

**FLORIDA DEPARTMENT OF
ENVIRONMENTAL PROTECTION
BUREAU OF BEACHES AND COASTAL SYSTEMS**

STRATEGIC BEACH MANAGEMENT PLAN

for the

FLORIDA KEYS REGION

SUBREGIONS

Upper Keys

Middle Keys

Lower Keys

Distal Sand Keys

FLORIDA KEYS REGION

There are 36.3 miles of beaches in the **Florida Keys** region, which extends from Soldier Key, just south of Key Biscayne in Dade County, to the Dry Tortugas in Monroe County as shown on Figure FK.1. There are a total of 10.2 miles of critically eroded beaches in this region, of which 1.4 miles have been restored and maintained.

The **Upper Keys** subregion extends from Soldier Key to Tavernier Creek. No natural beaches exist in the Upper Keys subregion.

The **Middle Keys** subregion extends from Tavernier Creek to Pigeon Key. There are 3.5 miles of critically eroded beaches in this subregion.

The **Lower Keys** subregion extends from Pigeon Key to Key West. There are 6.7 miles of critically eroded beaches in this subregion.

The **Distal Sand Keys** subregion extends west of Key West and includes Woman Key, Boca Grande Key, the Marquesas Keys, and the Tortuga Keys. This subregion has beach erosion conditions that have not been adequately studied for inclusion in this plan.

Erosion in the **Florida Keys Region** is attributed to tropical storms and hurricanes, and to natural geomorphic changes caused by the pattern of littoral transport of sediments in this area. However, natural shoreline fluctuations are exaggerated by interaction with coastal protection structures, such as seawalls and revetments, which are located at the ends of many small pocket beaches in this region. The most erosive storms in recent years were Hurricane Andrew (1992; Upper Keys), Hurricane Georges (1998), which caused extensive property damage throughout the Keys and significant beach erosion at many locations, Hurricane Irene (1999; Middle and Lower Keys), and Hurricanes Rita and Wilma (2005; throughout the keys including the Distal Sand Keys).

STRATEGIES FOR INLETS AND CRITICALLY ERODED BEACHES

MIDDLE KEYS SUBREGION

SEA OATS BEACH, LOWER MATECUMBE KEY, MONROE COUNTY

This is a 0.7 mile segment of critically eroded beach along Lower Matecumbe Key in the City of Islamorada. Erosion threatens recreational interests and U.S. Highway 1 along Sea Oats Beach. Hurricanes Rita and Wilma (2005) caused moderate beach and dune erosion and flooding in this segment.

Strategy: Initiate a feasibility study to determine environmentally acceptable erosion control alternatives.

LONG KEY STATE PARK, MONROE COUNTY

This is a 1.0 mile segment of critically eroded beach at Long Key State Park. Park officials have estimated shoreline recession to be as much as three feet per year since the park was opened in 1970. A rock revetment was constructed along a limited segment of shoreline in 1976; however, erosion end effects are most apparent adjacent to the structure. The park was severely impacted by Hurricanes Georges and Irene in 1998 and 1999. Beach and dune restoration was considered necessary after these storms, and a feasibility study was initiated by the Department. In 2005, Hurricanes Rita and Wilma combined to

severely impact the park and destroyed all the waterfront campsites and infrastructure. Updated surveys and park management decisions are currently needed for any viable project to move forward.

Strategy: Conduct feasibility study to determine environmentally acceptable erosion control alternatives.

CURRY HAMMOCK STATE PARK, LITTLE CRAWL KEY, MONROE COUNTY

This is a 0.1 mile segment of critically eroded beach at Curry Hammock State Park, where recreational interests are threatened. In 2005, Hurricanes Rita and Wilma combined to severely impact the park. In 2005, a feasibility study was completed to investigate sand sources for state parks in the Keys, including Curry Hammock State Park. The **Curry Hammock State Park Beach Restoration Project** was constructed via truck haul with removal of inappropriate fill and 14,450 cubic yards of sand in April 2008.

Strategy: Maintain the project through monitoring and nourishment.

WEST COCO PLUM BEACH, MARATHON, MONROE COUNTY

This is a 0.3 mile segment of beach created by dredge and fill development in the 1950's. Located outside of the critically eroded beach, most of the eastern end of Coco Plum Beach is a City of Marathon public park. The beach sustained moderate erosion during Hurricane Georges in 1998. Following Hurricane Irene in 1999, this segment of beach was designated critically eroded where upland private development is threatened. This segment has two rock groins on the western end. Net sediment transport along this segment is to the southwest. During Hurricane Rita (2005), minor beach and dune erosion prevailed with significant overwash observed landward of the beach, and rock revetments were destroyed. Hurricane Wilma (2005) inflicted moderate beach and dune erosion and additional overwash, and also damaged major structures.

Strategy: Assisted recovery of storm erosion impacts consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

KEY COLONY BEACH, MONROE COUNTY

This is a 0.9 mile segment of critically eroded beach fronting on the Straits of Florida in the City of Key Colony Beach, west of Coco Plum Beach. Key Colony Beach is the western of two dredge and fill developments east of Marathon and is stabilized by 15 limerock groins, which were constructed in 1958. The 4,550-foot long private beach sustained minor to moderate beach erosion during Hurricane Georges (1998) and additional erosion during Hurricane Irene (1999). The upland development sustained substantial flooding and structural damage; however, little post-storm recovery was undertaken except some minor groin repair and the return of overwash sediments. In 2005, Hurricanes Rita and Wilma combined to cause minor to moderate beach and dune erosion.

Strategy: Assisted recovery of storm erosion impacts consisting of sand trucked from upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

WEST KEY COLONY BEACH, MONROE COUNTY

This is a 0.2 mile segment of critically eroded beach along the western shoreline of the City of Key Colony Beach, northwest of Sandy Point and includes the city's public beach, Sunset Beach. Hurricane Rita (2005) inflicted minor beach and dune erosion and destroyed the rock revetment at Sunset Beach. Hurricane

Wilma (2005) caused major beach and dune erosion of this segment and greater structural damages. In April 2006, this segment was designated as critically eroded where public recreational interests at Sunset Beach are threatened.

Strategy: Assisted recovery of storm erosion impacts to public beaches above mean high water consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

SOMBRERO BEACH, VACA KEY, MONROE COUNTY

This is a 0.3 mile segment of critically eroded beach at the southwestern tip of Vaca Key. Sombrero Beach is a City of Marathon public park. The beach is sheltered from east and southeast wave activity. This results in the net sediment transport along the beach to be easterly into an adjacent canal on Tingler Island. The park facilities sustained major damage from storm tide flooding and landward sediment transport during Hurricane Georges (1998). In 2005, Hurricanes Rita and Wilma combined to cause minor to moderate beach and dune erosion. Hurricane Wilma also damaged much of the park's infrastructure. Significant sand losses have occurred as a result of overwash and sediment transport into canals on Tingler Island. Private interests on Tingler Island have constructed impermeable docks and groins, which should partially mitigate the loss of material into adjacent canals from Sombrero Beach.

Strategy: Conduct a feasibility study to determine environmentally acceptable erosion control alternatives.

LOWER KEYS SUBREGION

LITTLE DUCK KEY, MONROE COUNTY

This is a 0.2 mile segment of critically eroded beach and is the site of Veteran's Memorial Park, a Monroe County park. Hurricane Wilma (2005) caused moderate beach and dune erosion and destroyed all the park facilities. In April 2006, this segment was designated as critically eroded threatening recreational interests at the county park.

Strategy: Assisted recovery of storm erosion impacts to public beaches above mean high water consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

BAHIA HONDA STATE PARK, MONROE COUNTY

Bahia Honda Key has three erosional areas. Within Bahia Honda State Park, Calusa Beach (between the bridges), Loggerhead Beach (a western segment) fronting on the Straits of Florida, and a stretch of Sandspur Beach at the east end have 2.0 miles of critically eroded beaches. The most significant carbonate beaches and dunes of the lower Keys are on Bahia Honda Key, which is part of Bahia Honda State Park. The island has 11,900 feet of beach, south of U.S. Highway 1, fronting on the Straits of Florida and another 800 feet of beach north of the highway fronting on the Gulf of Mexico. The estimated annual longshore transport of more than 2,000 cubic yards of sediment is to the southwest. Several attempts have been made to armor, build groins, and fill the eroding areas since the early 1970's. In 1989, a 100-foot long groin and restoration was constructed at Caloosa Beach, the 600 ft long recreation beach between the Flagler Bridge and the U.S. Highway 1 bridge. The western 3,500 feet of Loggerhead Beach fronting the Straits of Florida, also designated critically eroded, receded about five feet between 1971 and 1986. Erosion control efforts have included the placement of concrete bridge piles near the west end, riprap along the 400 to 500

feet of threatened roadway in the early 1970's, the 1988/89 construction of a 1,200-foot long limerock revetment, and substantial sea oats planting during the 1980's and 1990's.

Hurricane Georges (1998) caused major beach and dune erosion and severely damaged the park facilities, roadway and bridge. Hurricane Rita (2005) inflicted minor beach and dune erosion at Calusa Beach and Sandspur Beach, and minor to moderate beach and dune erosion at Loggerhead Beach. Hurricane Wilma (2005) caused moderate to major beach and dune erosion at Calusa Beach and Loggerhead Beach, and minor dune erosion with beach accretion within the critically eroded portion of Sandspur Beach. Wilma also caused severe damage to the park's recreation facilities at the public beaches. During post-storm recovery operations, overwash sediments were returned to the beaches. In 2005, a feasibility study was completed to investigate sand sources for State Parks in the Keys, including Bahia Honda State Park.

Strategy: Assisted recovery of storm erosion impacts to public beaches above mean high water consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration, and stabilized with plantings of native vegetation.

BOCA CHICA KEY, MONROE COUNTY

This is a 1.3 mile segment of critically eroded beach and a Monroe County park. Hurricanes Georges (1998) and Irene (1999) caused moderate to major beach and dune erosion and road damage in this area. In 2005, Hurricane Rita caused minor beach and dune erosion and Hurricane Wilma caused moderate to major beach and dune erosion. Rita caused overwash deposits onto Boca Chica Beach Road and Wilma destroyed much of the road.

Strategy: Assisted recovery of storm erosion impacts to public beaches above mean high water consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

SMATHERS BEACH, REST BEACH, HIGGS BEACH, AND SOUTH BEACH, KEY WEST, MONROE COUNTY

This is a 2.8 mile segment of critically eroded beach fronting on the Straits of Florida. The U.S. Army Corps of Engineers and others have studied this segment of shoreline since 1951. The net annual longshore sediment transport is to the west; however, the eastern end of the shoreline along South Roosevelt Boulevard is hardened with a seawall providing little material for transport. Smathers Beach, an approximately 3,300-foot long beach, has been nourished in the past with sand screened from crushed limerock and from oolitic aragonite imported from the Bahamas. Four groins were constructed in 2000 and 2001 to retain sand within the beach limits.

In 1998, Hurricane Georges damaged the South Roosevelt seawall and private property to the west of Smathers Beach. Rest Beach and South Beach sustained substantial damage. In 1999, Hurricane Irene damaged the seawall again and caused additional erosion. Nourishment and groin construction was conducted at Smathers Beach in 2000. In total 0.6 miles of beach at Smathers Beach has been restored. In 2005, Hurricane Rita caused minor beach erosion to Smathers Beach, Higgs Beach, South Beach and the private beaches, and minor beach and dune erosion to Rest Beach. Hurricane Wilma caused minor beach and dune erosion to Smathers Beach, moderate to major beach and dune erosion to Berg and Kitsos Beaches, major beach and dune erosion to Rest Beach, and minor beach erosion to Higgs Beach, South Beach, and Truman Annex beaches. Wilma substantially destroyed the entire park infrastructure at Rest Beach as well as many major structures along the southeastern shoreline of Key West.

Strategy: Maintain the project at Smathers Beach through monitoring and nourishment using sand from approved sources; assisted recovery of storm erosion impacts to city and county public beaches above mean high water consisting of sand trucked from approved upland borrow sites.

SIMONTON BEACH, MONROE COUNTY

This is a 0.1 mile segment of critically eroded beach located on the south shoreline of Key West fronting the Gulf of Mexico. The City of Key West's sole public beach on the Gulf of Mexico was eroded by Hurricane Wilma (2005), threatening recreational interests. In April 2006, the Department designated this segment as critically eroded.

Strategy: Assisted recovery of storm erosion impacts to public beaches above mean high water consisting of sand trucked from approved upland borrow sites, placed in an alongshore berm configuration above mean high water, and stabilized with plantings of native vegetation.

FORT ZACHARY TAYLOR HISTORIC STATE PARK, KEY WEST, MONROE COUNTY

This is a 0.3 mile segment of critically eroded beach on the southwest tip of Key West, an area built on dredge material from the ship channel dredging project. The fill site includes the 150-year old fort. Erosion undermined a revetment built by the U.S. Navy in 1964. In 1989, a terminal groin and breakwater project was constructed including approximately 10,000 cubic yards of sand. In 1998, Hurricane Georges caused major beach and dune erosion along this area leaving an eight to nine-foot vertical escarpment along the dune line between the west breakwater and the terminal groin. In 1999, Hurricane Irene caused additional erosion and damaged the west shore revetment. In 2005, Hurricane Rita caused minor to moderate beach and dune erosion along the park's beach, and Hurricane Wilma caused additional minor beach and dune erosion along the beach, and moderate upland bank erosion behind the west shore revetment. Also during Wilma, one of the four detached breakwaters sustained major damage, and the west shore revetment sustained minor damage. In October of 2005 a carbonate sand source investigation recommended silicate sands from an inland mine in Hendry County. The restoration, via truck haul, was completed in December 2007.

Strategy: Maintain project above mean high water line; repair the west shore revetment to prevent breaching of the terminal groin.

REGIONAL STRATEGIES FOR BEACH AND INLET MANAGEMENT

SPONSORS AND FUNDING

The Middle Keys subregion includes the communities of Plantation, Islamorada, Key Colony Beach, Marathon Shores, and Marathon. The Lower Keys subregion includes the City of Key West. These communities as well as Monroe County and the U.S. Army Corps of Engineers are eligible governmental entities under the beach erosion control assistance program. Monroe County and the City of Key West have participated with the Department as the local sponsors of beach management projects. In addition, the Department's Division of Recreation and Parks manages state parks on Long Key, Little Crawl Key, Indian Key, Lignumvitae Key, Bahia Honda, and Key West, and is responsible for environmental resource management of all the wet sandy beaches of the keys under the Florida Keys National Marine Sanctuary program. Project cost estimates and schedules may be found in the Florida Beach Management Funding Assistance Program - Long Range Budget Plan.

PROJECT COORDINATION

Regionalization is the funding and coordination of multiple nourishment and inlet management activities to take advantage of identifiable cost savings through economies of scale, reduced equipment mobilization and demobilization costs, and elimination of duplicative administrative tasks. Opportunities in this subregion include:

1. Regional opportunities for beach management activities have not been studied at the critically eroded beaches, but would include combining management activities at several sites to reduce costs through economies of scale.
2. Placing beach quality sand from navigational dredging on beaches in critical need.

ENVIRONMENTAL PROTECTION

The protection of marine turtles, shorebirds, mangrove wetlands, seagrass beds and hardbottom and coral reef communities and their habitats are primary environmental concerns within this sub-region. The timing of construction activities has not been restricted during the marine turtle nesting season of May 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse environmental impacts to natural resources, listed species and their habitat. The Keys are located within the limits of the Florida Keys National Marine Sanctuary and include the Lignumvitae Key Aquatic Preserve and Coupon Bight Aquatic Preserve. Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.

SAND SOURCES

Adequate sand sources have not been identified for this region. Sufficient upland sand supplies for Curry Hammock State Park and Fort Zachary Taylor State Historic Park have been identified. Sand has been trucked in from upland sites in Dade County for small nourishments. Maintenance dredging of navigation channels in this region is conducted infrequently. Oolitic aragonite sand from the western Bahamas Islands has been used to nourish Smathers Beach in Key West. The Northwest Channel at Key West has been identified by the U. S. Army Corps of Engineers as a sand source for beach nourishment. A comprehensive investigation of upland sand sources has been performed to locate and characterize all beach compatible sand within economic distance of the critically eroded beaches.

ADDITIONAL INFORMATION

The introduction at the beginning of the state's Strategic Beach Management Plan provides additional information including overviews of:

- The principals followed to help guide the state's management strategies
- The miles of critically eroded beaches under active management
- Statewide sand source studies
- Statewide monitoring programs
- Innovative technologies examined
- Basic suggestions for emergency response plans

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