



FLORIDA

State of the Coast Report

Preparing for a Sustainable Future



SEPTEMBER • 1996



Department of
Community Affairs



Florida
Coastal
Management
Program



NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE

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State of the Coast Report:

PREPARING FOR A SUSTAINABLE FUTURE

Foreword

In October 1994, the Florida Coastal Management Program in the Department of Community Affairs entered into a subgrant agreement with the Florida Center for Public Management at Florida State University to identify a set of indicators that could be monitored to determine the health of Florida's coastal areas. As a part of this project, a group of coastal experts gathered in January 1995 and identified many critical issues facing Florida's coast. The end result of this year-long effort was *FACT: the Florida Assessment of Coastal Trends*—an innovative management tool that inventories environmental, growth management, social, and economic factors affecting Florida's coastal areas. *FACT* may be obtained by contacting the Florida Coastal Management Program or via the Internet at: <http://www.fsu.edu/~cpm/FACT/index.html>

This *Florida State of the Coast* report is an effort to analyze the indicators contained in *FACT* and identify trends affecting some key coastal issues. It is our hope that the *Florida State of the Coast* report will provide coastal decision-makers with a better understanding of Florida's natural, cultural, and economic coastal resources, and thus support improved resource management by local, regional, and state governments.



Introduction

Once upon a time there was a mountain peak with a wonderful view, so that people came from all over to stand on top of the mountain and look out. The village at the foot of the mountain charged a dollar a head to all tourists. But so few of them could stand on top of the mountain at the same time, they leveled the top of the mountain to provide more room and increase the take. This seemed to work, so they kept enlarging the area on top of the mountain. Finally, they had a place up there that would accommodate ten thousand people, but by then the mountain was only forty feet high, and suddenly everybody stopped coming to see the view. This convinced them that people were tired of views, so in the name of Progress and a Tourist Economy, they turned the flattened mountain into a carnival area, and every night you could see the lights and hear the music for miles around. They still attracted customers, but it was the kind of people who like carnivals instead of the kind of people who like beauty.

—John D. MacDonald,
A Flash of Green, 1962

Florida's coast is its essence, its defining feature. Our coast dominates our lives. We are a state surrounded on three sides by the Atlantic Ocean and the Gulf of Mexico. Florida's 8,400 miles of tidal shoreline have drawn nearly 14 million people to our state and are responsible for enticing almost all of the 40 million tourists that come to Florida each year. An estimated 75% of Floridians live within ten miles of the coast, and all but a handful of north Florida residents live no more than 70 miles from salt water, slightly more than an hour's drive away. Our coast shapes how we live, molds our culture, and influences how we work and how we play.

The coast is our image to the world; to the rest of the world, Florida is its coast. For Florida's future that image must be strong and positive.



Florida's coastal areas are unique to the United States:

- Florida's coastline is the longest in the continental United States and is second only to Alaska overall.
- The Florida Keys are unique to the United States and perhaps the world, containing the world's third largest coral reef, the only living coral reef in the continental U.S.
- Florida has more estuarine systems than any other state, many of high quality. Apalachicola Bay has been designated as an Outstanding Florida Water, an Aquatic Preserve, and a Class II Shell Fish Harvesting Water by the State of Florida; a National Estuarine Research Reserve by the federal government; and a Biosphere Reserve by the United Nations.
- Florida has more beaches identified among the ten most beautiful in the nation than any other state.

The history of Florida's coast is dominated by exploitive and unwise development. It is obvious, however, that after decades of heavy development, much of value remains. Florida's coastal resources historically have seemed so vast and inexhaustible that too often we have just consumed those resources, proceeding without regard for their future quality and availability. While the signs of past

and continuing degradation of our coast are clear, there are hopeful signs that we are learning to balance our many uses of the coast with the needs of natural coastal systems. As Floridians, we need to change from being mere users of coastal resources to being active stewards of our coast.

There is a perplexing duality to Florida's coast. It is the engine that directly and

indirectly supports our economy, and at the same time it is the foundation of the quality of life for our residents. *Sustaining our economic uses of the coast while preserving the natural values essential to maintaining the character of our coastal areas is our task for the future.*

Our role should be to prevent Florida's coastal areas from becoming the circuses of John MacDonald's fable.

The Importance of Florida's Coast

Florida's coast has value on many levels—



Economic. The coast supports Florida's economy in a number of ways:

- In 1993, 87,717 building permits representing 76% of all Florida building permits worth \$11,348,336,000 were granted in Florida's 35 coastal counties.
- In 1994, commercial fish landings were valued at \$202 million.
- Tourist Development Tax collections in the 35 coastal counties totaled \$94.14 million in 1994, not counting tourist tax collection through the sales tax and other taxes and fees.
- Beach-related tourism contributes about \$15 billion a year to the state economy.

Recreational. Recreational uses of the coast are extensive. They include water skiing, diving, boating, fishing, and a variety of beach activities.

Indications of this activity include:

- In fiscal year 1995-96, 541,854 one-year saltwater licenses were sold to Florida residents, 73,467 one-year licenses were sold to non-residents, and 248,781 three- and seven-day licenses were sold to non-residents. Total revenue for all saltwater licenses was \$11,710,619.



- In fiscal year 1995-96, 511,202 recreational vessels were registered in Florida's 35 coastal counties.
- In 1991, the economic impact of saltwater fishing by Florida residents was estimated to be \$1,327,405,000 and \$1,305,594,000 for non-residents.

Coastal Protection. Our barrier islands, with their beaches and dune systems, buffer the mainland from the effects of hurricanes and other strong storms. Dune systems on mainland beaches similarly buffer inland areas from storm surge.

Ecological. Nearshore and estuarine waters, with their seagrass and wetland systems, serve as nurseries and habitat for important and popular marine and estuarine fish, shellfish, and mammals. Destruction of these habitats would seriously damage and, in some cases, eliminate species essential to the sustainability of important recreational and commercial fisheries.

Quality of Life. Our coast is a source of beauty—a place to relax, experience nature, and restore balance to our lives.



Pressures on the Coast

Population and development in Florida over the past 30 years have maintained a rapid and constant rate of growth. The coast is under ever-increasing pressure from this population growth and its related development. Pressures generated by coastal development have led to disruptions of natural processes and have threatened the ecological and economic values of the coastal zone. If growth in Florida's coastal areas is allowed to continue unabated at the same rapid rate, many of the qualities

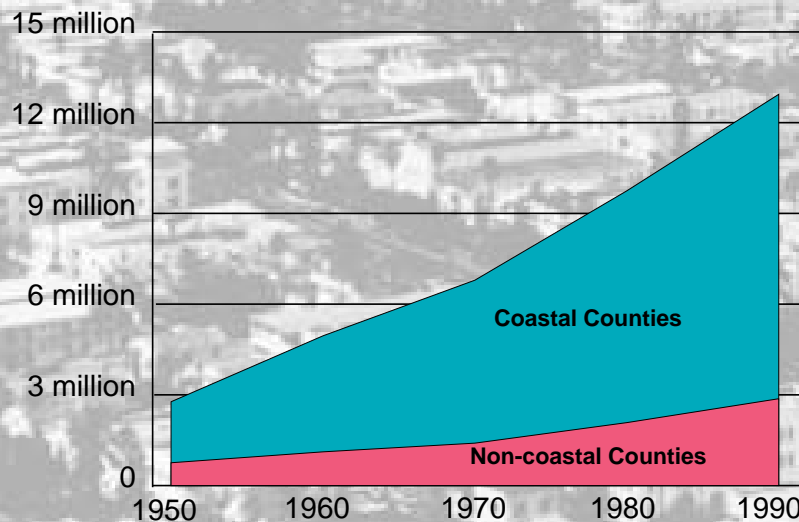
that initially attracted people to the coast will be lost. The challenge will be to reach a balance between this tremendous growth and the coastal environment in order to sustain Florida's unique and most valuable resource.

The population of Florida has exploded during the second half of this century. Since 1950, Florida's population has grown from 2.7 million to nearly 13 million, a 381% increase. As profound as this rate of growth has been, coastal growth has been even greater. Florida's coastal counties,

those having shoreline along the Gulf of Mexico or Atlantic Ocean, grew by more than 400% between 1950 and 1990. Currently, 78% of the state's population resides in coastal counties. In 1960, about 79 million people in the United States lived in coastal counties and 3.8 million (5%) of those people lived in Florida. In 1990, about 111 million people lived in coastal areas nationwide and Florida accounted for 10.1 million (9%) of those residents. By 2010, the nation's coastal population is expected to grow by 12% to 124.6 million people. During this same period, Florida's coastal population is expected to grow by 35% to 13.7 million people, 11% of the nation's coastal residents. In addition, tourism brings millions of people to Florida each year, most of whom visit coastal areas. Tourism has increased significantly in Florida during the last 15 years, with 41 million people visiting Florida in 1993—an increase of 105% over the 20 million visitors to the state in 1980.

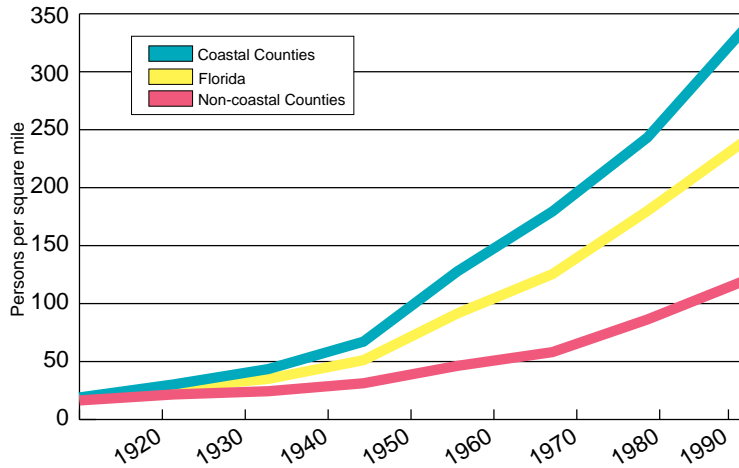
This increase of residents and visitors in Florida has been concentrated in the state's coastal zone, one of its most sensitive environmental areas. In turn, the population density of coastal counties has increased just as dramatically and is more than double that of Florida's non-coastal

Figure 1
Florida Population



Source: Bureau of Economic and Business Research

Figure 2
Population Density



Source: Bureau of Economic and Business Research

counties. As the population density of coastal counties has increased, the associated impacts of development in our coastal areas have also intensified.

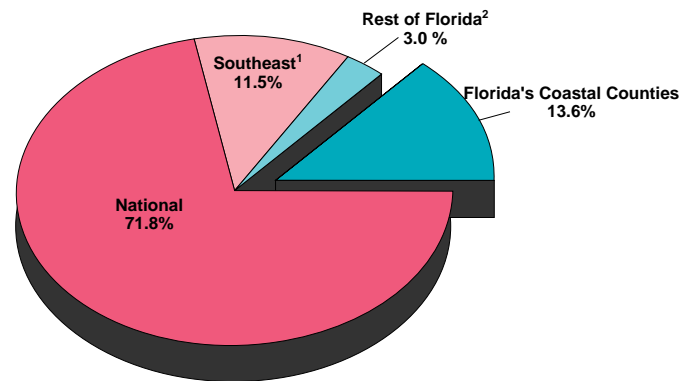
This growth has led to a rise in the number of residents and tourists that need to be fed, housed, and entertained. Developments such as houses, condominiums, restaurants, and malls are built to support people's needs and desires. Infrastructure like roads, bridges, and sewers is required to support the development. This leads to pressures (such as increased areas covered by impervious surfaces associated with development and infrastructure construction) that can cause problems with stormwater runoff into surrounding coastal waters. Additional impacts are generated by the need for sewage treatment, waste disposal, water supply, and electric power production. The magnitude of the situation in Florida can

be seen in the fact that between 1970 and 1989, over 13% of all coastal residential building permits in the nation were issued in Florida. Development's impacts are the sources of pollution that plague the air and waterbodies of the state and

threaten the coastal environment. The cumulative impacts of these pressures interfere with the natural processes of the coast and cause the degradation of coastal ecosystems.

Until recently, widespread development was not seen as a major threat because the pressures had not exceeded the assimilative limits of the natural systems. Areas of the coast are just now beginning to reach the limit of their ability to withstand these pressures without becoming seriously degraded. As the coastal population continues to grow, the impacts of human-induced pressures will become more evident. Controlling these long-term impacts will require efficient resource use, reversal of the degradation caused by existing development, and implementation of strategies for sustainable use of the land, water, and biological resources that make up Florida's coastal ecosystems.

Figure 3
Coastal Residential Building Permits
1970–1989



¹ Southeast states include Texas, Louisiana, Mississippi, Alabama, Georgia, South Carolina, and North Carolina.

² NOAA's definition of coastal counties extends several counties into each state and includes every county of Florida. For this chart, Florida's counties that are on the coast are reported separately from the rest of Florida.

Source: NOAA, 1992.

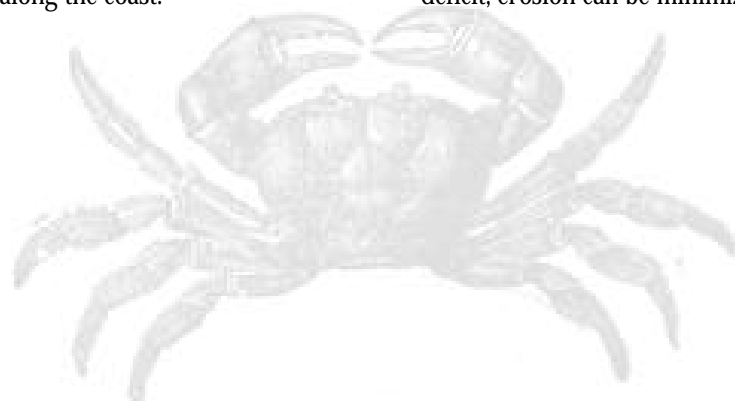
Impacts on Coastal Resources

I Disruption of Coastal Processes



The coast is where the sea meets the land. It is a dynamic area where the energy of wind and water is constantly in the process of breaking down and building up the shoreline. The results of these coastal processes are the very features that make the coast distinctive: sandy beaches, dunes, sand bars, barrier islands, and coastal marshes. When we try to alter or stabilize the coast into a fixed form for human convenience, we disturb the balance of forces acting on the coast and disrupt the processes that form these coastal features. The most common activities that disrupt coastal processes are inlet construction, coastal armoring, and dune destruction. These activities interfere with coastal processes and often lead to abrupt changes in the shape and form of the coastline. As a result, erosion, loss of habitat, and loss of natural buffering from the wind and waves occur along the coast.

Inlet construction and related channel protection activities are by far the leading causes of beach erosion in Florida (Dean, 1996). Dredging a shipping channel can remove millions of cubic yards of sand. Stabilizing an inlet with jetties prevents the natural movement of sand along the shore, resulting in a build-up of sand on one side and erosion on the other side of an inlet. Erosion around inlets is being reduced through the use of inlet management plans in coordination with the Florida Department of Environmental Protection's (DEP's) Bureau of Beaches and Coastal Systems. By placing sand from maintenance dredging on or near an eroding beach, some of the erosion loss can be reduced. Sand bypassing is another method of mitigating erosion. By pumping sand that collects on one side of a jetty and depositing the sand on the opposite side where there is a sand deficit, erosion can be minimized. There





are two sand bypassing facilities operating in Florida, both in Palm Beach County.

Coastal armoring such as seawalls, jetties, bulkheads, and breakwaters is usually constructed to stabilize an eroding shoreline or protect an inlet. However, measures to control erosion can actually aid in the process or simply shift problems from one location to another. In 1990, 20% of Florida's coast

was regulated by the coastal construction control line, consisting of some form of armoring. Some structures were built to protect inappropriate development that was constructed too close to a beach that was rapidly eroding.

Currently there are 444 miles of Florida beaches subject to erosion. About 60% of these are critically eroding. The State of Florida, through DEP's Bureau of Beaches and Coastal Systems and the





Board of Trustees of the Internal Improvement Trust Fund, administers a program paying up to 75% of the costs of beach erosion control projects. Typically these projects qualify for federal funding (50% share). Most of these projects are for beach renourishment, and over 142 miles of beaches have been renourished under this program. However, federal funding has recently been limited due to budget cuts. Costs for beach renourishment are high—about \$6 million for every mile. Renourishing the beaches without addressing the root causes of beach erosion provides only an expensive and temporary solution.

Some coastal features are remarkably fragile and easily disturbed by human activity. Sand dunes, for example, can be damaged simply by walking over them, or picking the sea oats that hold the sand in place, or by building a structure that blocks the wind from replenishing the dune with sand. Many north Florida sand dunes also provide habitat for endangered southeastern beach mice. At the same time, sand dunes help buffer the shoreline from erosion due to waves and storm surge. Although dunes are often destroyed by storms, over time they usually recover. During a storm, dunes supply sand to the beach, help protect upland areas, and effectively reduce beach erosion.

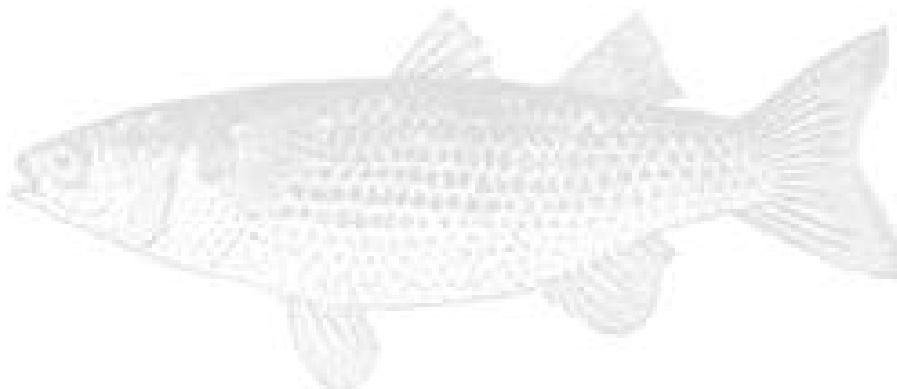
Impacts on Coastal Resources

II Ecosystem Degradation

Florida's dynamic and productive coast is its economic backbone. The coast's outstanding fishing, spectacular beaches, and agreeable climate continually attract new residents, tourism, and development. In many cases, development has been short-sighted and destructive. Development has degraded nearshore and estuarine waters, which are essential elements of a healthy coastal ecosystem and productive Florida economy. Pollution has decreased the water quality of many Florida waterbodies and many coastal species have declined in abundance. Continued deterioration of Florida's coastal areas threatens to eradicate species and habitat unique to Florida. The sustainability of Florida's recreational and commercial resources requires thoughtful management of coastal areas.

Coral reefs, mangroves, seagrasses, wetlands, and marine fisheries are components of Florida's coastal ecosystems that have particularly suffered because of pollution and historic management practices. In Hillsborough Bay, for example, seagrass acreage plummeted from 351 acres in 1954 to almost 0 acres in 1982 (DEP, 1996). This pollution-induced crash nearly eliminated seagrasses, a critical source of habitat and nutrients, from the north section of Hillsborough Bay.

In reaction to coastal ecosystem degradation, citizens and government mobilized to restore and preserve much of Florida. Some species formerly characterized by decline, such as the southern bald eagle, have increased in numbers after the banning of DDT and efforts to preserve their habitat. Government and citizen-supported programs dedicated to the

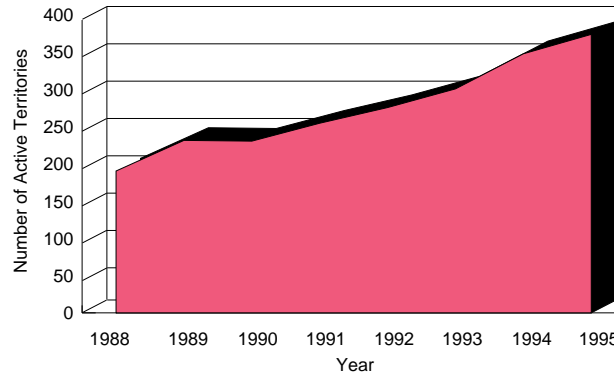


protection of Florida's natural areas have acquired large tracts of coastal land, and management practices of the past are evolving into more holistic, sustainable techniques. A restoration plan for Florida Bay is being developed to alleviate recent degradation.

Three wildlife species, the southern bald eagle, wood stork, and brown pelican, may indicate the condition of Florida's coastal areas because of their reliance on healthy nesting habitat such as mangroves and cypress trees. Formerly a federally listed endangered species, Florida's southern bald eagle population rebounded after the banning of DDT, causing its reclassification to threatened species. Wood stork nesting population appears to have declined recently, largely because of human-induced changes in



Figure 4
Number of Active Southern Bald Eagle Territories in Florida's Coastal Counties



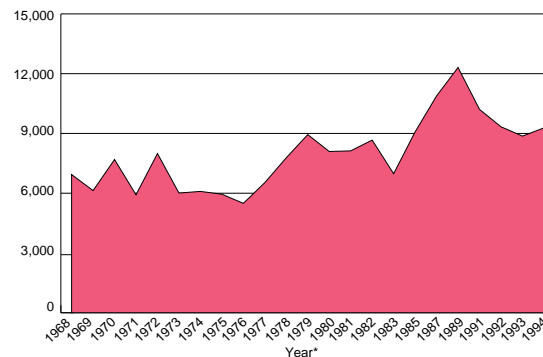
Source: Florida Game and Fresh Water Fish Commission, Bureau of Wildlife Research.

the hydrological regimes of its habitat. In the 1970s and 1980s, Florida's brown pelican nesting population gradually increased, partially because of the banning of DDT. Since about 1990, though, this threatened species appears to be experiencing a decline in population; water quality degradation and hydroperiod changes are likely causes. Some efforts to restore hydroperiods are

in the planning process and may lead to future increases in nesting populations.

In response to population growth and natural areas decline, state legislators enacted the Preservation 2000 program to ensure the protection and endurance of Florida's varied ecosystems. As Florida's economy is dependent upon coastal areas, many of Preservation

Figure 5
Brown Pelican Nesting Population



NOTE: Data were not collected for 1984, 1986, 1988, and 1990.

Source: Florida Game and Fresh Water Fish Commission, Bureau of Wildlife Research.



2000's acquisitions have been properties directly on, or adjacent to, the coast. Since the program's inception in 1990, Preservation 2000 has purchased 400,000 acres of Florida's unique and most ecologically essential lands. Florida residents have responded enthusiastically to the proactive protection program, signifying a mutual public and governmental commitment to the preservation of Florida's natural environment. Citizens of more than twenty local governments in Florida have voted to tax themselves to generate money for environmental land acquisition.

Preservation 2000 has purchased vast tracts of coastal land deemed especially worthy of protection. In 1991, Martin County's Seabran property was acquired, which includes more than 900 acres of mangrove forest, freshwater

hardwood swamp, and endangered scrub. More than 44,000 acres in Tate's Hell Swamp were purchased in 1993, which serves as a critical buffer for the oyster-rich Apalachicola Bay. Most recently, Preservation 2000 has purchased portions of the Archie Carr Sea Turtle Refuge in north Florida, property adjacent to Florida Bay, and rare tropical hammocks in the Florida Keys.

Topsail Hill Beach in Walton County, one of north Florida's finest coastal properties, was purchased from 1992 through 1996 to ensure the preservation of this portion of undeveloped waterfront. Topsail Hill Beach is characterized by massive sugar-sand dunes, lakes, and dwarf forests, and it has been ranked among the world's most beautiful beaches. Preservation 2000's acquisition of this property allowed for the protec-





tion of this resource in its natural state. These examples are merely a few highlights of the program's acquisitions thus far and are only the beginning of Preservation 2000's legacy of environmental protection (The Nature Conservancy, 1996).

In 1994, the Florida Legislature passed the Everglades Forever Act, aimed at restoring the Everglades and Florida Bay and mitigating the deleterious effects of agriculture and urbanization. The Act challenges farmers to reduce phosphorus runoff, which degrades the Everglades. Through the construction of human-

made wetlands, cooperating federal, state, and local agencies hope to use natural processes to purify water before entry into the Everglades. Specific dates of compliance and implementation are mandated by the Act, allowing for accountability and documentable restoration progress. This massive restoration policy is the largest of its kind, and it is the first step in reviving the natural health and beauty of the Everglades.

An estuarine habitat, Florida Bay requires freshwater inputs to maintain a healthy subtropical ecosystem. Florida



Bay formerly was noted for its “clear, shallow waters, lush seagrass beds, and outstanding fishing” (SFWMD, 1996). Beginning in the early 1980s Florida Bay underwent dramatic changes, including massive death of seagrasses, sustained algal blooms, and a decline in commercial and recreational fishing yields. Freshwater diversions away from Florida Bay for human uses are believed to be the cause, spurring the formulation of a restoration plan. The Everglades Forever Act mandates the modification of water delivered to Florida Bay for restoration purposes. Currently, experimental water deliveries are being conducted and

refined, with the ultimate aim of permanently restoring freshwater flows into Florida Bay. The restoration plan for Florida Bay and the Everglades may enhance the populations of species that have diminished because of recent practices. This action exemplifies a fostering of citizen and governmental concern for preserving the health of coastal areas.

Restoration and preservation efforts suggest that Florida will continue to be defined by the beauty and utility of its coast, allowing future generations to share its endowments.



Impacts on Coastal Resources

III Coastal Threats and Hazards



*I have seen the hungry ocean gain
Advantage on the kingdom of the shore,
And the firm soil win of the watery main
Increasing store with loss and loss with store.*

—William Shakespeare,
“Sonnet LXIV”



Florida is extremely vulnerable to hurricanes due to its extensive coast, the concentration of population along the coast, and the low elevation of most of its coastal areas. Floridians hold over 49% of all V-zone policies (velocity zone or coastal high hazard zone) and over 43% of A-zone policies (coastal flood hazard zone) issued for the entire United States by the Federal Emergency Management Agency’s National Flood Insurance

Program (COPR, 1992). Florida is also a primary target for hurricanes. From 1900 to 1994, 36% of all U.S. hurricanes hit Florida and 71% of category 4 or higher hurricanes have hit either Florida or Texas (Hebert, Jarrell, and Mayfield, 1995). Homestead, Florida has the dubious distinction of hosting the most costly hurricane in the history of the United States: Hurricane Andrew, which struck in 1992, caused about \$25 billion in damages and 24 deaths.



The 1995-96 hurricane season was the second busiest season of the century. The most punishing storm of the year for Florida was Hurricane Opal, which concentrated its destruction along a 120-mile stretch of the panhandle from Pensacola to Mexico Beach. Opal damaged or destroyed more structures by erosion and wave impact than all other coastal storms over the past twenty years combined and caused over \$6 billion in damages (Hurricane Andrew's \$25 billion in damages was primarily a result of high winds). The growth of population in coastal areas puts additional people and property at risk, makes evacuation more difficult, and likely increases the proportion of the population with little hurricane education.

Although the coastal construction permitting program by DEP's Bureau of Beaches and Coastal Systems has been very successful in reducing the probability of damage to permitted coastal structures by most storms, Florida's coastal construction program is not sufficient protection from a direct hit by a high magnitude storm (category 3 or higher). Furthermore, there are only 24 counties with a control line program and less than 16% of the major habitable structures in these counties are permitted. Given Florida's growth, it is only a matter of time before another high magnitude storm like Hurricane Andrew (a category 4) hits a heavily populated portion of Florida's coast; and in fact, most of Hurricane Andrew's damage was to structures landward of the coastal construction control line.





Evacuation planning and preparation prior to hurricane season are important. It is not currently possible to accurately forecast more than 12 hours in advance where a hurricane will strike. Furthermore, storm surge can flood low-lying bridges and roads 3 to 6 hours in advance of a storm. The cost of evacuation is high: lost productivity, prevention measures such as boarding up windows, and public supervision of the evacuation total an average of \$50 million per evacuation. This puts tremendous pressure on local officials who must weigh public safety and public cost in deciding when to evacuate. There is also a danger that coastal residents will not heed evacuation warnings because of lack of experience with hurricanes or

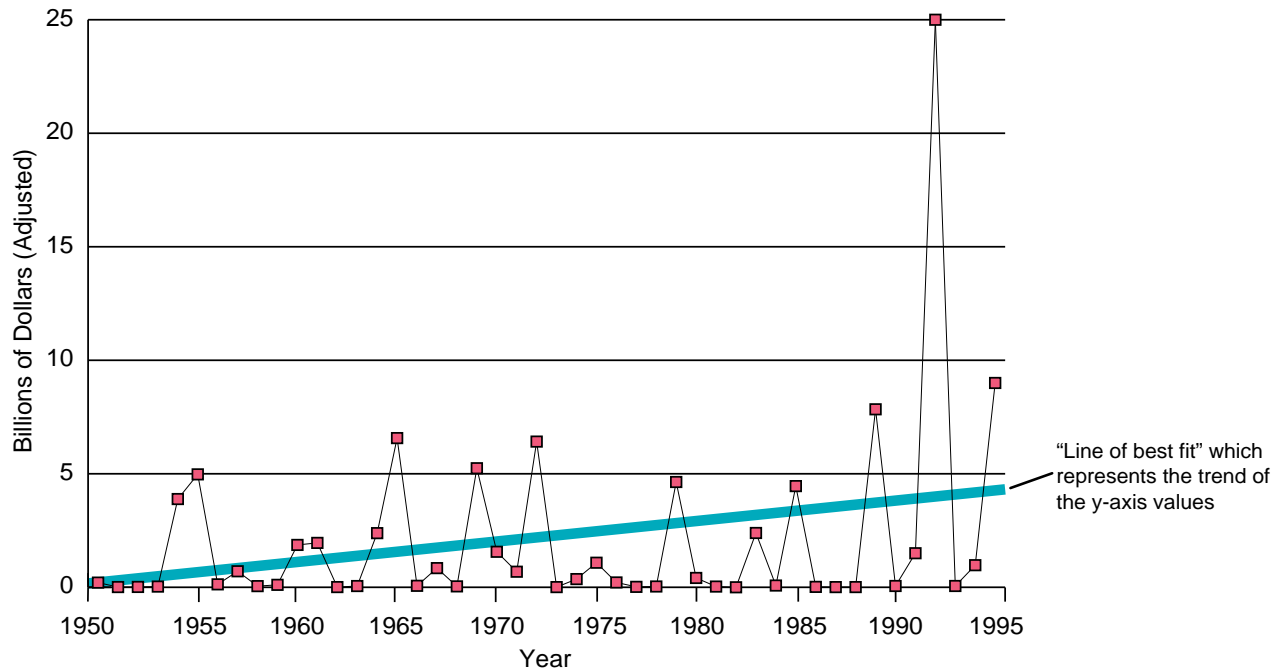
because past evacuations may have seemed unnecessary.

Global warming may encourage storm formation. Hurricanes feed on the energy of warm tropical ocean water. An increase in the global mean surface air temperature will produce storms of greater magnitude and frequency. Furthermore, as the sea-level rises, coastal storms will likely cause more intense erosion, especially in areas already subject to erosion. Florida is especially vulnerable to beach erosion. Over 60% of Florida's sandy beaches are classified as critically eroding.

As displayed in Figure 6, the average value of damage caused by hurricanes has increased over time (and would do



Figure 6
Annual U.S. Hurricane Damages



NOTE: 1992 and 1995 figures are estimates; dollars have been adjusted to 1990 dollars.
 Source: Hebert, Jarrell, and Mayfield, 1995

so even with Hurricane Andrew removed from the data set). This is because of the increased amount of development that has occurred in coastal areas. After Hurricanes Andrew and Opal, Florida’s coastal property owners experienced difficulty in obtaining property insurance. In 1993, the Florida Legislature created the Florida Hurricane Catastrophe Fund to provide additional insurance capacity to insurers. The fund pays a portion of the insurance losses caused by catastrophic hurricanes.

Coastal hazards require long-term preparation and planning by govern-

ment to minimize loss of life and property. One strategy is for government to purchase property in coastal areas to reduce public exposure to coastal hazards. Another strategy is the Florida Department of Community Affairs’ new Long-Term Redevelopment Program. This program assists communities in planning for post-storm redevelopment in ways that will mitigate the hazards of catastrophic storms. Certainly, as growth and development continue along Florida’s coast over the next decade, concern for the safety of coastal residents must occupy the public agenda.



Impacts on Coastal Resources

IV Water Use and Water Quality

*All the rivers run into the sea,
Yet the sea is not full.
From whence the rivers come
Thither they return again.*

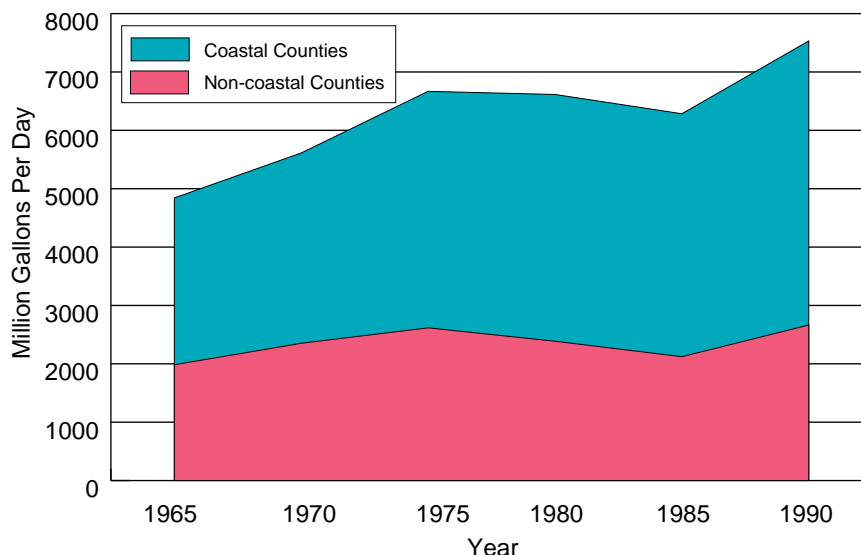
—Ecclesiastes 1:7

Florida's coastal counties depend on their water resources for drinking, agriculture, tourism, and industry, as well as to support their many diverse natural systems. Unfortunately, the freshwater resources of coastal counties are especially vulnerable to overuse. It is therefore ironic that Florida's population has congregated mainly in coastal areas where freshwater resources are the most fragile and limited. Figure 7 illustrates how consumption of freshwater in

Florida's coastal counties has increased at a much greater rate than in non-coastal counties. Overuse of freshwater resources is indicated by water shortages, saltwater intrusion into ground water, and degradation of coastal estuaries.

Over the next decade water distribution will become the lead environmental issue in Florida. With the state's population expected to grow 3% per year and most of that growth likely to occur in urban

Figure 7
Total Freshwater Withdrawals



Source: USGS, Water Resources Division



coastal counties, additional conflicts over shrinking supplies of drinking water are inevitable. The battle lines will be drawn between the growing but water-poor coastal counties and those rural inland or northern counties that wish to protect the local water supply, maintain their way of life, and ensure their future growth and expansion. The availability of potable freshwater has already become limited along the southeast and southwest coasts of Florida, where rapid population growth has occurred. This has led to mandatory restrictions on water use and conflicts over limited water supplies. The freshwater shortage in southwest Florida is particularly acute and has resulted in what has been termed a “water war” between neighboring counties.

To minimize reliance on ground water, many of Florida’s coastal communities that have experienced shortages are using water reclaimed from local municipal wastewater treatment facilities for non-domestic use. In 1994, over 1,100 million gallons a day of reclaimed water were used by coastal counties—about



20% of the amount of total freshwater withdrawals made by these counties. The coastal counties in southeast and southwest Florida account for about 80% of all reclaimed water used by coastal counties throughout the state.

Coastal freshwater resources are easily depleted and damaged by overuse and pollution. One of the results of overuse is the overpumping of ground water. When ground water is drawn down by overpumping, surface water flows can be reduced, causing lakes and other

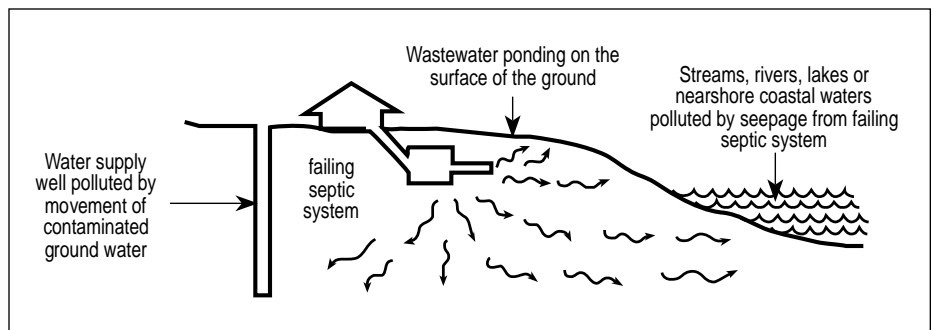
wetland areas to recede. In coastal counties, the drawdown of ground water can also result in saltwater intrusion. One indication of saltwater intrusion in coastal counties is the number of reverse osmosis treatment facilities brought on-line to meet drinking water quality standards. As of March 1995, there was a total of 141 reverse osmosis facilities in coastal counties. In 1994 there were 138 and in 1991 there were 119 (DEP, 1995). These figures represent an 18.5% increase from 1991 to 1995.



Nonpoint source pollution in its many forms is Florida's largest surface water quality problem. Each river in Florida has a watershed or collection basin that can extend far inland. For example, the watershed for the Apalachicola extends all the way to Atlanta, Georgia. Because all rivers run to the sea, nonpoint source pollution anywhere along the river or its watershed also affects Florida's valuable estuaries. Nonpoint source pollution comes from stormwater runoff, agricultural runoff, soil erosion from construc-

tion or mining, faulty septic tanks, leaking sewer lines, motor boats, and atmospheric deposition of air pollutants. Unlike point source pollution, nonpoint

source pollution is difficult to trace to a single source. Rather, the pollution is often the result of many small polluters. There are three major categories of pollution problems affecting Florida's coastal ecosystems: excessive nutrients, toxic chemicals, and pathogens. Of these, excessive nutrients is the most prevalent problem. Fortunately, almost every major estuary in south and southwest Florida (Charlotte Harbor, Sarasota Bay, Tampa Bay, and Indian River Lagoon) has a management program to help protect and restore these great waterbodies. Limiting freshwater consumption and preventing nonpoint source water pollution will help sustain these valuable coastal resources.



Issues for the Future

Florida's coast has been in a state of decline for many years. However, there are increasing signs that we are learning to appreciate the value of our coast and, more importantly, learning to adapt and adjust our practices and behaviors to conserve its essential character. We are faced with three challenges:

Improving the quality of our currently developed areas. Much of Florida's coast is already developed, some of it well, some of it not so well, and some of it disastrously. We need to reward and publicize those examples of good development, using them as models for the future. For poor development, we need to take whatever steps we can to correct and improve the economic, environmental, social, cultural, and aesthetic impacts these developments are having.

Ensuring the quality of new development. Florida's growth will guarantee additional development of our coast. We must learn from our past and employ new planning, regulatory, and technological tools to ensure that new development is consistent with the ecological and geological functioning of coastal areas, the safety of our coastal residents and visitors, the maintenance of our economic viability, and the preservation of the unique values that give our coast its appeal.

Preserving natural values. Some portion of Florida's coast must forever be preserved from development and the impacts of development. A coast without clear blue water, fish, birds, manatees, coral reefs, and swimmable beaches would, for Florida, be unthinkable. Unless we have the wisdom and forethought to protect our essential natural systems and features, such an unthinkable future is possible.





Preserving our coast is everyone's responsibility. Government, private industry, and individual citizens have each in their own way contributed to the historical abuses that characterize much of our present coastal development. Yet it is these same groups that must now each provide the leadership required to halt and reverse the effects of poor development. Each of these groups needs to view the coast differently than in the past, recognizing that coastal resources are not inexhaustible and that great care, consideration, and wisdom need to be cooperatively applied to ensure a quality future for the coast. We must collectively—both as individuals and organizations—become active stewards of our coast. This will not be an easy transition, but it is a transition we must make if Florida's coast is to exist and flourish in the 21st century.



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Preparing for a Sustainable Future

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