

COASTAL MANAGEMENT ELEMENT

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I. INTRODUCTION

A. General. Consistent with Florida Administrative Code (FAC) Section 9J-5.012, the purpose of the Coastal Management Element (CME) is to plan for and, where appropriate, limit development activities where such activities would damage or destroy coastal resources, and protect human life and limit public expenditures in areas that are subject to destruction by natural disaster. The FAC requires the CME address coastal management, natural disaster and deepwater port issues. This Element primarily addresses the coastal management issues. Its goal is to manage development activities in Broward County's coastal area to maximize aesthetic, environmental, recreational, and economic values. Natural disaster and deepwater port issues are respectively addressed in the Natural Disaster and Deepwater Port Components. The CME Support Documents provide data and analysis used as the basis for the goal, objectives and policies included in the CME.

The CME Support Documents are divided into five parts. Part I identifies the service area, the planning horizons and defines key terms. Part II addresses the data requirements and includes inventories of land uses, natural resources, historic resources, beaches and dunes, estuarine conditions, public access, infrastructure, natural disaster planning, and deepwater port issues. Part III analyzes current coastal resources and management practices. Part IV addresses CME implementation and Part V is an appendix.

B. Service Area. The CME regulatory service area is the Unincorporated Area lying within the Coastal Planning Area. The planning service area, as it relates to erosion and accretion trends, beach nourishment projects, beach conditions, vegetative coverings, marine resources, sea turtle protection, fisheries' management, and artificial reefs, is county-wide.

C. Planning Horizons. The planning horizons for this Element are 2002 and 2015.

D. Definitions. For CME purposes, the following terms shall be defined as below unless the context dictates otherwise. Sources of the definitions, where available, are given in parentheses.

Beach. A zone of unconsolidated material that extends landward from the mean low-water line to the place where there is a marked change in material or physiographic form, or to the line of permanent vegetation, usually the effective limit of storm waves (Section 161.54(3), Florida Statutes).

Beach Nourishment and Renourishment. The systematic augmentation by artificial means of the linear width and/or elevation of the beach exposed above the high tide line. Nourishment suggests the first augmentation project; Renourishment suggests maintenance projects thereafter.

Coastal Planning Area. An area that encompasses all the following: water and submerged lands of oceanic water bodies or estuarine water bodies; shorelines adjacent to oceanic waters or estuaries; coastal barriers; living marine resources; marine wetlands; water-dependent or water-

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related facilities on oceanic or estuarine waters; or public access facilities to oceanic beaches or estuarine shorelines; and all lands adjacent to such occurrences where development activities would impact the integrity or the quality of the above (9J-5 FAC).

In Broward County, the Coastal Planning Area is the land and water eastward of the westward right-of-way of U.S.1. The only Unincorporated Areas within the Coastal Planning Area is the Hillsboro Inlet Lighthouse.

Coastal Construction Control Line (CCCL). A line established to delineate that portion of the beach-dune system which is subject to severe fluctuations based on a 100-year storm surge, storm waves, or other predictable weather conditions (Section 161.053, Florida Statutes).

Coastal High Hazard Area. The evacuation zone for a category 1 hurricane as established in the regional hurricane evacuation study applicable to the local government (9J-5 FAC).

Broward County has identified its Coastal High Hazard Area as the land and water eastward of the Atlantic Intracoastal Waterway to the Atlantic Ocean. The Hillsboro Inlet Lighthouse falls within this category. Map 11-1 identifies both the Coastal Planning Area and the Coastal High Hazard Area.

Coastal or Shore Protection Structures. Shore-hardening structures, such as seawalls, bulkheads, revetments, or rubblemound structures which are intended to protect other structures from wave and hydrodynamic forces, or erosion control structures, which are intended to prevent erosion, such as groins, breakwaters, and aggregates of materials other than natural beach sand used for beach or shoreline protection and other structures which are intended to prevent erosion or protect other structures from wave and hydrodynamic forces including beach and dune restoration Environmental Planning Department (EPD) Biological Resources Division.

Dune. A mound or ridge of loose sediments, usually sand-sized sediments, lying landward of the beach and deposited by any natural or artificial mechanism, which may be bare or covered with vegetation and is subject to fluctuations in configuration and location (62B.003(17)FAC).

Erosion. Process that occurs as a result of net loss of sediments, i.e., more sediments (sand) are carried away than deposited (The Encyclopedia of Beaches and Shores).

Erosion Control Line. The line which determines the landward extent of the claims of the state in its capacity as sovereign titleholder of the submerged bottoms and shores of the Atlantic Ocean (Section 161.151, F.S.).

Estuary. A semi-enclosed, naturally existing coastal body of water in which saltwater is naturally diluted by freshwater and which has a connection with oceanic waters, including bays, embayments, lagoons, sounds and tidal streams (9J-5 FAC).

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Hurricane Vulnerability Zone. The areas (hurricane evacuation areas and mobile home parks) delineated by the regional or local evacuation plan as requiring evacuation (EMA).

Littoral Drift. Process whereby perpetual wave action transports sand in an longshore direction along the coastline (EPD Biological Resources Division).

Living Marine Resources. Oceanic or estuarine plants or animals, such as mangroves, seagrasses, algae, coral reefs, and other marine habitat; fish, shellfish, crustacea and fisheries; and sea turtles and marine mammals (9J-5, FAC).

Marine Habitat. Areas where living marine resources naturally occur, such as mangroves, seagrass beds, algal beds, salt marshes, transitional wetlands, marine wetlands, rocky shore communities, hard bottom communities, oyster bars or flats, mud flats, coral reefs, worm reefs, artificial reefs, offshore springs, nearshore mineral deposits, and offshore sand deposits (9J-5, FAC).

Public Access. The ability of the public to physically reach, enter or use recreation sites including beaches and shores (9J-5, FAC).

Revegetated Dunes. Those dune areas that, for a variety of reasons, have previously been denuded of associated dune vegetation or are artificially elevated regions of the beach usually associated with beach renourishment projects; both types are sometimes artificially or naturally revegetated with pioneer zone plant species such as sea oats (*Uniola paniculata*) (EPD, Biological Resources Division).

Shoreline or Shore. The interface of land and water and is limited to oceanic and estuarine interfaces (9J-5, FAC).

Storm Surge. The vertical rise in the still water level near the coast caused by wind stresses on the water surface and low barometric pressure (Broward County Coastal Construction Control Line Study).

Water-dependent Uses. Activities which can be carried out only on, in or adjacent to water areas because the use requires access to the water body for: waterborne transportation including ports or marinas; recreation; electrical generating facilities; or water supply (9J-5 FAC).

Water-related Uses. Activities which are not directly dependent upon access to a water body but which provide goods and services that are directly associated with water-dependent or waterway uses (9J-5 FAC).

Wetlands. Those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Florida wetlands generally

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include swamps, marshes, bayheads, riverine swamps and marshes, tidal marshes, mangrove swamps and other similar areas (9J-5, FAC).

Wildlife Habitat. Areas where wild animals and vegetation naturally reside.

II. DATA REQUIREMENTS

Rule 9J-5.012, FAC, requires the CME be based upon the following data: inventories of existing land uses; natural resources; historic resources and sites; estuarine pollution; natural disaster concerns; beach and dune systems; public access facilities; existing infrastructures; and the deepwater port issues. CME Part II addresses the above described rule requirements.

A. Inventory of Existing Land Use Coverages. This section addresses existing land use coverage, shoreline uses, water-dependent and water-related uses, and areas in need of redevelopment.

1. Description of Area and Inventories of Existing Land Use Coverage. The only unincorporated coastal area is the Hillsboro Inlet Lighthouse which is approximately 7.7 acres in size. Its boundary to the south is the Hillsboro Inlet which provides a connection between the Atlantic Ocean and the Intracoastal Waterway. The area is bordered by the municipalities of Hillsboro Beach to the north and Pompano Beach to the south.

2. Inventory of Shoreline Uses. Shoreline uses are those uses along the shore of either the Atlantic Ocean or the Intracoastal Waterway. The Future Land Use Designation at the Hillsboro Inlet Lighthouse is Community Facilities.

3. Inventory of Water-Dependent and Water-Related Uses. Activities which can be carried out only on, in or adjacent to water areas because the use requires access to the water body for: waterborne transportation, recreation, electrical generating facilities, or water supply, are water-dependent uses. The Hillsboro Inlet Lighthouse is a water-dependent use.

Activities which are not directly dependent upon access to a water body but which provide goods and services that are directly associated with water-dependent or waterway uses are water-related uses.

4. Identification of Areas in Need of Redevelopment. An area in need of redevelopment, as used here, means an area in which there are a substantial number of slums, deteriorated, or deteriorating structures and conditions which endanger life or property by fire or other causes or one or more of the following factors which substantially impair or arrests the sound growth of the county and is a menace to the public health, safety, morals, or welfare in its present condition and use: the

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predominance of defective or inadequate street layouts; faulty lot layouts in relation to size, adequacy, accessibility, or usefulness; unsanitary or unsafe conditions; deterioration of site or other improvements; tax or special assessment delinquency exceeding the fair value of the land; and diversity of ownership or defective or unusual conditions of title which prevent the free alienability of land within the deteriorated or hazardous area. There are no areas in need of redevelopment.

B. Inventories of Natural Resources. This section addresses vegetative cover, wetlands, areas subject to coastal flooding, wildlife habitats, and living marine resources.

1. **Vegetative Cover.** Vegetative communities are ecological communities, such as coastal strands, oak hammocks, and cypress swamps, which are classified by the presence of certain soils, vegetation and animals.

Vegetation on, and in proximity to, the beach consist primarily of grasses, sea oats non-woody perennials, and exotic species used and landscape materials.

2. **Wetlands.** Wetlands are those areas that are inundated or saturated by surface water or ground water at a frequency and a duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soils. Florida wetlands generally include swamps, marshes, bayheads, riverine swamps and marshes, tidal marshes, mangrove swamps and other similar areas.

3. **Areas Subject to Coastal Flooding.** The term “areas subject to coastal flooding” means the areas delineated in the local hurricane evacuation plan require evacuation. In Broward County, it is defined as that area requiring evacuation in the event of a 100-year storm or Category 3 storm event. The Hillsboro Inlet Lighthouse is within the area subject to coastal flooding.

For an inventory and map of other areas subject to coastal flooding, please see the Natural Disaster Component of the Coastal Management Element.

4. **Wildlife Habitats.** Wildlife habitats are areas where wild animals and vegetation naturally reside.

5. **Living Marine Resources.** Living marine resources are oceanic or estuarine plants or animals, such as mangroves, seagrasses, algae, coral reefs, fish, shellfish, crustacea, fisheries, sea turtles, and marine mammals. Living marine resources adjacent to the Broward County coast include at least fifteen families of cartilaginous fishes such as sharks and rays and 55 families of bony fishes such as tarpon, herring, snook, snapper, and species typically inhabiting in the coral reefs of southeast Florida. See Appendix 10-1 for a more complete marine resource listing.

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C. Inventory of Historic Resources. Historic resources are areas, districts, or sites containing properties listed on the Florida Master Site File, the National Register of Historic Places, or designated by the County as historically, architecturally, or archeologically significant. The Hillsboro Inlet Lighthouse was first placed into service on March 7, 1907. Although not listed on the National Register or designated as historically significant, the Hillsboro Lighthouse Preservation Society was founded in 1997 for the purpose of preserving the historic Hillsboro Light in its original form for the safety, enjoyment and education of the public. The primary goals of the society was to repair the Hillsboro Light's original lens, to open the Hillsboro Inlet Lighthouse and its grounds for the education and enjoyment of the public, and to support of the community in maintaining the lighthouse for future generations.

D. Inventory of Estuaries and Estuarine Conditions. An estuary is a semi-enclosed, naturally existing coastal body of water in which saltwater is naturally diluted by freshwater and which has an open connection with oceanic waters. Figure C of the Natural Resources Series Map, Broward County Land Use Plan, shows there is only one estuarine system in Broward County. Westlake Regional Park, a county facility located in the City of Hollywood, lies within the estuarine system.

E. Natural Disaster Planning Issues. This section addresses natural disaster planning issues specifically, hurricane evacuation and post-disaster redevelopment planning. The Natural Disaster Component of the CME addresses natural disaster planning issues on a county-wide basis.

1. **Hurricane evacuation planning.** The Hillsboro Inlet Lighthouse is maintained by the United States Coast Guard Auxiliary. This subsection addresses the hurricane vulnerability zone, the number of persons requiring evacuation and requiring public hurricane shelters, the number of shelter spaces available, evacuation routes, transportation and hazard constraints on the evacuation routes, and evacuation times.

a. *Hurricane vulnerability zone.* The hurricane vulnerability zone includes the hurricane evacuation areas and mobile home parks in Broward County. The areas mapped in the Natural Disaster Component are only areas subject to coastal flooding, and Hillsboro Inlet Lighthouse is within that zone.

b. *Persons requiring evacuation.* The US Coast Guard Auxiliary will determine if evacuation is required.

1) Special needs population. There is presently no data on the special needs population at Hillsboro Inlet Lighthouse.

c. *Persons requiring public hurricane shelter.* Only a portion of the people requiring evacuation will use public hurricane shelter. The proportion is

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unknown. Many will evacuate to the homes of friends or relatives inland.

d. *Available public hurricane shelter spaces.* The School Board of Broward County makes a number of its facilities available for public hurricane shelter spaces. A complete inventory of the spaces is included within the Natural Disaster Component.

e. *Evacuation routes.* There are two primary evacuation routes for the Hillsboro Inlet Lighthouse: westbound Hillsboro Boulevard, and westbound NE 14th Street. These roadways provide access to important north-south roadways (such as I-95 and Florida's Turnpike) critical to local and regional evacuation.

f. *Transportation and hazard constraints on evacuation routes.* The normal travel speeds on evacuation routes will be reduced significantly due to the high number of evacuees using private automobiles. Hazard constraints include the unpredicted early arrival of gale force winds blowing debris and sand onto evacuation routes, flooding, and the falling of objects, such as utility poles causing road blockages, and thereby restricting vehicular movement out of evacuation areas. Hillsboro Boulevard is a four-lane divided highway with a moveable bridge. NE 14th Street is a four-lane divided highway with a movable bridge.

g. *Evacuation time.* Evacuation time is the time in hours that evacuees reach their destinations. The estimated travel time includes 30 minutes loading time and 10 minutes unloading at a travel speed of 15 miles per hour; therefore, the people at the Hillsboro Inlet Lighthouse can reach public shelters within two hours.

2. **Post disaster redevelopment.** This subsection addresses existing and proposed land uses in the coastal high hazard area, structures with a history of repeated damages in coastal storms, coastal or shore protection structures, and beach and dune conditions.

a. *Existing and proposed uses in the coastal high-hazard areas.* Broward County has identified its Coastal High-Hazard Area as the land and water from the Intracoastal Waterway eastward to the Atlantic Ocean including any coastal protection structures. The Hillsboro Inlet Lighthouse falls within this area and its future land use designation is Community Facilities on the Future Unincorporated Area Land Use Map Series (FUALUMS).

b. *Structures with a history of repeated damage.* No historical evidence has been found which identifies structures that have been affected by repeated storm damage.

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c. *Coastal or shore protection structures.* Shore-hardening structures, such as seawalls, bulkheads, revetments, or rubble mound structures, which are intended to protect other structure from wave and hydrodynamic forces, or erosion control structures, which are intended to prevent erosion, such as groins, breakwaters, or aggregates of materials other than natural beach sand used for beach or shoreline protection.

A 260 ft. long stone breakwater was installed from the base of the lighthouse to ocean.

d. *Measures to reduce exposure to hazards.* Measures to reduce exposures to hazards during a hurricane.

F. Inventory of Beach and Dune System. The portion of the beach east of the erosion control line is accessible to the public.

Development in the NUCA has also eliminated much of the natural dune system; only one parcel of land with 312 feet of shoreline was left without being disturbed until March 1996. Since then, the construction of condominiums has begun, therefore, the only dune systems existing today are located beyond the buildings eastward toward the ocean.

1. **Past trends in erosion and accretion.** Erosion trends on Broward County's beaches were first documented in a U.S. Army Corps of Engineers study in 1961. At that time, it was determined that the beaches had been experiencing erosion problems for decades and that 8.9 miles of these beaches required nourishment and coastal protection structures. Table 10-2 shows recent erosion and accretion trends in Broward County.

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**Table 10-1
Shoreline Change Trends
Broward County**

Segment	Comments
Deerfield Beach (1980-1999)	Accretion 1.7 ft/yr
Hillsboro Beach (1980-1999)	Accretion 1.2 ft/yr (includes a beach nourishment project in 1998)
Pompano Beach/Lauderdale-by-the-Sea (1983-1998)	Accretion in north Pompano Beach at about 1.0 ft/yr due to increased sand by passing at Hillsboro Inlet. Recession at south Pompano Beach and Lauderdale-by-the-Sea at about 4 ft/yr following the 1983 beach renourishment project.
Fort Lauderdale (1983-1998)	Accretion north Port Everglades Inlet; stable to moderate recession along middle of Segment II
John U. Loyd State Park (1989-1998)	Recession, north 9.0 ft/yr
Dania (1989-1998)	Recession, 0.5ft/yr
Hollywood/Hallandale (1989-1998)	Recession, 4.0 ft/yr

Sources: EPD historical data

2. **Identification of existing and potential beach renourishment areas.** Beach renourishment is a county-wide effort. The most recent beach renourishment project, (Segment III), completed in February 2006, covered the areas from John U. Lloyd State Park to the Miami-Dade County line. The State permit for Segment II phase of the beach renourishment project (consisting of portions of Fort Lauderdale, Lauderdale-by-the-Sea and Pompano Beach) will be issued upon completion of 18 months of post-construction monitoring of the segment III portion of the project and outside of sea turtle nesting season. Therefore, Segment II beach construction could commence in late 2008.

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**Table 10-2
Completed and Programmed Nourishment Projects
Broward County
2006**

Year	Location	Quantity (c.y.)	Length (Ft.)	Funding	Cost (1)
1983*	Pompano Beach/ Lauderdale-by-the-Sea	1,750,000	27,900	Public	\$10,273,340
1989*	John U. Lloyd State Park	604,243	8,190	Public	\$5,677,933
1991	Hollywood/ Hallandale	1,108,000	27,500	Public	\$9,540,066
2005*	John U. Lloyd State Park to South County Line	1,800,000	35,904	Public	\$44,800,000
2008*	Fort Lauderdale-By- the-Sea/Pompano Beach	940,000	23,750	Public	\$22,100,000

(1) Obtained from the Broward County Capital Program FY 1993 - 2006.

* Updated information.

Source: Broward County EPD, 2006

G. Public Access Facilities. Public access means the ability of the public to physically reach, enter or use recreation sites including beaches and shores. Public access facilities include public access points through public and private lands, parking facilities and marinas, boat ramps, etc.

1. **Public access points to the beach or shoreline through public lands.** There are no public access points to the beach at the Hillsboro Inlet Lighthouse.
2. **Private properties open to the general public.** There is no private property open to the general public.
3. **Other legal means of public access.** There are no other legal means of public access to the Hillsboro Inlet Lighthouse.
4. **Parking facilities.** There are no designated public parking facilities.
5. **Coastal roads and facilities providing scenic overlooks.** State Road A1A was designated by Florida Department of Transportation (FDOT) in the 1960s as a scenic road along the Florida east coast as shown in the Florida Highway Map.

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6. **Marinas, boat ramps, public docks, and fishing piers.** There are no public marinas, boat ramps, docks, or fishing piers.
7. **Fishing areas.** There are no designated fishing areas.
8. **Open space.** The area seaward of the erosion control line is open space available for use by the public.

H. Inventory of Infrastructure. Infrastructure means those human structures which serve the common needs of the population, such as: roadways; bridges or causeways; sewage disposal systems; potable water systems; solid waste disposal sites; stormwater systems; utilities; piers; docks; breakwaters; bulkheads; revetments; marinas; seawalls; and navigation channels.

1. **Roadways.** The main coastal road is State Road A1A. Local roads extend from State Road A1A to service the residential neighborhoods.
2. **Bridges or causeways.** There are no causeways or bridges to the mainland. For hurricane evacuation purposes, the bridges or causeways that would be affected include Hillsboro Boulevard to the north and NE 14th Street to the south.
3. **Sanitary sewer facilities.** Wastewater treatment is accomplished by septic tanks or sanitary sewer service.
4. **Man-made drainage facilities.** Stormwater runoff east of S.R. A1A Highway flows to the Atlantic Ocean.
5. **Public shore protection structures.** There is a stone breakwater protecting the Hillsboro Inlet Lighthouse.

III. ANALYSIS REQUIREMENTS

Rule 9J-5.012, FAC, provides the CME shall be based upon the following analyses: existing land use coverage analysis; natural resources analysis; impacts of development and redevelopment on historic resources and sites; analysis of estuarine pollution; analysis of natural disaster planning issues; beach and dune systems analysis; capacity of and the need and demand for the public access facilities; infrastructures analysis; and deepwater Port analysis. This analysis is provided below, except for the deepwater port analysis, which is addressed in the Deepwater Port Component.

A. Existing Land Use Coverage Analysis.

1. **Conflicts Among Shoreline uses.** Land use conflicts center on the proximity of structures to the CCCL. Beachfront structures at the Hillsboro Inlet Lighthouse are

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situated on or seaward of the CCCL.

The Hillsboro Inlet Lighthouse has been in its present location since 1907 and development activities are expected to be limited and to have no measurable impact on infrastructures.

2. **Need for Water-Dependent and Water-Related Development Sites.** Although there are no public marinas, boat ramps, public docks, fishing piers, or traditional shoreline fishing areas, the Hillsboro Inlet Lighthouse remains a water-dependent site. The EPD should provide criteria or standards for prioritizing shoreline uses and giving priority to water-dependent uses.

3. **Analysis of Economic Base Based on Future Condition Map.** Economic base means the system of production, distribution, and consumption of goods and services within a planning area.

No analysis has been completed the economic base of the Hillsboro Inlet Lighthouse The NUCA is not an independent economic entity; it is a component of the whole Broward County economy. The Hillsboro Inlet Lighthouse is not an independent economic entity; it is a component of the whole Broward County economy.

B. Natural resources analysis. The following analyzes the natural resources in the areas of vegetation, wetland, wildlife habitat and living marine resources.

1. **Vegetative and wetland analysis.** The natural coastal vegetation at the Hillsboro Inlet Lighthouse has been disturbed. Vegetation on and in proximity to the beach consists primarily of sea oats, sea grapes, grasses, non-woody perennials, and exotic species used as landscape materials. This vegetation helps to protect upland property during storm conditions.

2. **Wildlife habitat and living marine resources.** The EPD has been involved in a variety of research projects that are aimed at improving the coastal environment. Artificial reef studies include mechanisms of recruitment of reef fish to artificial reefs, effects of artificial reef construction and the effect of water depth on fish abundance at artificial reefs. Sea turtle research projects include fish predation on the hatchery released sea turtle hatchlings and hatchling disorientation from urban beach-front lighting. The Broward County EPD will maintain the guidelines for local government implementation of sea turtle conservation programs developed in conjunction with the Florida Wildlife Research Institute.

Broward County's coastal marine habitats include shallow and deep hardbottom communities and pelagic fish populations. All of these habitats are important from an ecological and economic perspective. According to EPD, new threats had created the

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need for response plans to minimize and assess damage from such events. To aid in creating response plans, it is necessary to develop offshore resources maps to serve as baseline data.

Although, fisheries' management is carried out by the State, Broward County's Artificial Reef Program creates an opportunity for involvement in local stock restoration. The initiation of reef fish recruitment studies by the EPD has demonstrated a need for such studies to the extent that artificial reefs may prove to be a valuable tool for increasing fish populations. While further scientific studies are very important, it is also important to understand the economic value of artificial reefs as well as natural habitats to justify funding of further projects and studies.

A high level of boating activity in Broward County can result in an increased risk of anchor damage to reefs. The on-going installation and maintenance of permanent small boat moorings on the reefs allow divers and fishermen an opportunity to enjoy the resources without the risk of damaging hardbottom habitats.

C. Impacts of development/redevelopment on historic resources and sites. The Hillsboro Inlet Lighthouse was the first placed into the service on March 7, 1907 and is not listed on the National Register or designated as historically significant. There are no impacts expected from development and redevelopment activities.

D. Analysis of estuarine pollution. Figure C of the Natural Resources Series Map, Broward County Land Use Plan, shows there is only one estuarine system in Broward County. Westlake Regional Park, a county facility located in the City of Hollywood, lies within the estuarine system.

The EPD and the Development Management Division assess the potential development impacts on estuaries through the development review process, including site plan and plat applications. Also, the EPD coordinates efforts and existing resources protection plans where possible, and of other agencies through participation in the development review process, to protect estuaries within the jurisdiction of more than one local government.

E. Analysis of natural disaster planning issues. The following natural disaster planning concerns are analyzed, but a more detailed analysis is founded in the Natural Disaster Component.

1. **Hurricane evacuation planning.** Hurricane evacuation planning is based on the hurricane evacuation plan contained in the local emergency management plan and the Coastal Hurricane Evacuation Plans are analyzed; and the hurricane vulnerability zone, the number of persons requiring evacuation, the number of hurricane shelter spaces available, evacuation routes, transportation and hazard constraints on the evacuation routes, and evacuation time are discussed below:

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- a. *Hurricane Vulnerability Zones.* The Broward County vulnerability zone has been divided into two zones: the Hillsboro Inlet Lighthouse located between NE 14th Street and Hillsboro Boulevard on the barrier island.
- b. *Persons Requiring Evacuation.* The US Coast Guard Auxiliary will determine if evacuation is required at the Hillsboro Inlet Lighthouse.
- c. *Available Hurricane Shelter Spaces.* Broward County has a total of more than 67,000 hurricane shelter spaces. There are 12 primary shelter sites containing approximately 37,000 spaces. All shelters have been selected for safety features and location to serve the most vulnerable sections of the community. There are currently enough spaces for those who wish to evacuate. If additional shelter spaces are needed, more schools could be opened.
- d. *Evacuation Routes.* Evacuees will use S.R. A1A and either NE 14th Street or Hillsboro Boulevard causeways to evacuate to the mainland.
- e. *Transportation and Hazard Constraints on Routes.* NE 14th Street and Hillsboro Boulevard causeways have four-lane draw bridges. In the event of a hurricane, both boat and vehicle traffic will be hectic; thus, creating transportation constraints. Another hazard constraint will be potential flooding of roadways.
- f. *Evacuation Time.* In order to ensure that all evacuees could reach their destination prior to a landfall, the County's Mayor would issue an evacuation order. Measures to maintain or reduce evacuation times were incorporated into the Broward County Emergency Operations Plan, which identifies tasks and assigns responsibility to specific County divisions for their timely implementation. The measures devised to reduce evacuation times include: public information, traffic control, debris removal, and public transit.

2. **Post-disaster redevelopment.** The Emergency Management Agency (EMA) along with other county agencies and municipalities shall develop a county wide post-disaster redevelopment and mitigation plan which reduces exposure of life and property to natural hazards.

The Broward County Environmental Protection Department (EPD) assists state agencies in the enforcement and monitoring of compliance with the Florida Department of Environmental Protection (DEP) CCCL regulations. The EPD also assists in monitoring development in the coastal areas to ensure proper compliance with state and local regulations. In addition, structures with a history of repeated damages in coastal storms may be required to relocate westward of the CCCL in order to reduce exposure.

According to the Natural Disaster Element, if a structure was damaged by a natural

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disaster in excess of 75 percent of its replacement cost, any post-disaster redevelopment would need to meet the design criteria established pursuant to the designation of the Coastal Construction Control Line (CCCL).

The Hillsboro Inlet Lighthouse has a stone breakwater to protect the lighthouse against hazards. Other measures to reduce exposure to hazards during a hurricane consist of a beach renourishment program and revegetation of an area on the beach to create sand dunes. The presence of sand dunes prevents sand from being blown onto upland property and moderates wave overtopping. Since most dunes were destroyed by coastal development, the replenishment of the dune system could help mitigate the impacts of storms.

3. **Coastal high-hazard areas.** The only potentially threatened infrastructures are streets and highways; therefore, no potential for relocation exists. Relocating infrastructures owned or operated by the County was analyzed and deemed unnecessary because the County is responsible for maintaining local roadway networks. State Road A1A is maintained by FDOT.

F. Beach and Dune Analysis.

1. **Past trends in erosion and accretion.** The EPD is charged to monitor beaches, and restore eroded beaches. The EPD regularly conducts countywide beach surveys to identify areas where nourishment projects would generate the greatest benefits. Data repeatedly confirm that the County should continue its beach renourishment program as one means of conserving the barrier island's resources. The beaches should be maintained to a width of approximately 75 to 125 feet. Segment III of the Shore Protection Project (John U. Lloyd State Park to the Miami-Dade County Line) was completed in February 2006. The next planned project (Segment II) could begin construction in late 2008.

Any development and redevelopment in the coastal area should not degrade or destroy existing natural beaches or berm areas. Also, Broward County will continue to encourage local governments and property owners to protect existing beach vegetation, to revegetate the beach, where appropriate, and to encourage landscaping with native trees, shrubs, and ground covers in areas of historic beaches or berm communities through the distribution of educational pamphlets.

Inlet management plans were carried out for Hillsboro Inlet and Port Everglades in accordance with cost sharing agreements with FDEP. The plans provided analyses and recommendations on strategies to improve sand bypassing, and stabilization of down-drift beach sand using jetty modifications.

COASTAL MANAGEMENT ELEMENT

2. **Effects of shore protection structures.** There is a stone breakwater protecting the Hillsboro Inlet Lighthouse.

3. **Measures which could protect or restore beaches.** Certain structural measures have been used to stabilize beach sand from erosion. These include inlet sand bypassing, groins and breakwaters. In conjunction with beach renourishment, methods such as these could help stabilize sand and reduce the frequency or magnitude of renourishment. Engineering and economic studies should be undertaken to determine the feasibility of such measures.

G. Capacity and Need for Public Access facilities. There is no public beach access facilities at the Hillsboro Inlet Lighthouse.

1. **Public access.** There is no public access at the Hillsboro Inlet Lighthouse.

2. **Parking.** There is no parking at the Hillsboro Inlet Lighthouse.

3. **Scenic overlooks.** There is no scenic overlook at the Hillsboro Inlet Lighthouse. The closest highway parallel to the beach or shores is S.R. A1A.

4. **Marinas, boat ramps, public docks, and fishing piers.** There are no public marinas, boat ramps, public docks, and fishing piers at the Hillsboro Inlet Lighthouse.

5. **Open space.** There is no open space at the Hillsboro Inlet Lighthouse. The area seaward of the erosion control line is available for use by the public.

H. Infrastructure Analysis. S.R. A1A is the main roadway on the barrier island and is under State jurisdiction. The following infrastructure issues are analyzed, but more detailed analyses are found in the Infrastructure Element.

1. **Demands upon existing infrastructures.** The traffic demand on A-1-A has its seasonal change from higher in the winter to lower in the summer.

2. **Area served by existing infrastructure.** The area served by existing infrastructure is relatively small (7.7 acres).

3. **Estimated future need for infrastructure.** There is no need for additional infrastructure.

5. **Fiscal impacts in terms of estimated costs, funding sources, and phasing of infrastructures.** The Hillsboro Inlet Lighthouse has required several infrastructure improvements since 1907. All of these improvements have been completed without the use of County funds.

COASTAL MANAGEMENT ELEMENT

IV. IMPLEMENTATION

A. Authority. Managing coastal resources in Broward County is the responsibility of several State and County agencies. Table 10-3 lists these agencies, their responsibilities concerning coastal area management, and existing regulatory programs to protect environment quality in the coastal area.

B. Sources. The Broward County Environmental Protection Department is the primary source for the data and analysis included in this Element. Other sources include the Broward County Emergency Management Agency and Transportation Planning Division.

COASTAL MANAGEMENT ELEMENT

**TABLE 10-3
COASTAL MANAGEMENT LEGISLATION
AND RESPONSIBLE AGENCIES
BROWARD COUNTY, 2006**

Agency	Enabling Legislation	Responsibility
U.S. Department of Interior	Federal Coastal Zone Management Act of 1972, Public Law 92-583	Provide financial assistance to participating coastal states. Identifies general coastal zones and defines permissible land and water uses within.
	Water pollution Control Act, Public Law 92-500	Prohibits coastal pollution.
	Coastal barrier Resources Act, Public Law 97-348	Restricts federal subsidies in undeveloped designated coastal areas.
Florida Department of Environmental Protection	Florida Coastal Management Act of 1978, Chapter 380, Part II, Florida Statutes.	Coordinates the Florida Coastal Management Act of 1978; Implements the Federal Coastal Management Act of 1972.
	Chapter 403, Florida Statutes	Develops and enforces pollution controls on waters of the State. Permit dredge and fill activities in wetlands.
	Chapter 161, Florida Statutes	Established coastal construction control lines. Regulates coastal constructions. Oversees Erosion Control Trust Fund. Enables establishment of Beach and Shore Preservation Districts.
Broward Soil and Water Conservation District	Chapter 582, Florida Statutes	Control or prevent soil erosion and further the conservation of soil and water resources.
South Florida Water Management District		Manages estuarine pollution through water control and timing of fresh water delivery.
Broward County Environmental Protection Department (Formerly known as the Department of Natural Resources Protection)	Section 8.17, Broward County Chapter	Monitor water quality and permits dredge and fill activities. Develops and implements Beach Management Program. Implements Sea Turtle Conservation Program; manages Artificial Reef Program.

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V. APPENDICES

COASTAL MANAGEMENT ELEMENT

Appendix 10-1 Marine Resources Broward County Coast, 2006

Family: Clupeidae - herrings
Engraulidae - anchovies
Order: Myctophiformes
Family: Snyadontidae - Lizard fishes
Chlorophthalmidae - Greeneyes
Alepisauridae - Lancet fish

Order Perciformes

Families: Centropomidae - Snooks
Serranidae - Sea basses
Grammistidae - Soapfishes
Priacanthidae - Bigeyes
Apogonidae - Cardinal fishes
Branchiostegidae - Tilefishes
Pomatomidae - Bluefishes
Rachcentridae - Cobias
Echeneidae - remoras
Carangidae - Jacks and pompanos
Corphaenidae - dolphins
Lutjanidae - Snappers
Lobotidae - Tripletails
Gerreidae - Mojarres
Pomadasyidae - grunts
Sparidae - porgies
Sciaenidae - drums
Mullidae - Goatfishes
Pempheridae - Sweepers
Kyphosidae - Sea Chubs
Ephippidae - Spadefishes
Chaetodontidae - Butterflyfishes
Pomacentridae - Damselfishes
Cirrhitidae - Hawkfishes
Labridae - Wrasses
Scaridae - Parrotfishes
Mugilidae - Mulletts
Sphyraenidae - Barracudas

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Polynemidae - Threadfins
Opistognathidae - Jawfishes
Percophididae - Flatheads
Dactyloscopidae - Sand Stargazers
Uranoscopidae - Stargazers
Clinidae - Clinids
Blenniidae - Combtooth blennies
Gobiidae - gobies
Acanthuridae - Surgeonfishes
Trichiuridae - Cutlassfishes
Scombridae - Mackerals and tunas
Xiphiidae - Swordfishes
Istiophoridae - billfishes
Stromateidae - butterfishes
Scorpaenidae - Scorpionfishes
Triglidae - Searobins

Source: Broward County Environmental Protection Department, 1996

COASTAL MANAGEMENT ELEMENT

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