstrated.

STRATEGIC RETREAT - BEAUFORT COUNTY

Beach Development (Overlay) District

This district presently provides for strategic retreat by preventing most construction within 40 feet of the baseline. However, the district should be strengthened and amended to comply with particular requirements of the BMA.

The complete text for this zoning overlay district is contained in Appendix 1.

Flood Hazard (Overlay) District

The Flood Hazard (Overlay) District was established for the purpose of protecting future development from the effects of

rising tidal waters associated with probable future hurricanes. The District consists of that area designated on Official Flood Hazard Area Maps of Beaufort County and is specifically defined by reference to indicated elevation figures measured from mean sea level for each designated flood hazard area.

Key provisions include:

- Section 4.18.4 (A): "Construction of a residential structure (or commercial structure in the case of a commercial business subdivision) on that lot lying within a flood hazard area, shall have as a minimum first floor elevation the level of the 100-year flood or above as designated on official County flood plain maps."

- Section 4.18.4 (B): "Construction on lots within what is defined and designated as 'coastal high hazard velocity areas' shall be elevated and securely anchored to well-anchored piles or columns and have the level of the bottom of the lowest horizontal support member at or above the level of the 100-year flood. Space below the level of the first floor level shall be free of obstruction or covered by break-away facade material capable of producing free obstruction for the impact of abnormally high tides or wind-driven water."

The complete text for this zoning overlay district is contained in Appendix 4.

STRUCTURES IN/NEAR THE SETBACK ZONE - SEA ISLANDS

The BMA requires local plans to include an inventory of all existing structures located seaward of the baseline, seaward of the setback line, and within 50 feet (on the landward side) of the setback line. There follows a simple tabular inventory of all these structures. For a more complete picture of these structures, including exact location and supplementary notes, see the overlay maps.

The following code is used, below:

A - Habitable structure less than 5000 square feet in area
B - Habitable structure greater than 5000 square feet in area
C - Recreational structure, such as pool
1 - Located seaward of baseline
2 - Located seaward of setback line (but landward of baseline)
3 - Located within fifty feet landward of setback line (outside of South Carolina Coastal Council setback zone)

Number in parentheses after structure code indicates the number of such structures.

HARBOR ISLAND - Development in/near the Setback Zone

There are no plans at Harbor Island to relocate any structures located in the setback zone.

Parcel	Structure Inventory	Structure Location
(Tax Map 20A)		
123	B	3
128	A	3
133	A	3
140	A	3
(Tax Map 20C)		
1	A	1
5	A	1
10	A	3
16*	A	?
20	A	1
25*	A	?
28	A	2
42*	A	?

* These three houses are not shown on 1988 orthophotos. It appears that they are at least within 50 feet of the setback line.

HUNTING ISLAND - Development in/near the Setback Zone

All of the land on Hunting Island is owned by Parks, Recreation, and Tourism. The southern half of the island has been subdivided into several hundred parcels. There are cabins on forty five of these parcels: fifteen cabins are owned by Parks, Recreation and Tourism (the number shown in parenthesis, below, is cabin number); thirty cabins are privately owned (on leased lots).

There are no plans at Hunting Island to relocate any structures within the setback zone but such an approach has not been ruled out.

Parcel/Structure	Structure Inventory	Structure Location
(Tax Maps 20, 27, and 34)		
13	A	3
55	A	2
72	A	2
133	A	2
134	A	2
336 (16)	A	3
338 (2)	A	2
339 (3)	A	2
340	A	2
354	A	2
358	A	2
380	A	2
381	A	2
386	A	2
402 (9)	A	2
403	A	3
404	A	3
406	A	3
408 (10)	A	3
409 (11)	A	3
410	A	3
(14) *	A	3
(15) *	A	2
		2
Numerous Bathhouses		2
Recreation Building		2
Concession Stand **		2
3 Picnic Shelters		2
1 Concession Stand		2
1 Lighthouse		2
2 Outbuildings by lighthouse		2
1 House		2
1 Kiosk		2
		2

* These two cabins are not located on separate parcels.
** There are plans to remove this unused structure.

FRIPP ISLAND - Development in/near the Setback Zone

The author is not aware of any plans to relocate any structures located in the setback zone.

Parcel	Structure Inventory	Structure Location
(Tax Map 34)		
465	A	2
(Tax Map 39)		
1	A	3
2	A	3
3	A	3
4	A	3
5	A	3
6	A	3
8	A	3
10	A	3
11	A	2
12	A	2
13	A	3
14	A	3
15	A	3
16	A	3
17	A	3
18	A	3
19	A	3
21	A	3
24	A	3
25	A	3
26	A	3
27	A	3
28	A	3
29	A	3
32	A	3
36	A	3
37	A	3
38	A	2
65	A	2
66	A	3
67	A	3
69	A	3
70	A	3
(Tax Map 40)		
3	A	1
4	A	1
9	A	1
10	A	1

Parcel (continued)	Structure Inventory	Structure Location
11	A	1
16	A	1
17	A	1
18	A	1
27	A	1
28	A	1
37	A	1
39	A	1
40	A	1
54	A	1
66	A	2
109	A	2
110	A	1
111	A	1
112	A	2
119	A	1
120	A	2
128	A	1
133	A	2
134	A	2
135	A	2
140	A	2
141	A	3
142	A	2
149	A	3
150	A	2
157	A	3
158	A	3
160	A	3
162	A	3
163	A	3
164	A	3
165	A	2
166	A	3
168	A	3
169	A	3
170	A	3
172	A	3
174	A	3
177	A	3
179	A	3
263	A	3
264	A	3
265	A	3
273	A	3
274	A	1
275	A	3
281	A	3
282	A	3
283	A	2

Parcel	Structure Inventory	Structure Location
(continued)		
289	A	1
290	A	1
292	A	1
320	A	3
321	A	3
322	A	2
451	A	3
452	A	3
453	A	3
454	A	3
455	A	3
456	A	3
457	A	3
458	A	2
459	A	3
460	A	3
661	C	3
666	A	3
667	A	3
668	A	3
669	A	2
670	A	2
672	A	2
673	A	2
674	A	2
675	A	2
725	B	2
726	B	2
764	B	2
769	B(2), A	2
769	B	3
778A	B	3
780	C	3

PRITCHARDS ISLAND - Development in/near the Setback Zone

Parcel	Structure Inventory	Structure Location
(Tax Map 39)		
1	A	3
(Tax Map 44)		
1	A	2

CAPERS ISLAND - Development in/near the Setback Zone

Parcel	Structure Inventory	Structure Location
(Tax Map 43)		
12B	A	1
22	A	2
27	A,C	2
29	A	2

ST. PHILLIPS ISLAND - Development in/near the Setback Zone

There are no habitable structures within fifty feet of the setback zone on St. Phillips Island.

BAY POINT ISLAND - Development in/near the Setback Zone

There are no habitable structures within fifty feet of the setback zone.

DAUFUSKIE ISLAND - Development in/near the Setback Zone

Daufuskie Island Club

Parcel (Tax Map 27)	Structure Inventory	Structure Location
9	Gazebo at access point	2

Oakridge Tract

There are no habitable structures within 50 feet of the setback zone at Oakridge.

Melrose Club

There are no plans to relocate any structures at Melrose.

Parcel (Tax Map 25)	Structure Inventory	Structure Location
1A	B (Melrose Inn)	3
1A	Gazebo	2
1A	A(4)	2
1A	A(9)	3

Parts of the sixteenth, and most of the seventeenth and eighteenth holes, some lawn areas, and a cart path, concrete walk and patio behind the Melrose Inn are seaward of the setback line.

(Tax Map 25C)		
89	A	2
90	A	2
101	A	2
111	A	2

STRATEGIC RETREAT - POLICIES/ACTIONS

POLICIES - Strategic Retreat

1) Encourage property owners to site oceanfront buildings and structure as far landward as possible. The Board of Adjustments and Appeals is encouraged to grant variances from zoning code setbacks, as appropriate, to accomplish this.

2) Prior to new construction of any new beachfront structure, there should be consideration of the erosion rate and structures should be placed sufficiently landward to allow for safe shoreline migration during the useful life of the structure.

3) In PUD's encourage adjustment in setbacks as part of master plan review process to be incorporated into development parameters for that PUD.

4) Where buildings and structures encroach upon the setback area work with property owners to facilitate removal of the structure or relocation landward of the setback line.

5) When any public facility including roads or utilities is built or rebuilt within the setback area, build in a manner and in a location recognizing the vulnerability of that area to shoreline migration.

6) Where new baselines are established by SCCC, adjust the location of the Beach Overlay District accordingly.

ACTIONS (Mid Term) - Strategic Retreat

1) Explore creation of program for acceptance of conservation easement in the beach area, in coordination with the Open Land Trust, South Carolina Heritage Trust, and other appropriate agencies.

2) Explore development of mitigation guidelines/impact fee type program for construction activity and destruction of beach or dune vegetation in setback area.

3) Adopt land use controls to discourage development in areas most imminently threatened by erosion.

4) Explore creation of program for Transfer of Development Rights in the beach area.

ACTIONS (Immediate) - Strategic Retreat

1) Amend Beach Overlay District to be oriented to the 40 year setback line.

2) Amend Beach Overlay District to provide for relocation if baseline and setback lines are redrawn be Coastal Council.

3) Amend Beach Overlay District to clarify uses permitted seaward of 40 foot No-Build Line: accessory uses, utilities, lifeguard stations, golf course, etc.

4) Amend Beach Overlay District to require that structures, parking areas, and swimming pools seaward of the 40 foot No-Build Line that are destroyed by natural causes be rebuilt as far landward as feasible.

5) Or: Amend Beach Overlay District to prohibit replacement of existing structures and pools when they are destroyed beyond repair. "Destroyed beyond repair" shall mean that more than 67% of the replacement value has been lost.

6) Amend Beach Overlay District to clarify standards regarding reconstruction seaward of the 40 foot No-Build Line after damage to structures in terms of total square footage, linear footage parallel to the beach, and setback from the beach.

7) Amend Beach Overlay District to withhold all permits for development seaward of the 40-year setback line until a Coastal Council permit has been issued.

8) Amend Beach Overlay District to provide for increased setbacks on the seaward side of property and reduced setbacks on landward side of property.

9) Amend Beach Overlay District to require property owners to clean up debris after a disaster.

10) Amend Beach Overlay District to require that future subdivisions provide for lots that are of sufficiently depth to accommodate construction landward of the setback line.

POST DISASTER PLANNING

GENERAL ISSUES

The impact of storms upon the environment is powerful. In September, 1989 Hurricane Hugo blasted ashore in South Carolina with 135 mile per hour winds killing 29 people and causing an estimated $5.9 billion damage.

When winds reach 39 miles per hour a storm is given a name. At 74 miles per hour the storm is classified as a hurricane. A hurricane may cover an area of 300 square miles. The hurricane season runs from June 1 to November 30 of each year. There are an average of six hurricanes per year in the Atlantic Ocean.

The impact of storms and hurricanes upon the beach and structures in the beach zone depends upon the a number of factors including:

1) sand volume in the beach profile

2) elevation of the primary dune, upland area, and/or armoring device (seawall, revetment, rip-rap, bulkhead) if present

3) condition of armoring device if present

4) setback of buildings

5) elevation and structural integrity of the building and its foundation

BMA/COASTAL COUNCIL FRAMEWORK

The BMA mandates that local communities have a plan for managing the beach area in the aftermath of a disaster.

POST DISASTER PLANNING - BEAUFORT COUNTY

A study was prepared by the Planning Board staff with preliminary recommendations for post-disaster policies. This included areas where standard County requirements should be loosened in the aftermath of a disaster and areas where they should not be loosened. Highlights of that study follow.

- A program should be implemented to assess damages to the shoreline, beaches, dunes, and public and private upland development. Designated personnel should be equipped to record damages via written reports, photographs, or camcorder.

- Specific areas on each barrier island or each private development should be designated for the temporary storage of damaged materials and debris. The County might allow for such temporary storage for a period not to exceed 60 days following a major disaster.

Some areas that might be appropriate to loosen requirements which would ordinarily apply include:

- Reducing filing fees to provide economic relief where hardship has resulted

- Allowing for leeway in or temporary waiving of the nuisance ordinance regarding certain aspects such as noise, dust, dirt, light, and odors to expedite construction and demolition activities providing that no hazard is posed

- Regulations on fencing, screening, and setbacks for temporary storage of post-disaster debris might be waived for this period.

- Due to the large number of fallen or damaged trees, some loosening in the tree protection regulations regarding tree removal and surveying might be in order provided that some inventory of the losses could be obtained and that opportunistic cutting of healthy trees would not result.

- Parking, and loading requirements might be loosened to better accommodate crews conducting repair operations.

- Waiving or loosening of requirements regarding the placement of underground utilities to an impacted area provided such utilities are temporary

- Closure to roads to accommodate repair work

- Loosening of drainage plan requirements to provide for measures that will allow for quick release of floodwaters

- Transporting and placement on property of trailers/mobile units without permits provided that they are removed within thirty days after completion of repair work.

Areas that are probably not appropriate to loosen standard requirements include:

- Demolition permits should still be required before demolishing damaged structures.

- For safety reasons, regulations on open fires should not be waived.

- Security regulations should not be waived. Only authorized personnel should be permitted in danger areas.

EMERGENCY OPERATIONS PLAN

Wallace Stickney, Director of the Federal Emergency Management Agency recently toured the Beaufort County Emergency Operations

Center and said, "I'm here today to be briefed on what we think is the best hurricane warning system in the country" (Beaufort Gazette).

Beaufort County has an elaborate Emergency Operations Plan adopted in 1990 and coordinated by the Department of Emergency Preparedness. Direction and control of Emergency Operations is exercised from the Emergency Operations Center at 2305 Duke Street, Beaufort. Appendix 12 is an excerpt from the Beaufort County Catastrophic Recovery Plan.

The Emergency Operations Staff includes: The Chairman of County Council, County Administrator, Emergency Preparedness Director, County Sheriff, Deputy Administrator for Community Services, Recovery Coordinator, Public Works Administrator, Law Enforcement personnel and others.

PRE-DISASTER PHASE

The plan calls for an emergency response capability, establishing effective systems for warning, direction and control, and dissemination of emergency public information.

DISASTER PHASE

The emergency operations personnel evaluates disaster information and makes decisions accordingly; issues emergency proclamations and orders including evacuations; directs emergency operations; coordinates all forces and resources; and collects, analyzes and reports damage assessment data.

POST DISASTER (RECOVERY) PHASE

This is the key element prescribed in the BMA. The Emergency Operations unit directs recovery operations, coordinates request for state and Federal support, maintains communications with emergency agencies, collects, analyzes and reports damage assessment data. Governmental agencies, public services, and other organizations undertake emergency operations to repair damage to facilities and utilities.

Coastal Council has a Field Office Coordinator located in Beaufort. County officials would coordinate with this person for cleanup and rebuilding activities in the coastal area.

DEBRIS REMOVAL

The Deputy Administrator for Public Works is responsible for coordinating the removal of debris and obstacles from waterways and from public and privately owned lands when determined to be

in the public interest. He assists upon request in the repair and restoration of public utilities and critical facilities.

The personnel organization for emergency operations includes a Debris Site Coordinator who is responsible for locating and obtaining sites for debris dumping/disposal or burning. He will manage the day to day operations of the debris sites and will coordinate with law enforcement personnel to provide security at each burning site and to ensure that only debris and not household garbage is dumped. He will coordinate with fire safety personnel and DHEC about environmental concerns. The Debris Removal Coordinator is responsible for coordinating public and private agencies participating in debris removal.

All debris will be removed to a disposal site for burning. Sites for disposal will be designated around the county.

DAMAGE ASSESSMENT

The Beaufort County Tax Assessor is designated Chief of the Damage Assessment Organization. The organization includes personnel from the assessor's office, building inspections department, engineering department, building maintenance department, planning board, private enterprises including real estate professionals, utility companies, public work department, personnel from the SC Wildlife and marine Resources Department, SC Forestry Commission, SC parks and Recreation and others. The Assessor is responsible for organizing the damage assessment capability to determine the extent of damages resulting from natural disasters and to provide damage assessment reports including an evaluation of the estimated cost for loss to property and equipment.

PUBLIC INFORMATION

A person would be designated the Beaufort County Disaster Assistance Officer to organize and operate Disaster Information Assistance Centers. Information regarding debris removal, reconstruction, and other matters would likely be disseminated to the public from those centers.

POST DISASTER PLANNING - SEA ISLANDS

HARBOR ISLAND - Post Disaster Planning

The island does not have a designated place for post-storm debris. There is no shortage of land which could potentially be used for this purpose. The homeowner's association plans to discuss designating a location. Potential sites include the areas at the end of Harbor Drive North near the Marina Area, east of the West Marsh Pedestal Homes, and east of the Oceanmarsh Subdivision.

HUNTING ISLAND - Post Disaster Planning

Hunting Island's evacuation plans are in accordance with guidelines established by the Beaufort County Department of Emergency Preparedness. All solid waste leaves the island. On one occasion, natural debris from the beach was incinerated on the island in a cleared area of about one acre just south of the pond near monument 1820. This site could be used for incineration or temporary storage in the event of a disaster.

FRIPP ISLAND - Post Disaster Planning

The potential for flooding on the island due to a hurricane is significant. The highest and the average elevations on the island are, respectively, 22 feet and 10 feet above mean sea level

The damage in the wake of Hurricane Hugo was not extensive, primarily palmetto fronds and some roof shingles. A curbside pickup and disposal was arranged for this unusual situation.

Fripp Island is one of the first areas in the county to be alerted to approaching high winds, hurricanes, and possible flooding and thus its residents are usually the first to begin evacuation. Notice is given as far in advance as possible by the County Emergency Preparedness Office.

A dump area, just beyond the western end of Wahoo Drive, is designated in which limited controlled burning - only vegetation such as dry palm fronds - can be done. Only two or three maintenance people are allowed in this area.

In the event of a destructive storm this area might be utilized as a temporary holding area (perhaps for 60-90 days) to accept trash and waste, until it could be moved to a permanent site off-island. The property owners are contemplating purchasing a chipper/shredder which could be used in the dump area. Shredding could then be offered for use as mulch.

DAUFUSKIE ISLAND - Post Disaster Planning

The Daufuskie Island evacuation will be a joint operation between county officials and the major developers on the island, Melrose Company and International Paper Company.

In the event an evacuation is ordered on the island, boats of public agencies, such as the Sheriff's Department, Emergency Medical Services, Wildlife and Marine Resources, the Coast Guard, and others would be available to evacuate people.

Melrose and Daufuskie Island Club

There is a security department on the developments which is the command post for disaster situations. This office has a direct radio link with the Beaufort County Sheriff's Department 24 hours per day. A plan is kept on file with the County Emergency Preparedness Department and is updated annually.

There is a solid waste compaction site in the western corner of the Melrose tract. Waste from both Daufuskie Island Club and Melrose gets compacted here, stored in two large dumpsters then hauled by barge to the county landfill. In the aftermath of a disaster, this area would be utilized for temporary storage. If appropriate, natural debris could be burned at this same site.

SOLID WASTE DISPOSAL

Currently there is no public system for disposal of solid waste materials on Daufuskie Island. There are no landfills, no green boxes, no transfer station and no mini-transfer station. The residents on Daufuskie Island dispose of solid waste materials by either taking the solid waste materials to Savannah by boat or by burning the combustible items and feeding the eatable items to livestock or poultry. Items that can not be burned or fed to livestock, such as aluminum cans, old appliances, and glass items, have been discarded on the landscape. It is expected that the County will install mini-transfer stations on the island in the near future.

POST DISASTER PLANNING - POLICIES/ACTIONS

POLICIES - Post Disaster Planning

1) Beaufort County will work with all appropriate agencies including Coastal Council and the Federal Emergency Management Agency (FEMA) prior to and after a severe storm or natural disaster affecting the beach areas, to minimize potential injury and damage, and to expedite recovery and redevelopment.

2) In the event of a disaster, County building officials will coordinate with Coastal Council and other state and federal personnel in the surveying and documentation of damage to structures and erosion control devices.

3) Beaufort County will communicate with property owners, homeowner associations, and development companies along the beachfront to assure that affect parties are familiar with evacuation and disaster related procedures.

4) In the aftermath of a major storm, Beaufort County will make an assessment of damage to beaches, dunes, and structures in the setback area.

5) In the event that private structures seaward of an established building setback line are damaged beyond a certain threshold, it will be the responsibility primarily of the property owners to cleanup and remove debris located on private property.

ACTIONS (Mid Term) - Post Disaster Planning

1) Complete study conducted by Planning Staff for emergency post-disaster policies and measures. Implement appropriate measures.

2) Communicate with Harbor Island Property Owner's Association and developers/property owners of other sea islands regarding establishment of area for disposal of debris caused by a natural disaster.

ACTIONS (Near Term) - Post Disaster Planning

1) Amend Annex B Communications of the Beaufort County Emergency Operations Plan to establish coordination and notification system with Coastal Council for post disaster planning along the beachfront.

2) Amend Beach Overlay District to provide for measures regarding reconstruction of property that is destroyed beyond a certain threshold within the setback and within the 40-foot No-Build Zone.

PROTECTION OF ENDANGERED SPECIES

GENERAL ISSUES

* Please note - for simplicity the term imperiled species is used here to encompass species which are designated "endangered", "threatened", and of "special concern".

There are various federal protections covering imperiled species including the Federal Migratory Bird Act, the Marine Mammal Protection Act, and most significantly the Federal Endangered Species Act of 1973. The major agencies overseeing management of endangered species are the United States Fish and Wildlife Service and the South Carolina Wildlife and Marine Resources Department.

Protection of beach habitats including sand dunes and the dry sand beach will can protect habitats and greatly enhance the chances of survival and proliferation of imperiled species in the beach zone.

LOGGERHEAD TURTLE

The Loggerhead Turtle (Caretta Caretta) is probably the most visibly threatened animal in the beach zone. This species frequents the coast from spring through fall, mating in the shallow waters. At night the females crawl ashore, dig a hole in the sand along the front beach just above high tide line, and lay their eggs in it.

Turtles deposit 70-100 eggs, white and soft, and the size of ping pong balls. They fall a few feet into the hole. One turtle may lay two, three, or four clutches of eggs in a season. It is believed that turtles return to the same beach where they were hatched to lay their eggs.

Baby turtles emerge from their nests after an incubation period of about 90 days. Most of the eggs in a nest hatch within a few hours of each other . Hatchlings remain in the nest a day or so sending a scout climbing to the top of the nest to look out. Once it is dark they make a dash for the beach a few at a time. If all goes well the nest will be vacated within a few hours.

If hatchlings were to make their run during the day they would be vulnerable to predators, such as seagulls. But predators sometimes identify nests and dig them up.

The frequency of beach use by turtles, whose average weight is 200 pounds, varies from beach to beach. Nesting activity occurs on beaches from North Carolina to Florida with the majority of nests found along the Florida coast from Cape Canaveral to Palm Beach. South Carolina accounts for about 6% of the nests in the Southeast.

Incredibly, only about one in 10,000 eggs results in a mature turtle. Factors contributing to the decline in turtle population include development along the coast, armoring of beaches, disorientation caused by lighting from shorefront development, shrimping and fishing trawling and natural predation of the eggs by racoons, opossums and other small mammals. The United States population is estimated to be 14,500 nesting females. Along with other species of sea turtles, the Loggerhead is protected under the federal Endangered Species Act, making it a federal offense to bother a nesting turtle.

Beachfront lighting can confuse turtle hatchlings which orient toward the light of the horizon over the beach. When they emerge from their beachfront nests a day or so after hatching they instinctively follow the brighter horizon of the open ocean. If they reach the ocean, they start swimming and have a chance of surviving to adulthood. The turtles usually leave the nest at night and thus streetlights and lights on beachfront dwellings can disorient them, leading them away from the water. With strong artificial lighting in the beach area hatchlings may move toward private houses and driveways. Turtles that become lost due to bright lights can become prey to ghost crabs, gulls, racoons, dogs, cars and the morning heat. In turtle hatching season it is advisable to eliminate, reduce, or shield beachfront lighting. This approach is appropriate even upon beaches where there is little nesting activity if such lighting would be visible from any other beaches in the vicinity (even across bodies of water) where there is activity.

The Center for Environmental Education in Washington, D.C. recommends the following:

1) Avoid disturbing a turtle that is crawling to or from the ocean. If a turtle is distracted by human beings nearby, even if they are quietly observing, she may decide not to nest, aborting her eggs at sea.

2) Maintain a distance from sea turtle nests.

3) Avoid walking or using off road vehicles in nesting areas

4) Do not disturb markers or protective screening over nests

5) Avoid using lights which shine directly onto the beach.

These provisions should be incorporated into the existing Beaufort County Beach Ordinance and a new Beach Lighting Ordinance. For more information on protecting and relocating Loggerhead Turtle nests see descriptions Hunting Island and Pritchards Island in Endangered Species - Sea Islands section.

IMPERILED SPECIES

Coastal Council has identified a number of plant and animal species which have been placed on either federal or state lists of endangered or threatened species. Although the two lists use similar definitions for these classifications, the two lists are not identical. "Endangered species" means any species which is in danger of extinction throughout all or a significant portion of its range. The term "threatened species" means any species which is likely to become an endangered species within the foreseeable future throughout all or a portion of its range.

In addition several other species have been identified as being of special concern to the South Carolina Wildlife and Marine Resources Department because of diminished population, or loss of habitat, food sources, or ranging area. The following list includes species which use the beachfront for nesting, feeding or habitat purposes. Other marine species which inhabit the offshore section of the coastal zone, which extends to the three mile limit, but do not use the beach for these purposes are not included. See Table 5.

These species occupy different sections of the coast - some in the northern part, and some in the southern part. Periods of use vary, some using the beach year round, some only during the summer months, and others only in winter.

BROWN PELICAN

The Brown Pelican is found along the eastern coast from North Carolina to Texas. The reduced population is due primarily to the ingestion of pesticides and chemicals, mainly DDT and PCBs. Sand spits and offshore bars are used extensively for daily loafing and nocturnal roosting. Isolated spits and bars are preferred since they are removed from predatory mammals. Brown Pelicans nest mostly in colonies during early spring and summer.

IPSWICH SPARROW

This small bird uses the beachfront and sand dunes from early November to May, preferring undeveloped beaches and dune fields.

LEAST TERN

Least terns prefer to nest along beaches covered with shells during the late spring and early summer periods. Loss of nesting space to development and predation has reduced their numbers. During recent years least terns have begun to nest on gravel covered flat roof tops of large buildings to avoid interaction with beach users.

TABLE 5

IMPERILED SPECIES OF THE SOUTH CAROLINA BEACHFRONT

NAME	STATUS	HABITAT/ACTIVITY
Loggerhead Turtle	T (f,s)	beaches (nesting)
Eastern Brown Pelican	SC (s)	beaches
Ipswich Sparrow (wintering)	E (s)	beaches, dunes
Least Tern (nesting)	T (s)	beaches, dunes
Wilson's Plover (nesting)	T (s)	beaches, dunes
Piping Plover (wintering)	E (f,s)	beaches, dunes
Island Glass Lizard	SC (s)	dunes
Seabeach Amaranth	SC (s)	dunes (plant)

Legend

E = Endangered Species
T = Threatened Species
SC = Species of Special Concern
s = included on South Carolina list
f = included on Federal list

WILSON'S PLOVER

This small bird nests along sparsely vegetated beaches and islands along most of the South Carolina coast from March through October.

PIPING PLOVER

The Piping Plover inhabits the coastal zone from early August to late May, preferring dryer sections of the beach and mudflats. It nests from late April to early summer usually in the high beach area adjacent to the primary dunes. The presence of people can disrupt their nesting.

ISLAND GLASS LIZARD

This legless lizard inhabits pine and maritime forests adjacent to beaches and is found occasionally under wrack and washed up debris.

SEABEACH AMARANTH

This plant is found from Massachusetts to South Carolina only on barrier islands including beaches, primary sand dunes, and overwash flats.

ENDANGERED SPECIES - BEAUFORT COUNTY

The frequency of beach use by Loggerhead Turtles varies from beach to beach. The heaviest used beaches in Beaufort County are on Pritchards Island and Bay Point Island. A 1980 Resource Map prepared by SCWMRD pointed to the entirety of the beaches at Bay Point and Fripp Islands as having high incidence of turtle nesting. No other islands were included.

With the exception of the loggerhead turtle, patterns of species distribution and habitat are not well documented along the SC shoreline.

Beaufort County has an animal ordinance, Code of Ordinances, Section 4-8 Restraint of Animals by Owners a portion of which reads as follows: "(a) Animals running at large. It shall be unlawful for any owner or custodian of any dog, cat, or other animal to permit same to run at large at any time upon any street or highway or other property within the county." However, this provision does not sufficiently address the issue at hand.

See Appendix 2 - Beaufort County Public Beach Ordinance. It should be amended as shown in order to protect habitats and nesting sites of imperiled species from encroachment by human

beings and pets. A new ordinance protecting Loggerhead Turtle Hatchlings should be enacted to regulate lights on the beach. See Appendix 3.

ENDANGERED SPECIES - SEA ISLANDS

Pertinent information from The South Carolina Heritage Trust database was furnished to Beaufort County Planning Staff by The South Carolina Wildlife and Marine Resources Department. The database includes a listing of occurrences of imperiled species in or near beach areas of Beaufort County. This Heritage Trust listing is broader than the listing in Table 5 so reference is made below to species that are not included in that table. In addition, some species that inhabit areas outside of, but adjacent to, the beach/dune system are included below. The primary focus of this plan, however, is on species which are included on Coastal Council's listing (as shown in Table 5).

The South Carolina Department of Wildlife and Marine Resources does not assume that the Heritage Trust database is complete. Areas not yet inventoried by department biologists may contain important species. Also, the data should be updated regularly due to changes in natural populations and reclassifications.

Where locations of listed nests and sites are known and available at this time the locations are stated below and/or included in Overlay Maps as attachments herein. Otherwise the locations are either unknown or unavailable at this time.

HARBOR ISLAND - Endangered Species

LOGGERHEAD TURTLE

According to the Heritage Trust database, a low level of nesting occurs here, probably not more than 5-10 nests per season, perhaps due to human activity.

There is a program on Harbor Island to mark nests and erect chicken wire around the nests. There has been a problem with racoons invading the nests but use of traps has helped. The homeowners association has been trying to get property owners to remove lights that shine on the beach.

HUNTING ISLAND - Endangered Species

LOGGERHEAD TURTLE

Hunting Island is a prime turtle nesting location with sites all over the island, (although no reference was made in the listing provided by SCWMRD). Year to year the sites change; in 1991 there were more on the south end of the island. The turtles were

laying eggs until late July and the first nest hatched at about that same time. Dogs on the beach at the State Park are required to be leashed although many people disregard this rule.

Before renourishment there was no high tide beach. Nests would therefore be vulnerable to inundation by the surf. Hunting Island staff dug up and relocated these nests.

The park staff records the location of each nest, counts the eggs, and moves the nests when necessary, recording the date moved. If the nests are relocated they must be moved very quickly because the yolk of the eggs can set. Each egg is then buried separately in its own hole in proximity to others from the same nest.

OTHER SPECIES

More than 125 species of birds have been reported in the park with many herons, gulls, terns and egrets. One can see whiting, spot, trout, bass and drum in the lagoon.

According to the Heritage Trust database, an osprey nest was sited in the maritime forest near the beach. The Nature Conservancy classifies the Osprey as "apparently secure" in South Carolina.

FRIPP ISLAND - Endangered Species

Fripp Island is a wildlife sanctuary. Alligators, deer, racoons, egrets, and blue herons are abundant.

LOGGERHEAD TURTLE

According to the Heritage Trust database, there were probably fewer than 20 nests reported on Fripp Island in 1977. Potential nesting areas had been greatly reduced due to the loss of dry sand beach, partly the result of the construction of erosion control structures. Happily, the amount of nesting activity has increased: the inventory of turtle nests was 89 in 1990.

There are turtle nesting sites at the western end of the island, just before it curves upward toward Skull Inlet; and 3/4 mile west of Ocean Point, near the Drum Road off Marlin Drive.

In 1979, the South Carolina Department of Wildlife and Marine Resources issued a permit to Fripp Island to conduct a program for the protection of turtle nests. Fripp Island has an active program, conducted by volunteer island residents and supervised by an agent from the Wildlife Department. Residents along the shore are instructed not to turn lights on at appropriate times during nesting season. These individuals are assiduous in gaining compliance.

ENDANGERED SPECIES AND CRITICAL HABITAT

Fripp Island is designated as a Bird and Game Sanctuary pursuant to Section 50-11-2640 of the South Carolina Code of Laws. Under this law, no animal may be killed or removed from the island with two exceptions: Federally designated agents may remove alligators subject to Federal law; racoons which become highly destructive may be killed under special permits issued by the South Carolina Department of Wildlife and marine Resources.

PRITCHARDS ISLAND - Endangered Species

Landward of the beach is a maritime forest. Maritime forests are included in the Heritage Trust database and identified as imperiled or rare in South Carolina.

LOGGERHEAD TURTLE

According to the Heritage Trust database there were fewer than 25 nests reported in 1977.

In July of 1991 it was announced that the University of South Carolina Beaufort's Loggerhead Sea Turtle Conservation Project on Pritchards Island would soon have a new building to house scientists, students and volunteer turtle watchers. It will be called the Philip A. Rhodes Barrier Island Research Facility in honor of the Atlanta businessman who donated the island to the University in 1984 and who is now contributing $300,000 to build a research center there. The building will replace the existing cabin erected several years ago by USCB faculty and students. The 3,000-square foot building will include meeting space and a small library.

LOGGERHEAD SEA TURTLE CONSERVATION PROJECT

Since 1982 the University of South Carolina has administered a conservation project for the Loggerhead Sea Turtle on Pritchards Island. The activities include relocating threatened nests and protecting hatchlings until they enter the sea.

University has sought to educate the public about the species and obtains the aid of about 250 volunteers during the summer. Individuals have come from twenty-seven states and three foreign countries to participate.

The conservation project is certified by both federal and state permits because so many of the nests need to be moved due to the erosional nature of most of the beach. Nests that are laid in areas that would be inundated sometime during gestation are

located and moved to higher ground that is suitable for the development of eggs. If a nest is in a location which is not threatened by the tide, it is covered by 4" x 2" mesh wire, four foot square, and anchored.

ACTIVITIES PROTECTING NESTING SITES - 1990 SEASON EXPERIENCE

During the 1990 season 15 of the 174 nests were protected in this manner. 159 of the 174 nesting locations were considered to be too low on the beach and thus highly vulnerable to inundation by a high tide during the gestation period. Nests were relocated to a section of the beach that was higher than the highest storm tide. This area was determined by the wrack line.

The relocation site was protected by standard cyclone fence of 3" square mesh. The area was 10'x4'x10'x4' and covered by a 10'x4' piece of the same material. The cover was tied down on all sides. This relocation site could contain 20 nests centered at 2' intervals. All vertical wire was buried to a depth of 1½' to keep racoons from tunneling under. Ghost crabs were captured with a variation of a blue crab trap. These hatcheries were placed at nine locations on the island.

Beginning at dusk, a few staff members and volunteers walked near the water's edge, searching for tracks without lights. The purpose of walking at the water's edge is that if a turtle is still in the water, she will duck under and let the people pass, and if she has emerged, the people will be behind her and not distract her.

If a track was located, the staff member would check to see what progress the turtle had made. When the turtle was laying, the volunteers were allowed to observe. If the eggs could not be collected as a turtle laid, then the nest would be located with a blunt probe. The eggs were counted at the site and recounted at the relocation site. The relocation nest hole was constructed as much like the original as darkness and bugs would allow. First, the depth was achieved by using post hold diggers, and then the nest chamber was dug by using the shell of the Giant Atlantic Cockle. The eggs were gently placed in the nest and sand packed into the shaft. Each nest was marked with a nest number, total number of eggs, and the date laid.

Secure natural nests outside of the hatcheries were marked with reflectors so they could be monitored along with nests in the hatcheries. As nests hatched, they were excavated and checked for stranded hatchlings and unhatched eggs. Because the project ended on August 15, staff did not attend hatchlings after that date. The self-releasing hatcheries were checked twice weekly through the hatch period and, when appropriate, nests were excavated and unhatched eggs and dead hatchlings noted. Due to limitations of the project, it was not possible to know incubation periods, except for a portion of the nests at the beginning. Also, during

1990, efforts to record percentage of infertile, spontaneously aborted, stillborn eggs and hatchlings were made. However, the results recorded were not representative of the total.

During high tide approximately one-half of the island beach is inaccessible because of waves breaking in the fallen trees on the southern end of the island. During this period the racoons still have access to nesting turtles. In 1990, five nests were lost to racoons because of this.

CAPERS ISLAND - Endangered Species

According to the Heritage Trust database there were probably fewer than 30 Loggerhead Turtle nests reported in 1977. The small amount of suitable beach appears to be the limiting factor.

ST. PHILLIPS ISLAND - Endangered Species

Landward of the beach is a maritime forest. Maritime forests are identified in the Heritage Trust database as imperiled or rare in South Carolina.

According to the Heritage Trust database there were probably fewer than 15 Loggerhead Turtle nests reported in 1977. Most nesting occurred from mid-July to early August.

BAY PT. ISLAND - Endangered Species

According to the Heritage Trust database there were fewer than 35 Loggerhead Turtle nests reported in 1977. Most nesting occurred from mid-July to early August.

An osprey nest was sited on the island in 1974. The osprey is unofficially classified by South Carolina as a species of concern.

Landward of the beach is a maritime forest. Maritime forests are identified in the Heritage Trust database as imperiled or rare in South Carolina.

Also landward of the beach, behind the outer dune system is a maritime shrub thicket. This vegetation is identified in the Heritage Trust database as imperiled or rare in South Carolina.

DAUFUSKIE ISLAND - Endangered Species

In 1984 SCWMRD identified the middle section of the island extending nearly the length of the beach area of Melrose Development and part of Oakridge as a nesting area for ospreys. In that highly erosional area, as trees have fallen into the

ocean, the ospreys have built nests in dead trees and snags. Human visitation to the site to observe the ospreys would probably not disturb the birds as long as people maintain some distance. The ospreys are more likely to continue using the area if a natural buffer is maintained landward of the beach area.

When interviewed, Mr. Steve Kiser, the developer of Melrose and Daufuskie Island Club, was not aware of any Loggerhead Turtle nesting sites on the island. According to Mr. Ed Drane, a Planner with the Town of Hilton Head, there is not very much nesting activity on Daufuskie Island due to the large mud flat in front of the beach. Most of the nesting which does occur is probably in the vicinity of Bloody Point.

ENDANGERED SPECIES - POLICIES/ACTIONS

POLICIES - Endangered Species

1) On beaches where critical habitat exists, direct beach renourishment projects to the inactive period. In the case of Loggerhead Turtles this safe period is between November 1 and May 14. Provide for use of renourishment material that is suitable for turtle nesting and other species if possible. Sand spits and offshore sandbars should not be used as borrow sources if designated as a critical habitat area for a designated species.

2) Seek information periodically from the South Carolina Wildlife and Marine Resources Department regarding nesting and habitat areas of endangered and threatened species and incorporate into area plans. Where appropriate, means should be sought to direct development away from such areas.

3) Incorporate critical areas into area maps and assure that land use ordinances and plans are consistent with protection of habitat areas, as practical and appropriate.

4) Enhance public awareness in the community about habitats and endangered species.

5) Seek to prevent development, including vegetation removal, excavation, grading, filling and construction of roads and structures, in sensitive habitat areas of imperiled species where significant degradation to habitat value may result, as appropriate and practical.

6) Restrict public access in areas of environmentally sensitive habitats to low intensity recreational, scientific, or education uses, as appropriate and practical.

7) Coordinate with Coastal Council to promote public education in Beaufort County through dissemination of literature, public forums, and other means.

ACTIONS (Mid Term) - Endangered Species

1) Coordinate with South Carolina Wildlife and Marine Resources Department, property owners, and other agencies to establish community projects where needed, such as turtle monitoring and escort programs.

2) Coordinate with South Carolina Wildlife and Marine Resources Department, Beaufort County School system, and other local organizations to promote public education of turtle nesting process and other endangered species.

3) If, in the future, significant turtle nesting activity on Daufuskie Island is observed, coordinate with PUD communities on the island to establish a turtle protection and escort program.

4) Seek easements in developed areas containing environmentally sensitive habitat areas

5) Communicate with South Carolina Electric and Gas company regarding purpose for and provisions of Beaufort County Beach Lighting Ordinance

ACTIONS (Near Term) - Endangered Species

1) Establish Beach lighting ordinance to protect Loggerhead Sea Turtle. See Appendix 3.

2) Amend existing Beaufort County Public Beach Ordinance as described above to protect habitats and nesting sites from encroachment by human beings. See Appendix 2.

3) Amend the existing Beach Ordinance to prohibit free roaming dogs and other pets on the beach during the period May 1 through October 31. See Appendix 2.

4) Amend the Beach Development Overlay District to provide for some degree of protection of natural vegetation seaward of the 40 foot building setback. Such a natural buffer would enhance the nesting sites of ospreys on Daufuskie Island.

5) Coordinate with South Carolina Wildlife and Marine Resources Department in the identification and mapping of critical habitat areas in the beach/dune system.

6) Coordinate with the South Carolina Wildlife and Marine Resources Department to establish buffer areas around Critical Habitat Areas identified in this plan or other pertinent Beaufort County documents and to erect signage

pertaining to requirements to keep animals on leashes and prohibit trespassing. Signage:

a. Critical habitat Area - Leash law in effect beyond this point

b. Critical Habitat Area - No trespassing beyond this point from (appropriate months).

COASTAL WATER CONSERVATION

GENERAL ISSUES

POLLUTION OF COASTAL RESOURCES

The valuable resource of the coastal oceans including beaches is threatened along much of the east coast. Large amounts of treated and untreated sewage, dredge materials from harbors, oil spills, debris, sewage dumped from vessels, pesticides and toxic chemicals have been dumped into the ocean and rivers which flow into the ocean.

In the past some experts believed that dilution of pollutants in the open sea was a answer to dealing with pollution. But tides and coastal currents may keep many pollutant closer to the shore where the pollutants can wash up on the beaches. Many coastline materials circulate constantly, making the shoreline a very dynamic place. Because coastal currents are so complex, the ocean margin is an unpredictable place to dump pollutants. Some pollutants bind to particles in the nearshore coastal ocean and then these particle-pollutants are circulated inshore onto beaches.

Dealing with the issue of river and ocean dumping and spills is beyond the scope of this plan. However a discussion and inventory of wastewater, stormwater, and soils follows.

COASTAL WATER CONSERVATION - BMA/CC FRAMEWORK

STORMWATER RUNOFF

Coastal Council's standards provide that, to the extent feasible, discharged waters from drainage canals and ditches shall not result in extensive alteration in the quality of coastal waters.

Applicants for projects which require permits or certification from SCCC - including projects in the beach zone - must submit storm water management plans which are in compliance with the SCCC Stormwater Management Guidelines.

Drainage structures located seaward of the setback line are permitted by SCCC provided:

- New structures are part of a SCCC approved storm water management plan
- Replacement of structures does not involve an increase in the size of existing structures
- Any disturbances to the dunes and dune vegetation must be restored to pre-project conditions

- New drainage structures may be placed on the beach only if no feasible alternative exists

WASTEWATER

Several agencies, including primarily the South Carolina Department of Health and Environmental Control, regulate the installation and operation of waste water treatment facilities and septic tanks. Coastal Council's primary concern is with wetland degradation affecting commercially important shellfish, recreational fisheries, and critical wildlife habitats.

SCCC standards include the following:

- The siting of sewage treatment systems should avoid the critical areas. The location of structures other than actual pipelines near critical areas is prohibited unless no feasible alternatives exist.

- The construction of sewage treatment facilities and associated discharge pipes should be located and designed so as not to have adverse impacts upon areas of significant public use.

COASTAL WATER CONSERVATION - BEAUFORT COUNTY

ESTUARINE SYSTEMS

The saline marshes of Beaufort County are highly productive elements in the marine food chain. Decaying plant materials, called detritus, serve as the foundation of the food chain. Many important finfish and shellfish species depend upon the marshlands and estuaries.

The salt and brackish marshes protect adjacent upland areas from erosion and storm damage. The vegetation absorbs and dissipates wave energy. The marshes also perform a waste treatment function with the vegetation acting as a filter, trapping sediments and pollutants which enter as run-off from upland areas.

There follows an overview of the estuarine systems in Beaufort County, most of which is outside of the beach zone.

Fripp-Trenchards estuarine system

The Fripp-Trenchards estuarine system is a high salinity area where little fresh water inflow occurs. The marsh vegetation is dominated by halphytes which reflects the strong marine influence on the region. Almost all of this systems wetland acres were classified as salt marshes. Only 72 acres of coastal impoundments have been identified.

Smooth cordgrass dominates the major portion (82%) of these coastal marshes, while a diverse plant community exists in this system's 3,880 acres of high marsh (Harbor, Hunting, Fripp, Pritchards, Capers, St. Phillips, and Bay Point Islands).

St. Helena Sound estuarine system

The St. Helena Sound estuarine system is found in part along the northern part of Beaufort County's coast. Brackish water and fresh water marshes occur in nearly equal amounts and comprise roughly thirty per cent of the system's tidal marshes. Smooth cordgrass dominates the low marsh areas, while the high marsh is characterized by a mixed plant community.

Port Royal Sound estuarine system

All of the marshes, with the exception of impounded wetlands, in the Port Royal Sound estuarine system are classified as salt marshes.

The low marsh is characterized by extensive monospecific stands of smooth cordgrass, whereas the high marsh vegetation is relatively diverse with several common species. Under brackish conditions, needlerush commonly dominates large areas of high marsh in this system.

Calibogue Sound estuarine system

The marine environment dominates the Calibogue Sound estuarine system where little fresh water inflow exists. Characteristic marsh plants of this region are halophytes typical of salt and brackish marshes. Most of the area is low marsh. Smooth cordgrass forms monospecific stands in the low marsh, whereas the high marsh plant community is relatively varied with several common species (Daufuskie Island).

WATER QUALITY CLASSIFICATIONS

The South Carolina Department of Health and Environmental Control has established a system of classifying the quality of surface and ground water in the state.

The water quality classification of tidal saltwaters in the estuary adjacent to the seven barrier islands off St. Helena - including the Harbor River, Fripp Inlet, and Trenchard's Inlet and contiguous streams and inlets - is Shellfish Harvesting Waters (SFH). This classification protects shellfish harvesting and is the second highest classification after Outstanding Resource Waters (ORW). The tidal saltwaters adjacent to Daufuskie Island, Calibogue Sound and the New River, are classified SFH and SA, respectively.

SA waters are suitable for primary contact recreation and crabbing and fishing, except for harvesting of clams, mussels, or oysters for human consumption.

GEOLOGY AND SOILS

Most of the area along the shoreline in Beaufort County lies below ten feet in elevation consisting of nearly level lowlands and ridges with slopes generally less than two percent. The sea islands are generally sandy and range from excessively drained to very poorly drained. Most of the soils have high water tables.

Most of the soils just inland from the beaches on the seven barrier islands near Trenchard's Inlet are of the Fripp-Baratari complex or the Capers Association (of no known connection to the island names). The soils just inland from the beaches of Daufuskie Island include Seewee fine sand, Capers Association, and Baratari fine sand.

The Fripp-Baratari complex consists of a mix of Fripp and Baratari and other minor soil types. The complex is made up of excessively drained and poorly drained soils that occur in a regular and repeating pattern. The landscape is mainly one of narrow ridges and troughs with the long axis parallel to the shoreline. The main ridges are about 12 feet in height and 200 feet apart. The Fripp soils constitute the ridges and are excessively drained. They make up about 60 percent of the complex. Typically the surface layer of Fripp soils is grayish brown fine sand about five inches thick. The poorly drained, nearly level Baratari soils make up about 35 percent of the complex. Typically, the surface layer of Baratari soils is black fine sand about five inches thick.

The Fripp soils have moderate limitations for septic tank absorption fields because of their slope. The Baratari soils have severe limitations because of their wetness. The Fripp soils are in hydrology soil group A, meaning that they have a high infiltration rate/low runoff potential.

The Capers association consists of very poorly drained, nearly level soils that are on tidal flats. The landscape is one of marsh areas broken by an occasional saltwater stream. Capers soils generally occupy an intermediate position between upland and areas flooded by seawater. Usually the surface layer is about 22 inches thick made of very dark gray silty clay loam in the upper part and dark gray clay loam in the lower part. The soil has limitations for septic tank absorption fields due to its poor drainage.

Seewee fine sand is somewhat poorly drained, nearly level, sandy soil situated on low ridges. Typically the surface layer is fine sand about 14 inches thick. The water table is high, within one to two feet of the surface for about five months per year. Seewee

fine sand has severe limitation for septic tank absorption fields. However, the water table in most areas can be lowered by a well designed drainage system (Soil Survey of Beaufort and Jasper Counties).

DRAINAGE OF SOIL

Drainage of soil is affected by soil properties including permeability, texture, depth to bedrock and the water table, slope, stability of ditchbanks, susceptibility to flooding, and salinity and alkalinity.

STORMWATER RUNOFF

Beaufort County's policies regarding drainage fortunately prevent much potential pollution to beaches directly and from rivers and streams which flow into the estuary.

All applicants for subdivision of property into two or more lots (with some exemptions), or for multifamily or commercial development must comply with Beaufort County strict stormwater runoff standards.

Section 5.2.5 Stormwater Runoff Standards, subsection (I) (5) of the Beaufort County Development Standards Ordinance prevents direct stormwater discharge onto any beaches. Officials in the Public Works Department are not aware of any direct discharge of stormwater from development onto any beaches from point sources (ditches or pipes).

Pertinent excerpts from the standards follow:

Section 5.2.5 (A) - "No development shall be undertaken that appreciably increases the surface runoff reaching adjacent or surrounding property. Surface runoff shall be dissipated by detention or retention on the development parcel, percolation into the soil, evaporation, or by transport by natural drainage way or conduit to an appropriate point of discharge."

Section 5.2.5 (B) - "No development shall be undertaken except where the planned drainage system is adequate to accommodate at least the twenty-five year storm event."

Section 5.2.5 (F) (1) - "All applications for development will provide for on-site retention or detention (dry or wet), or percolation for the differential between the post-development and pre-development computed peak runoff."

Section 5.2.5 (H) (2) - "The first flush runoff (0.5 - 1.0 inches) from paved streets and parking areas is very detrimental to maintenance of water quality standards. Therefore, filtering of runoff from streets and parking areas through vegetation,

grass, gravel, sand or other filter mediums to remove oil, grease, gasoline, particulates and organic matter is required before the runoff enters any man-made or natural waterbody."

Section 5.2.5 (I) (1) - "Channeling runoff directly into natural or man-made waterbodies from pipes, curbs, lined channels, hoses, impervious surfaces, inverted crown street, rooftops or similar methods shall not be allowed unless methods of filtration are provided, either at the intake or outfall as approved by Beaufort County. Runoff shall be routed through swales, drywells, or infiltration ditches and other methods to increase percolation, allow suspended solids to settle and remove other pollutants."

Section 5.2.5 (I)(2) - "Where specific site hardships may require a variance to allow direct discharge into tidal areas, Coastal Council, DHEC, County Engineer, Corps of Engineers and Water Resources Commission approval is required before a variance is effective. Granting of a variance will be based upon unique site hardships and not upon hardship created by the proposed development plan, or financial consideration. Where specific site hardships may require a variance...methods of diffusing and filtering the discharge and of reducing the velocity will be required..."

See Appendix 7 - Beaufort County Stormwater Runoff Standards.

Some precipitation falling on single family properties might drain directly onto the beach if it is impractical to incorporate particular single family lots into the subdivision drainage plan. It is not expected that significant adverse impacts on water quality would result from these situations. On lots with little impervious surface and some dune structure, that stormwater might not flow to the beach but would be detained landward of the dune until it percolates into the ground.

The presence of dunes aids in preventing direct discharge of stormwater. Where dunes do not exist and there is potential for runoff from developments to run into the beach, dune enhancement is encouraged. Beaufort County will work with property owners to restore and maintain dune areas as a means of reducing the potential for direct discharge to the beach.

RIVER CONSERVATION OVERLAY DISTRICT

The Beaufort County Planning Board is presently reviewing a proposal to create a River Conservation Overlay District. The River Overlay District would provide additional protections for particular bodies of water within the estuary (those classified Outstanding Resource Waters - see definition, above) in three ways:

1) Providing for a fifty foot vegetated buffer along the bank of the waterway;

2) Providing for additional setbacks for multifamily, commercial, and industrial uses beyond the vegetated buffer; and

3) Excluding most commercial uses - for docks, piers, and boat landings - from these waterways.

The district would consist of that portion of the following waterways and their tributaries that lie in the critical area along with adjacent lands: Colleton River, May River, Cooper River, Okatie River, Saw Mill Creek, Bass Creek, Bull Creek, Callawassie Creek, and Chechesee Creek.

HYDROLOGY

Hydrology soil groups are used to estimate runoff from precipitation. Based upon the hydrology classification of the soil on a development parcel, Beaufort County allows for varying levels of impervious surface coverage - with building, pavement, sidewalks, etc. (see Appendix 7 under 5.2.5 (E) Impervious Site coverage. The four hydrology soil groups are:

Group A - soils with a high infiltration rate (low runoff rate) when thoroughly wet. Beaufort County permits a maximum impervious coverage of 80% of the development parcel.

Group B - soils with a moderate infiltration rate when thoroughly wet. Beaufort County permits a maximum impervious coverage of 70% of the development parcel.

Group C - soils with a slow infiltration rate when thoroughly wet. Beaufort County permits a maximum impervious coverage of 65% of the development parcel.

Group D - soils with a very slow infiltration rate when thoroughly wet. Beaufort County permits a maximum impervious coverage of 50% of the development parcel.

- Fripp soils are classified hydrology group A.
- Baratari soils classification ranges from A-D.
- Capers soils are classified D.
- Seewee soils are classified B.

WASTEWATER

Beaufort County requires approvals from appropriate state and federal agencies - including DHEC and SCCC - before final development permits are issued.

Most/all of the beach zone in Beaufort County is subject to storm surge and thus falls under the provisions of the Beaufort County

Flood Hazard Overlay District. Section 4.18.3 of this overlay district states that, "Wastewater disposal systems, including septic tanks, will be constructed to preclude infiltration by flood waters" within specially flood hazard areas, which includes the land in the setback zone.

COASTAL WATER CONSERVATION - SEA ISLANDS

HARBOR ISLAND - Coastal Water Conservation

Nearly all of the island's soils beyond the beach are classified Capers association. There are considered "poor" soils and are classified hydrology group D. Beaufort County permits a maximum impervious surface over these soils of 50%.

DRAINAGE

The are no outfall pipes on the island and no drainage systems seaward of the setback line.

WASTEWATER

The sewage on Harbor Island is treated by a private system and the treated effluent is then transported to Fripp Island where it is disposed of on the golf course as spray effluent.

HUNTING ISLAND - Coastal Water Conservation

Nearly all of the island's soils beyond the beach are classified Fripp-Baratari. Depending upon whether an area is Fripp or Baratari, these are considered "good" soils or "poor soils" and are classified hydrology group A or A-D, respectively. Beaufort County permits a maximum impervious surface over the Fripp soils of 80% and variable from %50-80 over Baratari soils.

DRAINAGE

Stormwater on the island generally flows north. Some drains into a pond northwest of benchmark 1820 which then flows into the ocean through a ditch 1000 feet north of the pond. There are no outfall pipes into the beach area.

WASTEWATER

Hunting Island State Park uses a private plant for the treatment and disposal of the wastewater.

FRIPP ISLAND - Coastal Water Conservation

Most of the island's soils in the area just inland from the beach in the northeastern part of the island are classified Fripp-

Baratari. Depending upon whether a specific area is Fripp or Baratari, these are considered "good" soils or "poor soils" and are classified hydrology group A or A-D, respectively. Beaufort County permits a maximum impervious surface over the Fripp soils of 80% and variable from %50-80 over Baratari soils.

Most of the island's soils in the area just inland from the beach in the southwestern part of the island are classified Capers association. These "poor soils" are classified hydrology group D. Beaufort County permits a maximum impervious surface over the Capers soils of 50%. There are no freshwater wetlands on the island.

DRAINAGE

There is no drainage plan for the area seaward of the setback line.

There are two brackish lagoon systems, one for the golf course in the southeast section and the other feeding Blue Heron Lake and Fiddlers Trace Lake. The outfall pipe for the latter is near Fiddler's Point Road emptying into the tidal marsh.

WASTEWATER

Fripp Island Public Service District provides community sewer service for approximately two-thirds of Fripp Island while the remaining one-third of the dwelling units are on septic tanks. The golf course is used for disposal of sewage effluent.

PRITCHARDS ISLAND - Coastal Water Conservation

Most of the island's soils in the area just inland from the beach are classified Fripp-Baratari. Depending upon whether a specific area is Fripp or Baratari, these are considered "good" soils or "poor soils" and are classified hydrology group A or A-D, respectively. Beaufort County permits a maximum impervious surface over the Fripp soils of 80% and variable from %50-80 over Baratari soils.

In the middle section of the island the soils in the area just inland from the beach are classified Capers association. These "poor soils" are classified hydrology group D. Beaufort County permits a maximum impervious surface over the Capers soils of 50%.

CAPERS ISLAND - Coastal Water Conservation

Nearly all of the island's soils in the area just inland form the beach are classified Capers association. There are considered

"poor" soils and are classified hydrology group D. Beaufort County permits a maximum impervious surface over these soils of 50%.

ST. PHILLIPS ISLAND - Coastal Water Conservation

Most of the island's soils in the area just inland from the beach are classified Capers association. These "poor soils" are classified hydrology group D. Beaufort County permits a maximum impervious surface over the Capers soils of 50%.

In the middle section of the island the soils in the area just inland from the beach are classified Fripp-Baratari. Depending upon whether a specific area is Fripp or Baratari, these are considered "good" soils or "poor soils" and are classified hydrology group A or A-D, respectively. Beaufort County permits a maximum impervious surface over the Fripp soils of 80% and variable from %50-80 over Baratari soils.

BAY PT. ISLAND - Coastal Water Conservation

In the northeastern and southwestern sections of the island the soils in the area just inland from the beach are classified Capers association. These "poor soils" are classified hydrology group D. Beaufort County permits a maximum impervious surface over the Capers soils of 50%.

In the middle section of the island the soils in the area just inland from the beach are classified Fripp-Baratari. Depending upon whether a specific area is Fripp or Baratari, these are considered "good" soils or "poor soils" and are classified hydrology group A or A-D, respectively. Beaufort County permits a maximum impervious surface over the Fripp soils of 80% and variable from %50-80 over Baratari soils.

DAUFUSKIE ISLAND - Coastal Water Conservation

Nearly two thirds of the island in the area just inland from the beach have Seewee soil. There "pretty good soils" are classified hydrology group B. Beaufort County permits a maximum impervious surface over the Seewee soils of 65%.

Nearly one third of the island in the area just inland from the beach are classified Baratari (not Fripp-Baratari). The drainage quality of these soils is variable with hydrology group classification ranging from A to D. Beaufort County permits a maximum impervious surface ranging from %50 to 80%.

Small parts of the island in the area just inland from the beach the soils are classified Capers association. These "poor soils" are classified hydrology group D. Beaufort County permits a maximum impervious surface over the Capers soils of 50%.

Melrose and Daufuskie Island Club

All stormwater in developed areas is filtered through lakes and lagoons. At the Daufuskie Island Club, there are three drainage ditches that flow off the island - one running along the beach access road and two that flow into the Munger River. There are no outfall pipes into the beach area.

There are probably no outfall pipes at Oakridge.

WASTEWATER

Septic tanks are the predominate method of wastewater treatment on Daufuskie Island. There are no sewers. Haig Point and Melrose have combined efforts and built a private treatment plant to serve only their respective Planned Unit Developments.

Over 75% of the soils on Daufuskie Island have severe limitations for septic tanks; none have moderate limitations; and less than 25% have slight limitations. It would appear that if septic tanks are utilized extensively as the method to treat wastewater problems can be expected.

The Daufuskie Island Sewer Plan calls for the expansion of the existing Haig Point/Melrose Wastewater Treatment Plant to serve Haig Point, Melrose, the Webb Tract, the Oak Ridge Tract and 500 acres of small parcels along the Cooper River. This implies a build-out capacity of 1.7 million gallons per day. A second treatment plant with a maximum capacity of 1.2 million gallons per day would be constructed for the southern end of the island and its service area would include the Daufuskie Island Club and the 900 acres along the New River. This plant will be built in phases with an ultimate capacity of 1.2 million gpd.

The development of two smaller plants instead of one large plant has been shown to be cheaper over time because of the simpler technology a small plant can utilize and because of the costs of moving the raw sewage and the treated effluent from one end of the island to another.

Effluent disposal will be through spray onto the existing and planned golf courses. A line will connect the two plants to allow effluent to be pumped where it is needed. If the flow begins to reach the capacity of the golf courses (projected as 3 million gpd) then it may be necessary to construct an emergency discharge line to either Mungen Creek or the New River. Wastewater would be discharged here only when no more could be applied to the various spray sites.

COASTAL WATER CONSERVATION - POLICIES/ACTIONS

POLICIES - Coastal Water Conservation

1) Continue to vigorously enforce the stormwater runoff standards of the Development Standards Ordinance which prohibit outfalls of pipes or ditches draining directly onto any beach area.

2) The presence of dunes aids in preventing direct discharge of stormwater. Where dunes do not exist and there is potential for runoff from developments to fall onto the beach, dune enhancement is encouraged. Beaufort County will work with property owners to restore and maintain dune areas as a means of reducing the potential for direct discharge to the beach.

GENERAL AND MISCELLANEOUS ISSUES

TRASH AND LITTER CONTROL

Trash and Litter Control, a private nonprofit organization located on Bay Street in the City of Beaufort conducts an annual beach sweep on the third Saturday in September. The organization is affiliated with the South Carolina Seagrant Consortium and South Carolina Clean and Beautiful (part of Keep America Beautiful, a national nonprofit organization). The program began in Beaufort County in 1988.

Areas included in the beach sweep include all of the nine barrier islands plus Otter Island and some beaches in the City of Beaufort and the town of Port Royal.

Waste Management, Inc., the private contractor that provides services to the county for solid waste disposal, provides bins and transports retrieved items to the county landfill site at Hickory Hill in Jasper County.

The program operates entirely with volunteers. In the 1990 Beach Sweep, 200 participants collected approximately 2400 pounds of garbage from beaches north of the Broad River and 3400 pounds of garbage south of the Broad River.

In November 1991 in Beaufort County, 354 volunteers turned out to collect 7,335 pounds of debris from the beaches, river sides and marshes.

PUBLIC EDUCATION

Materials are available through Coastal Council about coastal processes and coastal zone management. South Carolina's Education Television produced a documentary about coastal processes and the Beachfront Management Act. Copies of the one-hour show are available from the Charleston Coastal Council office. Coastal Council staff are available to give slide shows and talks.

GENERAL AND MISCELLANEOUS ISSUES - POLICIES/ACTIONS

POLICIES - General and Miscellaneous Issues

1) Review the Beach Management Plan at least every five years, revise as appropriate, and coordinate needed changes with Coastal Council. Submit any revisions to Coastal Council for approval.

2) Coordinate with SC Clean and Beautiful in promoting clean beaches and planning beach sweeps. Lend support as resources

permit.

3) Coordinate with Public Information Officer of Coastal Council to keep public informed on relevant issues.

4) Procure and distribute as appropriate, such Coastal Council brochures as, "Understanding Our Coastal Environment", "Public Access Guide to the South Carolina Coast", "How to Build a Dune", and "The New Coastal Zone Management Act"; and Coastal Council's newsletter, "Carolina Currents".

5) Coordinate with Beaufort County Public Schools in public education of beach management issues.

ACTIONS (Near Term) - General and Miscellaneous Issues

1) Amend as appropriate to meet the goals of this plan: Beaufort County Beach Development Overlay District and Beaufort County Public Beach Ordinance.

2) Distribute pertinent excerpts from this plan to appropriate county departments and agencies for incorporation into their respective operations.

GLOSSARY

Acre-Foot: An area of one acre covered with water to a depth of one foot. One acre-foot equals 43,560 cubic feet or 325,851 gallons of water.

Advance Engineering and Design Work. Work done by Corps of Engineers' and/or South Carolina Coastal Council offices in preparing a project for construction.

Appropriation. The setting aside of money by Congress or the State Legislature, through legislation, for a specific use.

Bank and Channel Stabilization. The process of preventing bank erosion and channel degradation.

Baseline - The line of the crest of the primary oceanfront sand dune. Where the shoreline has been altered the baseline is established by Coastal Council using the best data available along the line where the crest of the primary oceanfront sand dune would be located had the shoreline not been altered.

Basin. (1) Drainage area of a lake or stream, such as a river basin; (2) A naturally or artificially enclosed harbor for small craft, such as a yacht basin.

Beach. The zone of land subject to periodic inundation between the highest limit of waves and tides and the low-tide mark. It consists of loose, usually sandy sediments that are free to move by the process of waves, winds, and tidal currents such that no nonlittoral vegetation is established.

Beach/Dune System. All land from the mean high-water mark of the Atlantic Ocean landward to the 40 year setback line. (This is the definition used by SCCC. A different definition may be used in this plan and in Beaufort County Ordinance.)

Beach Profile: a representation of the shape of the beach based on a survey line extending from a starting point near the dunes across the beach and into the water. Elevations at various distances from the starting point can be graphed to show the shape, size, and slope of a beach at any representative section.

Beach Nourishment. The artificial establishment or supplementation and periodic supplementation of a beach with sand that is compatible with that beach in such a way as to create a dry sand beach at all stages of the tide.

Breakwaters - Structures in the water which absorb wave energy before it reaches the shore.

Bulkhead. A retaining wall designed to retail fill material but not to withstand wave forces on an exposed shoreline.

Cubic Feet Per Second (c.f.s.) Volume rate of water flow.

Closure Structure. A structure built along low points of a levee or floodwall such as a street to prevent flood waters from flooding the area protected by the levee or floodwall.

Confluence. The place where streams meet.

Dam. A barrier constructed across a valley or stream for impounding water or creating a reservoir.

Damages Prevented. The difference between damages that would occur without the project and the damages occurring with the project in place.

Deep-Draft Harbor. A harbor designed to accommodate vessels having drafts greater than about 15 feet.

Degree of Protection. The amount of protection that a flood control measure is designed for as determined by engineering, feasibility, economic criteria, social, environmental, and other considerations.

Dike. An embankment to confine or control water and/or soil.

Diversion Channel. (1) An artificial channel constructed around a point of high potential flood damages to divert floodwater from the main channel to minimize flood damages; (2) a channel carrying water from a diversion dam.

Downstream. In the direction of the flow of the stream.

Draft. The vertical distance from the waterline to the bottom of a floating vessel.

Dredged Material. The material removed in excavation or dredging in access canals, boat or navigation channels, drainage ditches, and lakes.

Earth-Fill Dam. A dam, the main section of which, is composed principally of earth, gravel, sand, silt, and clay.

Environmental Assessment (EA). A planning report that presents the first thorough examination of alternative plans to positively demonstrate whether or not the environmental and social consequences of an action significantly impact the quality of the human environment. Also, if it determines that the project will be environmentally controversial, an environmental impact statement will be required.

Environmental Impact Statement (EIS). A report required by Section 102(2)(C) of Public Law 91-190 for all Federal and/or State actions which significantly impact on the quality of the

human environment or are environmentally controversial. The EIS is a detailed and formal evaluation of the favorable and adverse environmental and social impacts of a proposed project and its alternatives.

Estuary. A semi-enclosed area between the open sea and land where freshwater meets saltwater.

Flood Capacity. The flow carried by a stream or floodway at bank-full water level.

Floodplain. Land along the course of a stream that is subject to inundation during periods of high water that exceeds normal bank-full elevation.

Floodproofing. Techniques for preventing flood damage to the structure and contents of buildings in a flood-hazard area.

Floodwall. A wall, usually built of reinforced concrete, to confine streamflow or ocean wave action to prevent flooding.

Geomorphology: The geologic study of the configuration and evolution of land forms.

Groin. A wall-like structure built perpendicular to the shoreline to trap sediment moving in the longshore direction and prevent beach erosion. Groins may be erected in a set of parallel structures as a "groin field".

Habitat. The total of the environmental conditions that affect the life of plants and animals.

Inlet Erosion Zone: A segment of shoreline along or adjacent to tidal inlets which is influences directly by the inlet and its associated shoals.

Intertidal Zone. The portion of the beach which exists between the low-tide and the high-tide mark.

Jetty. On open water, a structure built parallel to an inlet or opening along the shoreline which serves to stabilize a channel to the ocean while intercepting sediment moving along a beach. Usually built in the mouth of a river to help deepen and stabilize a channel. Sometimes referred to as a terminal groin, especially if its principal purpose is to intercept sediment along the beach and it is the last groin in a series.

Light-Draft Craft. A small boat, usually recreational, having a draft of about 20 feet or less.

Littoral Draft. Material such as sand that is swept along the littoral zone by waves and current.

Littoral Zone. The narrow area, including the land and water, bordering the shoreline.

Longshore. Used to describe processes such as sand movement occurring parallel and close to the shoreline.

Marina. Any boat yard, locked harbor, dry storage facility, commercial dock, any facility which provides fueling, pump out or repair or any area that provides more than 400 feet in docking space.

Mean Sea Level (m.s.l). The mean level halfway between high and low tide, used as a standard in reckoning land elevations or sea depths.

Mitigation or Mitigation Plans. The process by which adverse environmental impacts of any activity are minimized or replaced by beneficial features.

Mouth of River. The exit or point of discharge of a stream into another stream, lake, or the sea.

Pier. A structure which extends from the shore out into the lake, river, stream, or sea and serves primarily for mooring and landing of boats. The term is sometimes used synonymously with a jetty.

Pike Dike. A dike constructed of posts or similar piling driven into the soil.

Pre-construction Planning. Planning before construction, usually done during a project's post-authorization stage.

Primary Ocean Front Sand Dunes. Those dunes which constitute the front row of dunes adjacent to the ocean.

Rehabilitation. A major repair job. Usually involves considerable reconstruction of already existing structures.

Revetment - A sloping structure of individual rocks, precast armor units, or sandbags used to protect uplands form direct attack by waves and to hold soils in place

Riprap. A layer, facing or protective mound of randomly placed stones to prevent erosion, scour, or sloughing of a structure or embankment. The stone used for this purpose is also called riprap.

River Basin. A water resource basin is a portion of a water resource region defined by a hydrological boundary that is usually the drainage area of one of the lesser streams in the region.

Rock Dike. An embankment built principally of rock.

Seawall. A structure built to prevent waves and tides from penetrating interior land areas. Normally, a seawall extends above the surrounding land/beach elevation, whereas revetments serve as protective facing for the land/dunes behind the shore.

Sediment Load. The total sediment composed of suspended load and bed load transported by a stream. The suspended load is composed of fine sediment transported in suspension while bed load is composed of relatively coarse material transported along or near the bottom.

Setback Line - The line landward of the baseline that is established at a distance that is forty times the average annual erosion rate as determined by historical and other scientific means and adopted by Coastal Council. At a minimum all setback lines are established twenty feet landward of the baseline, including cases where the shoreline has been stable or accreting.

Shoals. Accumulations of sand along the coast which produce shallow areas compared to adjacent depths. In South Carolina, many shoals around inlets are intertidal because of the large tide range, being alternatively exposed at low tide and flooded at high tide.

Slack Water Area. (1) In tidal waters, the area where tidal current velocity is at a minimum; especially the moment when a reversing current changes direction and its velocity is zero; (2) In streams, a place where there is very little current.

Slough. (1) A small muddy marshland or tidal waterway which usually connects other tidal areas; (2) A tideland or bottomland creek. A side channel or inlet, such as from a river or bayou, that may be connected at both ends to a parent body of water.

Standard Erosion Zone: A segment of shoreline which is subject to essentially the same set of coastal processes, has a fairly constant range of profiles and sediment characteristics, and is not influenced directly by tidal inlets or associated inlet shoals.

Storm Surge: A super-elevation of the ocean level above normal tide elevations created by storm processes, the most important of which is strong winds blowing toward shore and producing a pile-up of water at the coastline.

Streambed. A channel occupied or formerly occupied by a stream.

Swale. (1) A slight depression, often wet and covered with vegetation; (2) A wide, shallow ditch, usually grassed or paved.

Tidal Inlet. The relatively narrow opening or channel between two land masses through which ocean waters move into or out of a bay, lagoon, or estuary.

Tributary. A stream or other body of water that contributes its water to another stream or body of water.

Turning Basin. A widen area in a navigation channel or harbor area intended to allow vessels to turn around.

Upstream. At or toward the source of a stream.

Watershed. The whole surface drainage area that contributes water to a collecting river or lake.

Wing Dam. A wall, crib, row of pilings, stone jetty, or other barrier projecting from the bank into a stream for protecting the bank from erosion, arresting sand movement, or for connecting the low flow of a stream into a smaller channel.

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(Cover cartoon from Parade Magazine, April 5, 1992)