# *Strategic Beach Management Plan: Southeast Atlantic Coast Region*

**Office of Resilience and Coastal Protection**

**Florida Department of Environmental Protection**

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## *List of Acronyms*

**Acronyms associated with the Florida Department of Environmental Protection's Strategic Beach Management Plan and coastal management activities:**

**Coastal Associations Acronyms:**

- ASBPA – American Shore & Beach Preservation Association
- FSBPA – Florida Shore & Beach Preservation Association
- DCA – Dredging Contractors of America

**Federal Agencies Acronyms:**

- BOEM – Bureau of Ocean Energy Management
- CBRA – Coastal Barrier Resources Act
- CHL – Coastal and Hydraulics Laboratory
- CIRP – Coastal Inlets Research Program
- CMS – Coastal Modeling System
- CSRM – Coastal Storm Risk Management
- CZMA – Coastal Zone Management Act
- EA – Environmental Assessment
- EIS – Environmental Impact Statement
- ERDC – Engineer Research and Development Center
- FCCE – Flood Control and Coastal Emergency
- FEMA – Federal Emergency Management Agency
- FRF – Field Research Facility
- GRR – General Reevaluation Report
- HCPs – Habitat Conversation Plans
- HSDR – Hurricane and Storm Damage Reduction
- LPP – Locally Preferred Plan
- LRR – Limited Reevaluation Report
- MMP – Marine Minerals Program
- NAVD 88 – North American Vertical Datum of 1988
- NEPA – National Environmental Policy Act
- NGVD 29 – National Geodetic Vertical Datum of 1929
- NHC – National Hurricane Center

- NOAA – National Oceanic and Atmospheric Administration
- NPS – National Park Service
- NWR – National Wildlife Refuge
- ODMDS – Ocean Dredge Material Disposal Site
- OCS – Outer Continental Shelf
- RSM – Regional Sediment Management
- PIR – Project Impact Report
- SAJ – Jacksonville District, South Atlantic Division
- SPP – Shore Protection Project
- SLC – Sea Level Change
- SLR – Sea Level Rise
- TSP – Tentatively Selected Plan
- USACE – United States Army Corps of Engineers
- USFWS – United States Fish and Wildlife Service
- WRDA – Water Resources Development Act

**State Agencies Acronyms:**

- AIWW – Atlantic Intracoastal Waterway
- APP – Aquatic Preserve Program
- BIPP – Beaches, Inlets and Ports Program
- BMA – Beach Management Agreement
- BMFA – Beaches and Mines Funding Assistance Program
- BMP – Best Management Practices
- BSM – Bureau of Survey and Mapping
- CCCL – Coastal Construction Control Line
- COASTS – Collection of Aerials and Shoreline Trends Systems
- DEP – Department of Environmental Protection
- DMMA – Dredge Material Management Area
- DSL – Division of State Lands
- DWRM – Division of Water Resource Management
- ECL – Erosion Control Line
- EOC – Emergency Operation Center
- FAC – Florida Administrative Code
- FAR – Florida Administrative Register

- FDEM – Florida Department of Emergency Management
- FDFS – Florida Department of Financial Services
- FDOT – Florida Department of Transportation
- FHCF – Florida Hurricane Catastrophe Fund
- FIND – Florida Inland Navigation District
- FPS – Florida Park Service
- FS – Florida Statutes
- FWC – Florida Fish and Wildlife Commission
- HCP – Habitat Conservation Plan
- IMP – Inlet Management Plan
- IWW – Intracoastal Waterway
- JCP – Joint Coastal Permit
- LABINS – Land Boundary Information System
- LGFR – Local Government Funding Request
- LRBP – Long Range Budget Plans
- MHWL – Mean High Water Line
- MLLW – Mean Lower Low Water
- MLW – Mean Low Water
- MOA – Memorandum of Agreements
- MOU – Memorandum of Understandings
- NERR – National Estuarine Research Reserve
- OCULUS – DEP's Electronic Document Management System
- OGC – Office of General Counsel
- ORCP – Office of Resilience and Coastal Protection
- R – Range or Reference Monument/Survey Marker
- RCP – Resilience and Coastal Protection
- ROSSI – Regional Offshore Sand Source Inventory
- SAND – Sediment Assessment and Needs Determination Study
- SBMP – Strategic Beach Management Plan
- SOP – Standard Operating Procedures
- SOW – Scope of Work
- TAC – Technical Advisory Committee
- TIITF – Trustees of the Internal Improvement Trust Fund
- WCIND – West Coast Inland Navigation District

Project Photo 4. A post-construction photo of the Delray Beach Shore Protection Project in April 2026. Photo courtesy of Cynthia Buisson, P.E., with the City of Delray Beach. See additional construction photos of beach nourishment projects.

## *Introduction - Southeast*

The **Southeast Atlantic Coast Region** has a total of 91.1 miles of beaches, of which 73.3 miles are critically eroded, and 51.1 miles are actively managed. There are also ten inlets within the Southeast Atlantic Region and seven of those inlets have an inlet management plan. For additional inlet management and sand bypassing information, see the Annual Inlet Report. For additional beach management or project information, see the current Critically Eroded Beaches Report, the joint coastal permits (JCP) by County, the JCP Projects under construction or the local government funding requests by County. Each subregion listed below will have an introductory paragraph listing miles of coastline and erosional events/storms that have affected the subregion.

Each title within the subregion will list the coastal location, the County and the Department of Environmental Protection (DEP) reference or range (R) monuments for the critical erosion area. For inlets, river entrances or passes, the title, the County and the adjacent range survey markers will be stated. In addition, there will be a subregion map highlighting the critical erosion areas and the managed project areas. Finally, references to coastal reports will also be listed at the end of each subregion.

For more specific information concerning projects or strategies along Florida's coastline, see the following links for the other six coastal regions of Florida. For background information, see the Strategic Beach Management Plan's Introduction.

Strategic Beach Management Plan Introduction
Northeast Atlantic Coast Region
Central Atlantic Coast Region
Florida Keys Region
Southwest Gulf Coast Region
Big Bend Gulf Coast Region
Panhandle Gulf Coast Region

For additional information pertaining to beach and ocean conditions, coastal associations, educational institutions or government agencies, see the following related coastal sites.

The State of Florida was significantly impacted by two hurricanes in 2022, Hurricane Ian and Hurricane Nicole. For additional information on funding to address recovery for the beaches and dunes, see the Hurricanes Ian and Nicole Recovery Plan. For all other hurricane-related material and

the post-storm impact reports, visit DEP's Office of Resilience and Coastal Protection hurricane web page.

## *Northern Palm Beaches*

There are 13.3 miles of beaches in the **Northern Palm Beaches** subregion, which extends from just north of the Martin-Palm Beach County line to Riviera Beach (R70) on Singer Island in Palm Beach County, as shown on Figure 1. There are 8.4 miles of critically eroded beaches in this subregion, of which 3.5 miles have been restored and maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes and the effects of Jupiter Inlet. The most erosive storms occurring in past years were Hurricane David (1979), the Thanksgiving Day Northeaster (1984), Hurricane Irene (1999), Hurricane Frances and Jeanne (2004), Hurricane Wilma (2005), Subtropical Storm Andrea (2007), October northeasters (2007), Hurricane Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Dorian (2019) and Hurricane Nicole (2022).

### *Strategies for Inlets and Critically Eroded Beaches*

#### Blowing Rocks Beach, Martin County, R126-R127.4

This is a 0.2-mile segment of critically eroded beach on southern Jupiter Island, south of the Blowing Rocks Preserve public access in Martin County, where private development is threatened. Anastasia formation creates an exposed rock headland within the Preserve. The area south of the Preserve is subject to dynamic erosion and accretion cycles on the downdrift side of the rock headland. In response to the 2004 hurricanes, a dune restoration project was constructed in 2008. Hurricane Sandy in 2012 caused erosion to the dunes and repairs to the dune were necessary. The dune repair was completed in November of 2012 with the placement of 8,600 cubic yards (cy) that restored 1,100 feet of dune between R126-R127. In addition, roughly 200 cy of sand was placed within the seaward edge of the dune along each of the nine properties in that area. Due to impacts from Hurricanes Matthew (2016) and Irma (2017), a dune restoration project was completed in December 2017, which placed roughly 4,800 cy of sand as a truck haul project to repair losses to the dune. The upper limits of the dune for both the 2012 and 2017 projects were re-vegetated with sea oats. To address losses sustained from Hurricane Dorian (2019) the Town reconstructed the dune at Blowing Rocks Beach in the winter 2020/2021 with the amount of 6,048 cy placed between R126 and R127.5. Due to erosion from

Hurricane Nicole (2022), the Town conducted dune restoration (above mean high water) and placed 5,427 cy between R126.2 to R127.5 under the State Emergency Order. The dune work was completed in December 2022 with the sand being trucked from an upland sand mine.

**Strategy:** Maintain dune project and monitor.

**Coral Cove Park, Tequesta and Jupiter Inlet Colony, Palm Beach County, R1-R10**

This is a 1.5-mile segment of critically eroded beach on southern Jupiter Island in Palm Beach County. It includes the communities of Tequesta and Jupiter Inlet Colony. A dune restoration project was completed within the boundaries of Coral Cove Park in 1989. Another dune restoration project was completed in Coral Cove Park (R5-R7.6) in 1993, using sand trucked to the site from an upland source. Discrete segments of armoring have been constructed along private developments in Tequesta. This area was severely impacted by Hurricanes Frances and Jeanne in 2004. Following the 2004 hurricane season, emergency protective berms were constructed in 2005 using funds from FEMA, and again in 2012 using state and local funds after the passage of Hurricane Sandy. Additional dune restoration was completed in 2014 and 2022, with 25,900 cy and 42,160 of upland sand on the dune. Due to significant erosion from waves generated by Hurricane Nicole (2022), an emergency dune restoration was completed in 2023, with 36,000 cy of sand placement. The Town developed a resolution in July 2026 to submit a local government funding request to the Department to conduct a feasibility study for the purpose of examining their eroded shoreline conditions and erosion control alternatives for restoring the shoreline between R8.7 to R12 (Jupiter Inlet).

**Strategy:** Conduct a feasibility study; maintain dune project and monitor.

**Jupiter Inlet, Palm Beach County, R12-R13**

Jupiter Inlet is maintained by the Jupiter Inlet District. The 0.8 mile of inlet shorelines to the north and south of Jupiter Inlet have been designated as critically eroded. The sediment impoundment basin located within the navigation channel is routinely dredged to a depth of -20 ft NGVD, with the sand placed on the downdrift beach south of the inlet. The placement area (R12-R19) is within the same template as the Jupiter-Carlin project (discussed below) limits. The Department adopted the Jupiter Inlet Management Study Implementation Plan in October 1997 that established an annualized bypassing objective of 75,000 cy. In 1999, the crests of both north and south jetties were raised, the south jetty was extended seaward, and the sediment impoundment basin was expanded as recommended in the adopted plan. 214,067 cy of sand was dredged from the inlet sediment

impoundment basin in 2021 and placed between R13 to R19. This link contains more information about the Jupiter Inlet District projects and history. See the department's Annual Inlet Report for inlet bypassing numbers since 1997. The Jupiter Inlet District initiated an inlet study with the Department in January 2023 to update their sediment budget and to update their inlet management plan. The study was completed by the consultant in April 2024 and consequently the Department developed an updated Jupiter Inlet Management Plan in July 2025 based upon the inlet study.

**Strategy:** Comply with the strategies of the updated IMP (2025) that are the following:

1) A comprehensive beach and inlet hydrographic monitoring program shall be conducted to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget. Beach and nearshore surveys between DEP Range/Reference Monuments R-1 and R-28 shall be collected. Periodic inlet hydrographic surveys should be collected to include the inlet channel, the sand trap and the ebb and flood shoals in their entirety.
2) Sand bypassing shall be performed from the Jupiter Inlet System to the adjacent Atlantic-fronting beaches to the south of the inlet between the south jetty near DEP range/reference survey monuments R-13 and R-19. The quantity of material to be bypassed shall be based on available navigation channel and sand trap deposition quantities documented through the monitoring protocol of Strategy #1 above and the target bypassing identified in Strategy #3 below.
3) On an average annual basis, the initial target inlet sand bypassing quantity at Jupiter Inlet shall be 81,000 cy per year to the south. This target quantity may be modified or updated based on a minimum of four years of additional monitoring data indicating a change in the sediment budget.
4) The source of sediment for meeting the target bypassing quantities in Strategy #3 shall be the Jupiter Inlet sand trap and adjacent interior channels, or as otherwise authorized by permit. The Jupiter Inlet flood shoal complex may be considered for further geotechnical and engineering design and permitting and implementation to develop an environmentally acceptable project as a potential sand source. Acceptable beach quality sand may also be obtained from upland sand mines or offshore sources to achieve the target sand bypassing quantities.
5) The north and south jetties shall be repaired and maintained as necessary to ensure their continued functioning as sediment management components of the Jupiter Inlet.

**Jupiter/Carlin, Palm Beach County, R12-R19**

This is a 1.1-mile segment of critically eroded beach between Jupiter Beach Park and Carlin Park that is partially in the area of influence of Jupiter Inlet. The federal General Design Memorandum was

approved in 1994, and the project history for this segment of shoreline is described in Table 1. Construction of the federally authorized Jupiter/Carlin Shore Protection Project (R13-R19), also known as Segment I, was completed using sand from the ebb tidal shoal of Jupiter Inlet in April 1995. The project is authorized until 2039. The local sponsor is Palm Beach County. The project design consists of a beach berm at elevation +7.5 ft NAVD that constitutes seven years of advance nourishment to protect the existing dune and upland development. The project includes construction of 3.5 acres of artificial reef to mitigate for adverse impacts to ephemerally exposed nearshore hardbottom. The project generally met its performance goal of protecting the dune, and upland property, except in the Jupiter Beach Park, which experienced severe erosion.

After the 1995 restoration project, periodic placement of sand in the area coincided with maintenance dredging of Jupiter Inlet and the Intracoastal Waterway. The Jupiter Inlet District completed a 175-ft extension to the south jetty in 1998, possibly contributing to the migration of the erosion hotspot from Jupiter Beach Park south to Ocean Trail Condominium. The north jetty height and width were also increased. Beach nourishment was completed in March 2002, using sand from an offshore borrow site. A study to evaluate alternatives to address the erosional hotspot at Jupiter Beach Park was finalized in 2007. Dune restoration was completed in December of 2007 between R13-R17 to address damage from Subtropical Storm Andrea. The County completed a large-scale, non-federal dune maintenance project in January 2012, using 41,145 cy from an upland sand source. A dune maintenance project was completed in January 2013 to replace approximately 6,100 cy lost during Hurricane Sandy. Prior to the next federal nourishment, a federal Section 934 report was required to evaluate economic feasibility of the project. The report was fully approved in 2019.

The project received Flood Control and Coastal Emergencies (FCCE) funding to repair damage sustained during Hurricane Sandy. In conjunction with the federal repair project that placed 132,638 cy of sand, the local sponsor conducted a supplemental local project that placed 282,084 cy from an upland sand source. Construction of the federal project began in February 2014 but was delayed until the following winter. The federal project was completed in January 2015, and the local project was completed in March 2015. Together, the two projects placed a total volume of 423,084 cy on the beach. An additional 45,300 cy of dredged material from the inlet sand trap was placed on the beach. The Intracoastal Waterway and inlet sand trap were dredged again in 2017, which placed a total of 102,068 cy on the beach. The Department issued a major permit modification in 2018 to incorporate dune restoration between R19 and R26, and to include the Juno Beach Nourishment Project under a single authorization. The project will be referred to as the **Jupiter/Carlin Shore Protection Project**

(**Segment I)**. Beach nourishment occurred again at the Jupiter/Carlin segment by placing 421,564 cy of material from an offshore borrow source. Construction was completed in January 2020. The 2021/2022 Jupiter/Carlin nourishment project placed 409,711 cy of material between R13 - R19.

**Table 1.** Jupiter/Carlin Shore Protection Project (Segment I) history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| April 1995 | 604,000 | Ebb Tidal Shoal | R13-R19 | 1.1 |
| 1995 | 2,000 | Sand Transfer – trucked from R75 | R13-R13.5 and R18-R18.5 | 0.3 |
| 1997 | 31,540 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 1999 | 85,000 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2000 | 156,200 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| 2001 | 82,900 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| March 2002 | 625,000 | Offshore | R13-R19 | 1.1 |
| 2002 | 164,000 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| 2004 | 172,115 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| 2005 | 78,000 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2006 | 65,670 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2008 | 194,771 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| 2009 | 64,721 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2010 | 43,391 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2011 | 124,591 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| January 2012 | 41,145 | Upland | R13-R19 | 1.1 |
| 2012 | 30,805 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| January 2013 | 6,100 | Upland | Between R13-R19 | 0.4 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2013 | 162,258 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| January 2014 | 4,000 | Offshore | Between R13-R19 | 0.4 |
| 2014 | 128,284 | Inlet Sand Trap and IWW | R13-R16.5 | 0.6 |
| January 2015 | 141,000 | Offshore | R13-R15.5 | 0.4 |
| March 2015 | 282,084 | Upland | R15.5-R19 | 0.7 |
| April 2015 | 45,333 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2016 | 61,699 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| March 2017 | 191,127 | Inlet Sand Trap and IWW | R14-R16.5 | 0.4 |
| 2018 | 52,751 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| 2019 | 27,896 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| January 2020 | 421,564 | Offshore | R13-R19 | 1.1 |
| March 2021 | 123,220 | Inlet Sand Trap | R13-R16.5 | 0.6 |
| December 2021 | 409,711 | Offshore | R13-R19 | 1.1 |
| 2022 | 71,330 | Inlet Sand Trap | R13-R15.5 | 0.4 |
| March 2023 | 173,531 | Inlet Sand Trap and IWW | R14-R16.5 | 0.4 |
| 2024 | 127,780 | Inlet Sand Trap | R13-R16.5 | 0.6 |
| April 2025 | 104,573 | Inlet Sand Trap | R15.5-R16.5 | 0.2 |

**Strategy:** Maintain the project through monitoring and nourishment.

**Town of Jupiter, Palm Beach County, R19-R26**

This is a 1.5-mile segment of critically eroded beach that is partially within the area of influence of Jupiter Inlet. No projects have been conducted in this segment of critically eroded beach. Nourishment projects at Jupiter/Carlin have provided a degree of stability to the shoreline in this segment through longshore transport of fill. Despite this updrift littoral supply, the shoreline in this

segment has continued to retreat. During a period of high seas in 2015, multiple dune crossovers were damaged or destroyed and the dunes were severely impacted, increasing the vulnerability of the State Road A1A, a hurricane evacuation route. The first county dune project placed approximately 3,308 cy of sand from an upland sand source in February 2016 to restore the dune from 230 ft north of R20 to 300 ft north of R21 to increase storm protection for upland infrastructure. The department issued a major permit modification in 2018 and in 2025 to the Jupiter Carlin Beach Nourishment Project to incorporate beach and dune restoration between R19 and R26 (Segment II) and to include the Juno Beach Nourishment Project under a single authorization. The project is referred to as the **North County Comprehensive Shore Protection Project, Segment II** within the Town of Jupiter. The county conducted a feasibility study to evaluate various shoreline protection alternatives. The second dune restoration project in 2019 placed 4,935 cy of material between R20 to R21 to repair damage from Hurricane Irma (2017). The third dune restoration was completed in February 2020 between R19.8 to R21. The county completed a fourth dune restoration in April 2022, with the placement of approximately 27,595 cy of upland sandy material along with the placement of salt tolerant plants between R19 and R26 to repair the dune erosion damages from Hurricane Dorian (2019). The feasibility study has been completed, and the selected alternative suggests a limited beach nourishment project would benefit this critically eroded area. The county plans to construct a beach restoration project in 2026/2027 between R21.3 and R25.9.

**Strategy:** Design and construct a beach nourishment project; monitor and maintain the dune restoration project.

**Juno Beach, Palm Beach County, R26-R38**

This is a 2.4-mile segment of critically eroded beach. The project history for this segment of shoreline is described in Table 2. The local sponsor is Palm Beach County. Initial construction of the **Juno Beach Nourishment Project, Segment III** (R26-R38) was completed in 2001 using 1,500,000 cy of sand obtained from an offshore borrow area. The project restored the beach berm at +9 ft NGVD and provided additional fill material equivalent to six years' advance nourishment. A physical and environmental monitoring program was also required. The first nourishment for this segment was completed in April of 2010 with 916,192 cy of sand from an offshore borrow area.

The project initially required construction of 4.47 acres of artificial reef to mitigate for adverse impacts to 3.77 acres of nearshore hardbottom. Construction of the mitigation reef was completed in 2002. However, post-construction aerial photography showed unanticipated coverage of hardbottom.

The county proposed to construct an additional 0.75 acre within a permitted nearshore placement area near Singer Island to mitigate for the unintended impacts. Limestone rock boulders and experimental prefabricated reef modules were used in the reef design. The secondary impact mitigation was completed in 2011. The current permitted beach berm elevation is +7.5 feet NAVD, with an average berm width of 200 feet. The Department issued a major permit modification in 2018 to the Jupiter/Carlin Beach Nourishment Project to incorporate dune restoration between R19 and R26 and to include the Juno Beach Nourishment Project (Segment III) under a single authorization. Beginning in 2020, a beach nourishment project was completed again in February 2021 that placed 1.03 million cy of material between R26 and R38. The next nourishment is expected to place approximately 603,000 cy of offshore material onto Juno Beach in 2026/2027.

**Table 2.** Juno Beach Nourishment Project (Segment III) history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| March 2001 | 1,500,000 | Offshore Borrow Site | R26-R38 | 2.4 |
| April 2010 | 916,192 | Offshore Borrow Site | R26-R38 | 2.4 |
| February 2021 | 1,030,000 | Offshore Borrow Site | R26-R38 | 2.4 |
| April 2027 | 603,000 | Offshore Borrow Site | R26-R38 | 2.4 |

**Strategy:** Maintain the project through monitoring and nourishment.

**Singer Island, Palm Beach County, R60.5-R69**

This is a 1.7-mile segment of critically eroded beach on Singer Island. The project history for this segment of shoreline is described in Table 3. The local sponsor is Palm Beach County. A large rock outcrop (R67) influences littoral sand transport and the width of the beach at Ocean Reef Park (R67-R68). North of the rock outcrop, erosion of the dune bluff threatens upland structures. Beginning in 2000, the county placed sand along the eroded dune bluff to protect upland structures. The Department and the county initiated the first phase of a feasibility study of coastal erosion control structures in March 2001. Preliminary findings were inconclusive. An additional feasibility study was concluded in 2005, recommending the placement of beach erosion control structures. The county began permitting activities to construct 14 offshore breakwaters between R61-R68 in 2006. The project was modified to 11 breakwaters due to concerns of downdrift impacts. The breakwater design did not receive initial approval from regulatory agencies. An alternatives

analysis was completed in July 2010, and a submerged breakwater design was proposed. The project was permitted by the Department, but it was not pursued by the county. Since 2013, eight upland property interests have constructed seawalls to armor approximately 3,400 linear feet. A dune restoration project for a new segment was authorized under a CCCL permit in 2015. The truck haul project was completed in April 2016 that placed approximately 11,822 cy of sand. Additional projects were completed in 2017 and 2022, with placement of 54,829 cy and 31,543 cy of sand on the dune. Due to significant erosion from waves generated by Hurricane Nicole, an emergency dune restoration was completed in 2023, with approximately 36,600 cy of sand placed. The next dune restoration project is expected to place approximately 38,070 cy between R60.6 to R66.8 along Singer Island's shoreline.

**Table 3.** Dune maintenance events at Singer Island.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2000-2001 | 10,000 | Upland | R60.5 to R69 | 1.7 |
| 2003-2004 | 13,000 | Upland | R60.5 to R69 | 1.7 |
| 2004-2005 | 56,000 | Upland | R60.5 to R69 | 1.7 |
| 2005-2006 | 30,000 | Upland | R60.6 to R63.5 | 0.5 |
| 2006-2007 | 49,338 | Upland | R60.5 to R69 | 1.7 |
| 2007 Emergency Placement | 49,955 | Upland | R60.5 to R65.5 | 1.0 |
| 2007-2008 | 50,697 | Upland | R60.5 to R65.5 | 1.0 |
| 2010-2011 | 30,313 | Upland | R60.5 to R65.5 | 1.0 |
| 2012-2013 | 55,581 | Upland | R60.5 to R65.5 | 1.0 |
| 2014-2015 | 46,803 | Upland | R60.5 to R65.5 | 1.0 |
| 2015-2016 | 11,822 | Upland | R65.5 to R66.8 | 0.3 |
| 2016-2017 | 54,829 | Upland | R60.7 to R66.9 | 1.2 |
| 2021-2022 | 31,543 | Upland | R60.6 to R66.8 | 1.3 |
| 2023 Emergency Placement | 36,600 | Upland | R60.6 to R66.8 | 1.3 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2026/2027 | 38,070 | Upland | R60.6 to R66.8 | 1.3 |

**Strategy:** Maintain the dune project and monitor; reevaluate beach erosion control alternatives.

***Regional Strategies for Beach and Inlet Management***

**Sponsors and Funding**

Palm Beach County, the local sponsor of both the Jupiter-Carlin Park and Juno Beach projects, constructed the Jupiter-Carlin Park project with reimbursement funding provided by the Department. Palm Beach County decided not to seek federal participation in the Juno Beach project to shorten the time between the planning phase and project construction. Palm Beach County's Shoreline Protection Plan, dated 2014, highlights the County's initiatives to preserve and manage its coastline. The Department also participates with Jupiter Inlet District on inlet management activities at Jupiter Inlet and with Palm Beach County on dune construction projects. Project cost estimates and schedules may be found in the Beach Management Funding Assistance Program-Long Range Budget Plan.

**Project Coordination**

Regionalization is the funding and coordination of multiple beach 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. Coordination of maintenance dredging of Jupiter Inlet and the adjacent Atlantic Intracoastal Waterway with maintenance of the Jupiter-Carlin project.

2. Jointly soliciting bids for the nourishment of the Jupiter-Carlin Park and Juno Beach projects with other projects in the region.

3. A regional beach, inlet and offshore data collection and processing program to be used by the local sponsor for project monitoring is recommended.

**Environmental Protection**

The protection of marine turtles and hardbottom/reef habitat are the primary environmental concerns

within this subregion. Sensitive areas for shorebirds include Blowing Rocks Preserve and John D. MacArthur State Park. Sensitive areas for beach mice include Coral Cove Park, Jupiter Beach Park, Carlin Park, Juno Dunes Natural Area, and John D. MacArthur Beach State Park. Within those sensitive areas, natural communities identified as primary and secondary dunes as well as scrub dunes, back dunes, coastal scrub and or coastal strand all provide essential habitat for beach mouse populations. Additionally, primary dunes and secondary dunes that occur on private lands are important for resilience of those developed lands and sustaining wildlife populations and should be maintained or restored. These areas can be subject to change as conditions change, and coordination with FWC shorebird staff and the FWC regional species conversation biologist for the FWC region where the project is occurring is encouraged during project development. The projects have been designed and implemented to avoid or minimize adverse impacts to marine turtles and hardbottom and reef habitat. The timing of construction activities has been restricted during the sea turtle nesting season of March 1 through October 31. Some parts of Palm Beach County reported record nesting events for 2015. Artificial reefs have been constructed as mitigation to offset adverse impacts to nearshore hardbottom caused by the Jupiter-Carlin and Juno Beach projects.

**Sand Sources**

Due to the fact that there are limited sand resources existing in state waters in Southeast Florida, the Department and the United States Army Corps of Engineers (USACE) completed the Sediment Assessment and Needs Determination (SAND) study. This study was conducted in a collaborative manner, and it was reviewed by and vetted through all the participating stakeholders. The SAND study indicates that the regional offshore supply of sand in state and federal waters is more than adequate to meet the volumetric needs of all the beach nourishment projects in the five southeastern coastal counties - St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade - for the next 50 years (through 2062), according to Ousley et al. (2014). Subsequently, the Department analyzed the need for sand over the next 10 to 20 years for the five southeastern counties and determined that approximately 20 to 30 million cy will be needed for beach nourishment projects. Due to the narrow continental shelf adjacent to Florida's southeastern shoreline, it is expected that some counties may need to look for sand resources in upland sand mines and/or offshore borrow sites in neighboring counties. Miami-Dade County has already initiated this process.

Coordination is recommended between the Department, the USACE, BOEM (Bureau of Ocean Energy Management), and Local Governments to use best management practices with these offshore

resources. For additional information on sand sources, the Department manages a database named the Regional Offshore Sand Source Inventory (ROSSI).

**Additional Information**

The introduction of the state's Strategic Beach Management Plan provides additional background information on the Department's Beach Management Programs and includes overviews of:

- The principles and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida inlets
- 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
- Beaches, Economics and Tourism

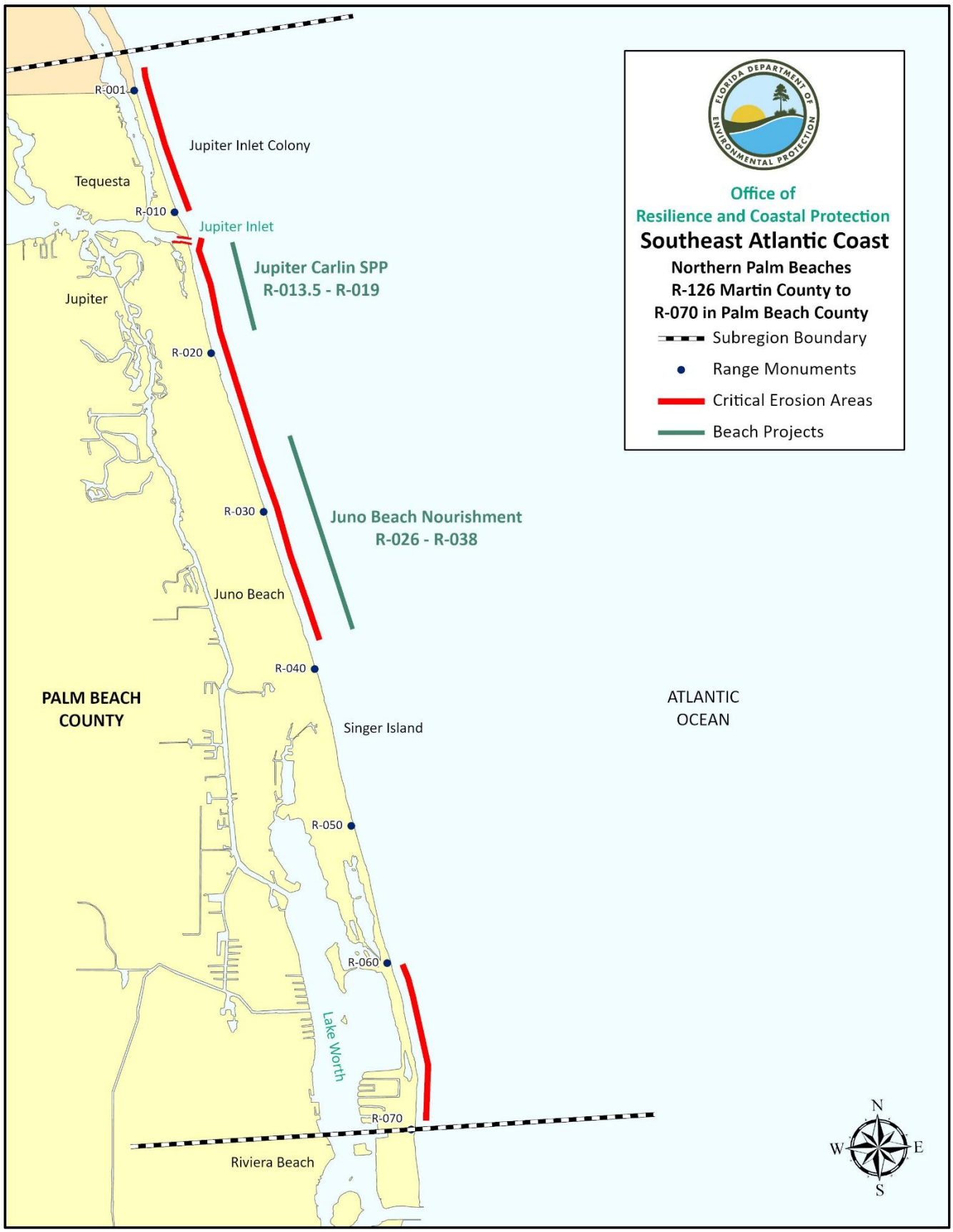


**Figure 1.** Map of Northern Palm Beaches subregion of the Southeast region of Florida. View an interactive map.

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## *Palm Beaches*

There are 20.7 miles of beach in the **Palm Beaches** subregion, which extends from Palm Beach Shores (R70) on Singer Island to Gulfstream (R170) in Palm Beach County, as shown on Figure 2. There are 17.5 miles of critically eroded beaches in this subregion, 8.2 miles of which have been restored or maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes, and the effects of Lake Worth Inlet and South Lake Worth Inlet. The most erosive storms occurring in past years were Hurricane David (1979), the Thanksgiving Day Northeaster of 1984, Hurricane Irene (1999), Hurricanes Frances and Jeanne (2004), Hurricane Wilma (2005), Subtropical Storm Andrea (2007), October northeasters (2007), Hurricane Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016), Hurricane Irma (2017), Hurricane Dorian (2019), and Hurricane Nicole (2022).

### *Strategies for Inlets and Critically Eroded Beaches*

#### Lake Worth Inlet, Palm Beach County, R75-R76

Lake Worth Inlet, part of the federal **Palm Beach Harbor Navigation Project**, is periodically dredged to maintain a navigation channel depth of -35 ft MLLW. The channel is dredged typically every one or two years, and the sand is placed either on the downdrift beach within 3,000 ft of the south jetty or in a permitted nearshore location. A sand transfer plant, maintained by the Town of Palm Beach and operated by Palm Beach County, was constructed on the north jetty in 1958 by the USACE. A settling basin north of the north jetty was built by the USACE between 1958 and 1968. The south jetty received repairs along with sand tightening in 1986. The sand transfer plant bypasses sand to the downdrift beach immediately south of the south jetty. The sand transfer plant continued to function until 1990 until it became inactive for six years due to a rusted transfer pipe. The sand transfer plant was upgraded in 1995 with a more powerful engine and pump, and in May 1996 began to function again. The Department adopted the Lake Worth Inlet Management Study Implementation Plan in 1996, but a bypassing objective was not established at that time.

A sediment budget study completed in 2000 recommended bypassing an average annual volume of 202,000 cy to the downdrift beaches. This volume was bypassed through the downdrift placement of material dredged from the navigation channel and operation of the sand transfer plant. The USACE completed a navigation study in May 2001 that recommended sand-tightening the north and south

jetties, construction of a larger sediment impoundment basin, and renovation of the existing sand transfer plant to include a new motor, flood-proofing, and a southerly extension of the discharge pipeline. The study recommended that Palm Beach County design and construct the sand transfer plant with reimbursement funding from the federal government. In February 2003, design and permitting for sand-tightening of the jetties was completed and the construction was completed later in 2003. The Department issued a joint coastal permit (JCP) authorizing expansion of the settling basin on the north side of Lake Worth Inlet in 2006. The USACE expanded the sediment impoundment basin on the northern side of the channel seaward of the north jetty in 2007. Lake Worth Inlet project activities receive regional sediment management (RSM) support by the USACE to manage the sediments in a manner that maximizes natural and economic opportunities for the coastal system. The Town of Palm Beach constructed a 3.1-acre artificial reef in 2004 to address anticipated impacts from the settling basin expansion. During the 2004 hurricane season, the sand transfer plant was damaged and became inoperable. To reestablish sediment bypassing, repair of the facility was completed in March 2005 using FEMA emergency funds. Sand bypassing was suspended between August and December of 2009 to begin a full rehabilitation of the sand transfer plant. The rehabilitation was completed in April 2010. In October 2012, the sand transfer plant was damaged again by Hurricane Sandy and was rendered inoperable until September 2013. Palm Beach Harbor/Lake Worth Inlet was dredged in 2016 with placement of 164,816 cy of beach quality sand between R76 and R78, and again the Palm Beach Harbor was dredged in February 2018 with placement of 237,923 cy of beach quality sand between R76 and R79.5. The sand bypass plant and maintenance of the inlet channel is included within the Beach Management Agreement (BMA) with the Town. The USACE completed dredging in March 2023 in the amount of 251,811 cy. See the Department's Annual Inlet Report for inlet bypassing numbers.

**Strategy:** Bypass an average annual volume of 202,000 cy of sand to the downdrift beaches through a combination of the operation of the sand transfer plant and beach placement of maintenance dredge material from the federally authorized navigation channel; place all beach compatible material dredged during channel maintenance on downdrift beaches in Reach 1, in an extended beach placement in Reach 2, and when feasible, at the Mid-Town and Phipps Ocean Park projects; dredging placement should be limited to dry beach; extension of the discharge pipeline to discharge points located at the south jetty, and approximately 3,600 ft south of the south jetty; comply with the Palm Beach Island Beach Management Agreement (BMA), 2013 and updated in 2021; monitor; update the sediment budget and an inlet management plan.

**Town of Palm Beach, Palm Beach County, R76-R134.4**

This is a 12.2-mile segment of critically eroded beach where erosion is attributed to the effects of Lake Worth Inlet as far south as R92.5, approximately 18,480 ft/3.5 miles from the Inlet. Most of this shoreline is armored with seawalls, bulkheads, and revetments. There are also numerous relics and functional groins. The Town of Palm Beach is the local sponsor for projects in this area. The area has been divided into eight reaches (Reaches 1 through 8). In 2001, the Palm Beach Island Feasibility Study was initiated for three areas including Reach 2, Reach 5, and Reach 8, to identify beach nourishment alternatives. Efforts underway in Reaches 2, 3, 4, 5, 7, and 8 are discussed below.

On September 26, 2013, a pilot Beach Management Agreement (BMA) was signed to promote regionalization and incorporate cell wide management of Palm Beach Island and was updated in 2021. The cell on Palm Beach Island consists of 15.7 miles of beach and is between Lake Worth Inlet at R76 and South Lake Worth Inlet at R151. The BMA includes the Lake Worth Inlet maintenance dredging placement, the Mid-Town project, Phipps Project, groin maintenance and rehabilitation, and dune work throughout the island. The BMA incorporates net ecosystem benefits such as annual hardbottom, turtle and physical monitoring throughout the cell, retrofitting and minimizing outfalls that release waters onto the coastal system, and improved inlet management practices. The BMA is a perpetual and adaptively managed agreement that is reviewed annually, with a more detailed review completed every five years. The Mid-Town beach nourishment project, as well as interim sand placement in Reach 7 and dune restoration in Reach 8, were constructed in 2015. The Phipps Ocean Park Beach Nourishment project, including dune restoration in Reaches 3 and 8, was constructed in 2016. See a BMA introductory presentation or to see a map and description of the different Reaches (1 through 11), see pages 6 and 7 of the BMA.

**Reach 1** (R76-R78.5) is a 0.5-mile segment of critically eroded shoreline. This area is directly south of Lake Worth Inlet in the Town of Palm Beach. This project area is maintained by inlet sand bypassing. Sandy material is bypassed to this project area on an annual basis. Recent bypass activities have indicated a deficit of sandy material reaching the settling basin on the north side of Lake Worth Inlet. To view Lake Worth Inlet's inlet sand bypassing activities, please see the Department's Annual Inlet Report.

The Town of Palm Beach has indicated it will investigate why this sand deficit is occurring at the settling basin with goals of improving the annual bypassing objectives. Palm Beach Harbor/Lake Worth Inlet was dredged in 2016 with placement of 164,816 cy of beach quality sand between R76

and R78. Palm Beach Harbor was dredged in February 2018 with placement of 237,923 cy of beach quality sand between R76 and R79.5. The Harbor was dredged again in December 2019 with placement of approximately 75,140 cy of beach quality sand between R76 and R79. The USACE conducted maintenance dredging in 2022 that placed approximately 285,570 cy between R76.3 to R79 on Palm Beach Island. To see additional information on the Town of Palm Beach coastal projects, view the Town's coastal project webpage.

**Reach 2** (R78.5-R90.4) is a 2.5-mile segment of critically eroded shoreline. This area includes the beach between Onondaga Avenue and El Mirasol in the Town of Palm Beach. The Mid-Town beach restoration project was recommended based upon studies conducted in association with the Lake Worth Inlet Management Plan to reestablish littoral transport and to mitigate the effects of the inlet.

Restoration in Reach 2 has not been conducted due to the vicinity of nearshore hardbottom and lack of public access. Future beach management alternatives may include construction of a sand bypassing discharge pipe from the Lake Worth Inlet sand transfer plant and rehabilitation or removal of derelict groins.

The **Palm Beach County Shore Protection Project**, **Mid Town Segment, also known as Reach 3, (R90.4-R95) and Reach 4 (R95-R102.3),** are in a 2.6-mile segment of critically eroded shoreline in the Town of Palm Beach. The project history for this segment of shoreline is described in Table 4. In December 1995, restoration of the Reach 4 segment was completed using 880,000 cy of sand from an offshore borrow site located south of Lake Worth Inlet ebb shoal. The project included construction of eleven groins that were completed in April 1996. The beach fill design restores a 25-foot-wide beach at elevation +9 ft NGVD and provides eight years of advance nourishment to offset future erosion losses. The restoration maintained a beach berm along most of the project length during the nourishment interval but experienced significant erosion at the north and south limits of the project. In February 2003, the project was expanded (R90.4-R101.4) to include a restoration in Reach 3 and a nourishment in Reach 4. The expanded beach fill template included two segments (R90-R94) and (R95-R101). The gap between the two fill templates was intended to avoid potential impacts to artificial nearshore hardbottom. The 2004 hurricane season caused significant beach erosion to the project, and, in 2005, FEMA provided emergency funding to replace the lost sand. Nourishment of the project was performed in 2006 and restored the beach to the design template. A physical and environmental monitoring program documented secondary impacts because of sand burial on nearshore hardbottom. Consequently, construction of artificial reef as mitigation for secondary impacts was required.

Reconstruction of six T-groins along the Mid-Town headland (R93.7-R95) was completed in 2012 to protect upland properties along part of the gap area between the two beach fill segments. To improve and continue the concept of protecting upland properties along the Mid-Town headland area three detached breakwaters with a peak elevation between 5.3 ft. to 6.3 ft. (NAVD 88) were constructed near the R-95 area in 2024/2025. The Town constructed an expanded Mid-Town Project in 2015 that extended the project northward to R89 into Reach 2 and southward to R100 into Reach 4, placing approximately 966,587 cy of offshore material on the beach. The dunes of Reach 3 (R91-R93) received 14,958 cy of trucked stockpile material from the Phipps offshore borrow area in April 2016. A small dune restoration project, approximately 6,000 cy, and a groin were constructed in May 2018 near Gulfstream Road (R- 99). Beach nourishment occurred again and was completed in May 2020 that included federal participation for the first time by the USACE, which covered 50 percent of the cost of approximately 838,650 cy of offshore material placed between R89 and R102. The Town nourished the beach again in early 2026 with placement of approximately 500,105 cy of offshore material between R92.1 to R102. To see additional information on the Town of Palm Beach coastal projects, view the Town's coastal project webpage.

**Table 4.** Mid-Town (Reach 3 and 4) beach nourishment project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| December 1995 | 880,000 | Offshore | R95-R100 | 1.0 |
| February 2003 | 1,273,100 | Offshore | R90.4-R101.4 | 2.2 |
| February 2006 | 918,320 | Offshore | R90.4-101.4 | 2.1 |
| March 2011 | 52,000* | Upland | R95-R100 | 1.0 |
| April 2015 | 966,587 | Offshore | R89-R100.6 | 2.5 |
| April 2016 | 14,958 | Offshore – SP* | R90-R93 | 0.6 |
| May 2018 | 6000 | Upland | R99 | 0.1 |
| May 2020 | 838,650 | Offshore | R89-R102 | 2.8 |
| 2022 | 11,700 - dune | Offshore – SP* | R99-R102 | 0.6 |
| May 2026 | 500,105 | Offshore | R92.1-R102 | 2.2 |

*FEMA dune restoration in March 2011. SP* represents stockpiled material from the Reach 7 Project that used an offshore borrow site for the dune restoration in Reach 3 or 4 in April 2016 and in 2022.

**Reach 5** (R102.3-R110.1) is a 1.7-mile segment of critically eroded beach between Banyan Road and Widener's Curve in the Town of Palm Beach. Much of the shoreline along this segment is hardened by seawalls and revetments with no significant public access. Restoration has not been conducted along this segment. Future beach management alternatives may include rehabilitation or removal of derelict groins. The Town submitted a JCP permit application in July 2026 requesting to nourish a 1.1-mile segment of shoreline between R102 to R106.9 with an approximate volume of 369,000 cy of sandy material. The construction schedule for this beach nourishment project has not been determined.

**Reach 6** (R110.1-R116.5) is a 1.3-mile segment of critically eroded shoreline in the Town of Palm Beach. This shoreline segment has remained stable due to the downdrift effects of the Mid-Town nourishment projects that have provided a sediment source for both Reaches 5 and 6.

The **Phipps Ocean Park Beach Restoration Project, also known as Reach 7,** (R116.5-R128.5) is a 2.3-mile segment of critically eroded shoreline in the Town of Palm Beach. In 2002, the design of an extended project (R116-R126) was completed and permitted by the Department. Issuance of the final federal permit was delayed pending completion of an Environmental Impact Statement (EIS) required by a settlement agreement from an administrative hearing challenging construction of the project. The project was subsequently reduced in length (R119-R126) and volume. The 2006 project restored 1.4 miles of beach at elevation +7.5 ft NAVD using 1.1 million cy of sand and added the construction of a dune from 450 ft south of R116 to R119, and from R126 to R133.6 (excluding Lake Worth Pier Park). The beach fill design provided eight years of advance nourishment to offset future erosion. The project included construction of 3.1 acres of artificial reef to mitigate adverse impacts to 3.1 acres of ephemerally exposed nearshore hardbottom. Another 0.8-acre deep-water mitigation reef was completed in 2006 as a federal requirement for the project. This area experienced erosion during the 2008 storm season. Construction of a FEMA dune repair project using 56,000 cy from an upland sand source was completed in March 2011. Dune nourishment projects have been conducted to replace some of the sand losses. In January and February 2015, the Town constructed a beach nourishment project by placing approximately 68,814 cy of upland material above the mean high-water line within the Phipps project template. Reach 7 received an additional 1,022,318 cy in 2016 from an offshore borrow site. Nourishment occurred again in May 2021 with placement of approximately 19,000 cy of material between R116 and R119. The offshore material in the amount of 495,000 cy was placed between R118.6 to R124.8 in 2021. A small dune restoration project was constructed with 11,700 cy of material between R99 to R101. The next nourishment was completed in January 2025 with the approximate

placement of 750,000 cy of material between R118.8 to R126. See project history in Table 5.

**Table 5.** Phipps Ocean Park (Reach 7) Beach Nourishment Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2006 | 1,100,000 | Offshore | R119-R126 | 1.4 |
| March 2011 | 56,000* | Upland | R116.5-R125 | 1.7 |
| February 2015 | 68,814 | Offshore | R116.5-R121 | 0.9 |
| April 2016 | 1,022,318 | Offshore | R116.5-R127 | 2.1 |
| May 2021 | 19,000 - dune | Offshore–SP* | R116-R119 | 0.6 |
| May 2021 | 495,000 | Offshore | R118.6-R124.8 | 1.2 |
| January 2025 | 750,000 | Offshore | R118.8-R126 | 1.4 |

*FEMA dune restoration in March 2011. *(SP) Stockpiled material of the Reach 7 Project that used an offshore borrow site for the dune project.

**Reach 8** (R128.5-R134.1) is a 1.4-mile shoreline segment in the Town of Palm Beach with an approximate 800 ft gap along the City of Lake Worth and the City's Municipal Pier area (R128.0-R128.8). The project segments between T125 and R128 and R128.8 through R134.1 are designated critically eroded. The Lake Worth Pier Park recreational area is not designated critically eroded (R128 -R128.8). A permit application for beach restoration was denied in July 2009, based upon the recommendation of an administrative law judge following an administrative hearing challenging the Department's Intent to issue a permit. The segment continued to experience erosion through storms and northeasters. Dune nourishment projects have been conducted to replace some of the sand losses.

However, the segment has been combined in an environmental impact study along with the county's South Palm Beach Island Restoration Project. Dune restoration was conducted in 2006 and 2011 with the placement of approximately 25,000 cy of material placed on the dune each year. Dune restoration was completed again in April 2015 by placing approximately 34,902 cy on the dune. Of the total volume, 18,540 cy were excavated from the existing beach, and the remaining 16,362 cy were excavated from the dredge sand stockpile from offshore material. The dunes of Reach 8 (R129-R134) received an additional 8,466 cy of trucked stockpile material from the Phipps offshore borrow area in April 2016 between R129 and R134. The dunes of Reach 8 (R129-R134) and Reach 9 (R134-R137) received an additional 23,297 cy of trucked stockpile material from the Phipps offshore borrow area in May 2021. See the project history in Table 6. The Town obtained a JCP permit in 2025 from the Department to restore the beach in Reach 8 and is expected to be constructed in 2026/2027. To see

additional information on the Town of Palm Beach coastal projects, view the Town's coastal project webpage.

**Table 6.** Reach 8 and Reach 9 Beach and Dune Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2006 | 25,000 | Upland | R129-R134 | 1.0 |
| 2011 | 25,000 | Upland | R129-R134 | 1.0 |
| April 2015 | 34,902 | Beach & Offshore | R129-R134 | 1.0 |
| April 2016 | 8,466 | Offshore – SP* | R129-R134 | 1.0 |
| May 2021 | 23,297 | Offshore – SP* | R128-R138 | 1.0 |

*(SP)Stockpiled material from Reach 7 that used an offshore borrow site for the dune restoration in Reach 8 and 9.

**Strategy:** Maintain the Town's restored projects through monitoring and nourishment using sand from offshore sources and upland sources; construct a feeder beach to reestablish littoral transport for Reach 2; maintain erosion control structures in Reach 4; construct restoration projects in environmentally suited areas of Reach 5 and Reach 8; comply with BMA (anticipated to be updated in 2026).

**Southern Palm Beach, Lantana and Manalapan, Palm Beach County, R134.1- R145.8**

The **Southern Palm Beach Island Comprehensive Shoreline Stabilization Project**, (formerly the South Palm Beach Island Restoration Project) has 2.3 miles of critically eroded beach along the shoreline of the Towns of South Palm Beach, Lantana, and Manalapan. The local sponsors are Palm Beach County with 0.67 miles (R134.1-R137.4) of project area and the Town of Palm Beach with 1.24 miles (R128.8-R134.1) of project area in Reach 8 (listed in section above). The project areas are listed in the BMA and are known as Reaches 9 and 10, as described on page 7 in Table 2 of the BMA. The critical erosion area (R134.1-R145.8) is slightly shorter in length than the project area, as listed in the BMA. The project has experienced severe erosion and has received six dune restoration projects.

In October 2012, Hurricane Sandy inflicted severe beach erosion and structural damage along 1.4 miles (R138.4-R145.8) of coastline at Manalapan. The entire segment is now designated critically eroded. Most of the project is armored by bulkheads and revetments, some of which were compromised during storms and other significant erosion events. Damage to the dune and the threat to upland structures at Lantana Public Beach resulted in the construction of a sheet pile wall at this

location in 2009. Palm Beach County completed a feasibility study in 2008 to assess beach management alternatives. The selected project from the study was beach restoration with coastal erosion control structures to reduce the volume of fill material and thereby reduce adverse effects to extensive nearshore hardbottom. An interlocal agreement was executed between the Town of Palm Beach and Palm Beach County in 2013 to incorporate a 4,378-ft segment of the Reach 8 shoreline in the Town of Palm Beach into a consolidated EIS study for the project area. The EIS study includes a design consisting of both sand fill and seven low-profile king-pile groins with a fill frequency of every 3 years to minimize the potential for downdrift impacts. The results of all the modeling alternatives were included in the Final EIS, published by the Corps in June 2016. The Notice of Intent to Issue was issued by the Department in January 2019, but the County withdrew the permit application shortly thereafter due to concerns about funding the project.

**Strategy:** Conduct dune restoration where economically and environmentally feasible; determine environmentally acceptable designs for beach restoration; comply with BMA (anticipated to be updated in 2026).

**South Lake Worth Inlet, Palm Beach County, R151-R152**

South Lake Worth Inlet (also known as Boynton Inlet) is a man-made inlet managed by Palm Beach County. A sand transfer plant was constructed in 1937 on the north jetty to bypass sand to the downdrift beach south of the inlet. Strong tidal currents prevent shoaling of the channel, which has a hard rock bottom at a nominal depth of -12 ft NGVD. A sediment impoundment basin (sand trap) is located along the south side of the interior entrance channel. The Department adopted the South Lake Worth Inlet Management Study Implementation Plan in March 1999, which established an annualized bypassing objective of 88,000 cy of sand, including a minimum of 60,000 cy of sand bypassed by the sand transfer plant.

An engineering study was completed in July 2001 that identified design parameters and provided cost estimates to reconstruct the sand transfer plant. Construction was completed in August 2002 on an expansion of the sand trap, as recommended in the adopted inlet management plan. Construction of a new sand transfer plant in 2009 included upgrading the engine from diesel to electric and increasing the size of the discharge pipe. This work was intended to improve the efficiency of the bypassing system at the inlet as recommended in the 1999 adopted inlet management plan. Dredging of the sand trap was completed in the winter of 2015. Seagrass pre-mitigation for future expansion of the sand trap was completed in 2014. Palm Beach County worked on an updated inlet study in 2020/2021. The

Department adopted an updated South Lake Worth Inlet Management Plan in September 2022. The fixed sand transfer plant located on the updrift jetty bypasses 100% of the sand trapped by the jetty, and strategy # 3 from updated IMP describes the goal of a minimum average annual bypass of 70,000 cy by the transfer plant. See the Department's Annual Inlet Report for inlet bypassing numbers.

**Strategy:** Comply with the four strategies of the updated IMP of 2022:
1) A comprehensive beach and inlet hydrographic monitoring program shall be conducted to evaluate the performance and impact of any sand bypassing and nourishment projects, and to periodically update the inlet sediment budget. Beach and nearshore surveys between FDEP Reference Monuments R-146 and R-159 shall be conducted. Periodic inlet hydrographic surveys to include the inlet channel and the ebb and flood shoals should also be conducted.
2) Sand bypassing shall be performed from the inlet system to the adjacent Atlantic- fronting beaches to the south of the inlet between the south jetty near FDEP Reference Monument R-152 and R-159. The quantity of material to be bypassed shall be based on available quantities documented through the monitoring protocol of Strategy #1 above and the target bypassing identified in Strategy #3 below.
3) On an average annual basis, the initial target inlet sand bypassing quantity shall be 115,000 cubic yards per year to the south with a minimum of 70,000 cubic years per year from the bypassing plant. This target quantity may be modified or updated based on a minimum of four years of additional monitoring data indicating a change in the sediment budget.
4) The sources of sediment for meeting the target sand bypassing quantities in Strategy #3 shall be the beach north of the inlet accessible to the sand transfer plant, maintenance dredging of the navigation channel, and the authorized sediment impoundment basin or as otherwise authorized by permit. A flood shoal dredging alternative may be considered for further geotechnical and engineering design and permitting to develop an environmentally acceptable project with suitable quality sediment. Acceptable beach quality sand may also be obtained from inland sand mines and offshore sources to achieve the target sand bypassing quantities.

**Ocean Ridge, Palm Beach County, R152-R168**

The **Ocean Ridge Beach Nourishment Project** is within a 3.3-mile segment of critically eroded beach that is partially within the area of influence of South Lake Worth Inlet. The project is within the limits of the Town of Ocean Ridge, but the local sponsor is Palm Beach County. The project is authorized until 2039 and has a 6-year nourishment interval. The project history for this segment of

shoreline is described in Table 7. In April 1998, construction of the federally authorized **Ocean Ridge Beach Nourishment Project** (R152-R159) was completed along 1.4 miles of beach using 784,300 cy of sand from a borrow site located 2,100 ft offshore of the project area. The project included construction of eight groins. The project restored a beach berm at elevation +9 ft NGVD and provided six years of advance nourishment (assuming a minimum of 60,000 cy of sand is bypassed annually by the inlet sand transfer plant). The project included construction of 2.0 acres of artificial reef to mitigate for adverse impacts to 2.0 acres of nearshore hardbottom. A physical and environmental monitoring program was conducted to verify the predicted impacts to nearshore hardbottom. Through 2004, the project met its performance goal of preserving a beach berm to the design parameters. This area sustained impacts during the 2004 hurricane season. The USACE provided emergency funding to accelerate the maintenance nourishment and replace the material lost to storms. Construction of the nourishment project (R153-R159) was completed in December 2005 along 1.1 miles of beach using 558,000 cy of sand from the same offshore borrow site. The 2005 nourishment project excluded the R152-R153 project limits since the sand transfer plant maintained the beach in the groin field, and to avoid additional coverage of the hardbottom areas located to the north of the project area (between R152 and R153) near the groin field. Environmental monitoring of the restoration project indicated additional impacts occurred because of the 1998 project beyond the 2.0 acres of predicted impacts. Consequently, Palm Beach County constructed 2.25 acres of artificial reef to mitigate these impacts. The project was nourished in 2014 by placement of 503,690 cy of sand. The stems of the south five T-head groins (groins 4 through 8, are located south of the sand transfer plant's discharge pipe) at Ocean Ridge were reduced in elevation from +7.5 ft NAVD 88 to +4.5 ft NAVD 88 to increase littoral drift. The project was nourished again in 2020 with placement of 463,928 cy of sandy material between R153 to R159. The next project event was nourished again in early 2026 with placement of approximately 500,000 cy of sandy material between R153 to R159.

**Table 7.** Ocean Ridge Beach Nourishment Project history

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1998 | 784,300 | Offshore | R152-R159 | 1.4 |
| 2005 | 558,000 | Offshore | R153-R159 | 1.1 |
| 2014 | 503,690 | Offshore | R153-R159 | 1.1 |
| March 2020 | 463,928 | Offshore | R153-R159 | 1.1 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| April 2026 | 500,000 | Offshore | R153-R159 | 1.1 |

**Strategy:** Maintain the project through inlet bypassing, monitoring and nourishment using sand from offshore sources.

***Regional Strategies for Beach and Inlet Management***

**Sponsors and Funding**

There are two federally authorized beach erosion control projects that provide for federal cost sharing in Palm Beach County: a 1958 authorization for beach restoration and nourishment of Palm Beach Island, including construction and operation of a sand transfer plant at Lake Worth Inlet, and a 1962 authorization for beach restoration and nourishment of the remainder of the county. The Town of Palm Beach, the local sponsor of the Mid-Town Beach and Phipps Ocean Park projects, is not seeking federal participation in the costs of these projects, based upon the additional administrative expenses required to obtain a relatively small percentage of federal cost sharing. Palm Beach County, the local sponsor of the Ocean Ridge project, constructs the project with reimbursement funding provided by the state and federal government. Palm Beach County's Shoreline Protection Plan, dated 2014, highlights the county's initiatives to preserve and manage its coastline. Project cost estimates and schedules may be found in the Beach Management Funding Assistance Program-Long Range Budget Plan.

**Project Coordination**

Regionalization is the funding and coordination of multiple beach 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. Palm Beach County has been actively coordinating the management of inlets within this subregion with the USACE. The Town of Palm Beach has made an agreement with the USACE to place dredged material from the maintenance of the Lake Worth Inlet navigation channel at the Mid-Town Beach project. The Ocean Ridge beach restoration project is designed to use sand transferred by the plant at South Lake Worth Inlet to maintain the beach between nourishment events. A regional beach, inlet, and offshore data collection and processing program are recommended to be used by the project sponsors in their monitoring programs.

**Environmental Protection**

The protection of marine turtles and hardbottom habitat are the primary environmental concerns within this subregion. Sensitive areas for shorebirds include the Town of Palm Beach immediately south of the Lake Worth Inlet. These areas are subject to change as conditions change, and coordination with FWC shorebird staff is encouraged during project development. The projects have been designed and implemented to avoid or minimize adverse impacts to marine turtles and hardbottom habitat. The timing of construction activities has been restricted during the marine turtle nesting season of March 1 through October 31. Artificial reefs were constructed as mitigation to offset adverse impacts to nearshore hardbottom caused by the Ocean Ridge project and the Phipps Ocean Park project, and secondary impacts that were assessed resulting from the Mid Town project. Environmental Impact Statements will be prepared during the design phase of all projects selected from the Palm Beach Island Feasibility Study.

**Sand Sources**

Since there are limited sand resources existing in state waters in Southeast Florida, the Department and the USACE completed the Sediment Assessment and Needs Determination (SAND) study. This study was conducted in a collaborative manner, and it was reviewed by and vetted through all the participating stakeholders. The SAND study determined that the regional offshore supply of sand in state and federal waters is more than adequate to meet the volumetric needs of all the beach nourishment projects in the five southeastern coastal counties - St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade - for the next 50 years (through 2062), according to Ousley et al. (2014). Subsequently, the Department analyzed the need for sand over the next 10 to 20 years for the five southeastern counties, and it was determined that approximately 20 to 30 million cy will be needed for beach nourishment projects. Due to the narrow continental shelf adjacent to Florida's southeastern shoreline, it is expected that some counties may need to look for sand resources in upland sand mines and/or offshore borrow sites in neighboring counties. Miami-Dade County has already initiated this process.

Coordination is recommended between the Department, USACE, BOEM and local governments to use best management practices with these offshore resources. For additional information on sand sources, the Department manages a database named the Regional Offshore Sand Source Inventory (ROSSI).

**Additional Information**

The introduction of the state's Strategic Beach Management Plan provides additional background information on the Department's Beach Management Programs and includes overviews of:

- The principles and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida inlets
- 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
- Beaches, Economics and Tourism

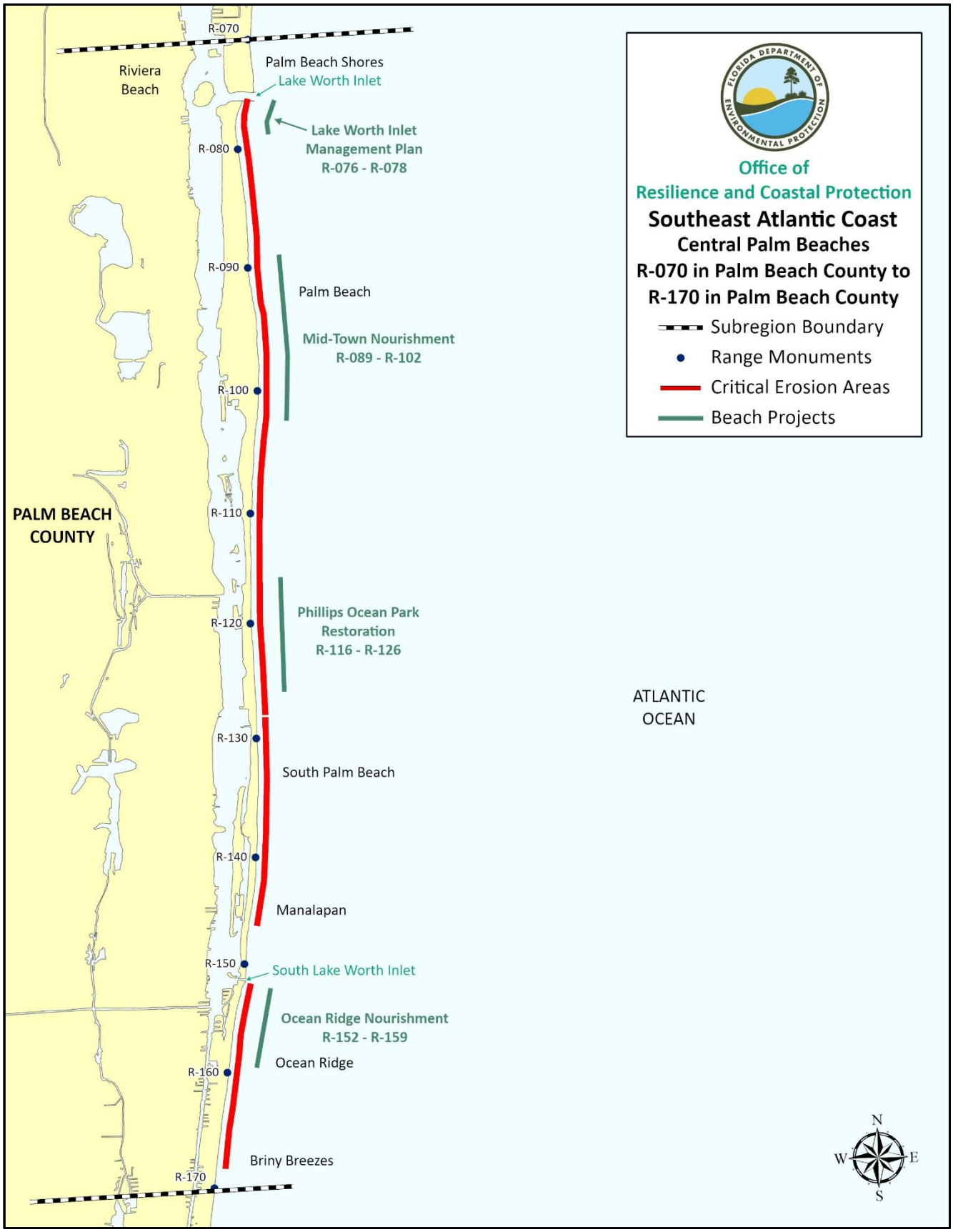


**Figure 2.** Map of Palm Beaches subregion of the Southeast region of Florida. View an interactive map.

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## *Southern Palm Beaches*

There are 11.8 miles of beaches in the **Southern Palm Beaches** subregion, which extends from Gulfstream (R170) to the Palm Beach – Broward County line, as shown on Figure 3. There are 7.9 miles of critically eroded beaches in this subregion, of which 6.7 miles have been restored or maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes, and the effects of Boca Raton Inlet. The most erosive storms occurring in past years were Hurricane Irene (1999), Hurricane Frances and Jeanne (2004), Hurricane Wilma (2005), Subtropical Storm Andrea (2007), October northeasters (2007), Tropical Storm Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016), Hurricane Irma (2017), and Hurricane Nicole (2022).

### *Strategies for Inlets and Critically Eroded Beaches*

#### Delray Beach, Palm Beach County, R176-R190

In July 1973, construction of the federally authorized **Delray Beach Shore Protection Project** (R175- R188) was completed on this 2.9-mile segment of critically eroded beach using sand from an offshore borrow area. The project is authorized until 2023, but the authorization has been extended till 2029. The project history for this segment of shoreline is described in Table 8. The project restored a beach berm at elevation +9 ft NGVD and provided six years of advance nourishment. In addition to the restoration, nine nourishments have been made by the City of Delray Beach. Beginning with the 1992 beach nourishment project, the design interval between beach nourishment events increased to eight years. The project has exceeded its performance goal of preserving a beach berm through the eight-year nourishment interval. This area was eroded during the 2004 hurricane season. The USACE provided emergency funding to replace the material lost to the 2004 storms, and construction of the emergency nourishment project was completed in 2005. Beach nourishment was conducted in 2013 and again in 2014 due to erosion caused by Hurricane Sandy. Hurricane Irma caused erosion in 2017, and storm repair nourishment occurred in 2020 with placement of 364,400 cy of material between R184.5 to R188.5. Hurricane Nicole caused significant erosion in 2022. To address storm damages and restore the full permitted beach template, the Delray Beach segment of the Palm Beach County Shore Protection Beach Renourishment Project was completed in 2026, with placement of approximately 1,353,996 cy of offshore material between R-175+330’ and R-190+200’.

**Table 8.** Delray Beach Shore Protection Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| July 1973 | 1,634,500 | Offshore | R175.4-R188 | 2.6 |
| May 1978 | 701,300 | Offshore | R176-R182 and R186-R188 | 1.7 |
| October 1984 | 1,311,000 | Offshore | R175.5-R188 | 2.6 |
| December 1992 | 1,196,500 | Offshore | R180-R188.5 | 1.8 |
| April 2002 | 1,230,000 | Offshore | R179-R188A | 1.9 |
| April 2005 | 250,000 | Offshore | R175.5-R188 | 2.6 |
| April 2013 | 1,158,500 | Offshore | R179-R188A | 1.9 |
| April 2014 | 381,200 | Offshore | R175.4-R180 | 1.0 |
| March 2020 | 364,400* | Offshore | R184.5-R188.5 | 0.8 |
| April 2026 | 1,353,996 | Offshore | R175.3-R190.2 | 3.0 |

*Storm repair – Hurricane Irma.

**Strategy:** Maintain the project through monitoring and nourishment using sand from offshore or upland sources.

**Boca Raton, Palm Beach County, R204-R223**

This is a 4.0-mile segment of critically eroded beach in the City of Boca Raton. Beach restoration and nourishment have been conducted within a portion of this area. The project history for this segment of shoreline is described in Table 9. In August 1988, construction of the federally authorized **North Boca Raton Shore Protection Project** (R205-R212) was completed using sand from an offshore borrow site. The north segment of the project is authorized until 2038. The local sponsor is the City of Boca Raton. The project restored the beach berm at elevation +7.4 ft NAVD 88 and provided ten years of advanced nourishment. The project included construction of six artificial reef modules as mitigation for impacts to nearshore hardbottom and a rock groin to protect the nearshore hardbottom known as Red Reef Rock. In April 1998, beach nourishment was completed and no additional impacts to nearshore hardbottom were indicated by environmental monitoring; however, continued physical and environmental monitoring was conducted to measure the effects of the project. The project met its

performance goal of preserving a beach berm through the ten-year nourishment interval. This area was eroded during the 2004 hurricane season. In 2006, the design and permitting of a maintenance nourishment event was initiated. Construction of the second nourishment was completed in March 2010. The third nourishment, initiated in spring 2014 and completed in December 2014, was constructed in coordination with the federal Hurricane Sandy storm repair. The most recent nourishment was completed in April 2020, with placement of 566,900 cy from the Boca Raton offshore borrow site in response to Hurricane Matthew (2016) with the USACE using FCCE funds.

**Table 9.** North Boca Raton Beach Nourishment Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| August 1988 | 1,100,000 | Offshore | R205-R212 | 1.5 |
| April 1998 | 680,000 | Offshore | R205-R212 | 1.5 |
| March 2010 | 782,200 | Offshore | R205-R212 | 1.5 |
| December 2014 | 561,600 | Offshore | R205-R212 | 1.5 |
| April 2020 | 566,900 | Offshore | R205-R212 | 1.5 |

In April 2004, construction of the **Central Boca Raton Beach Nourishment Project** (R216-R222) was completed using a borrow site located 2,500 ft offshore. The local sponsor of the project is the City of Boca Raton. The project history for this segment of shoreline is described in Table 10. The project restored the beach berm at an elevation of +7.4 ft NAVD 88 and provided eight years of advance nourishment along 1.5 miles of shore using 747,000 cy of sand. The project included construction of a groin 1,500 ft north of the Boca Raton Inlet to stabilize a highly erosional area and reduce the spreading loss of fill material into the inlet. The north jetty was reconstructed, and the weir was relocated 50 ft seaward to accommodate for the nourishment and extension of the MHW line. This area was eroded during the 2004 hurricane season. A maintenance nourishment event to refill the template was completed in March 2006 using sand from the Boca Raton Inlet ebb shoal that placed 325,000 cy on the beach. The first nourishment project commenced in March 2016 and ceased construction in April 2016 due to sea turtle nesting season. The Project then re-commenced in February 2017 and completed construction in March 2017 with a total placement of 514,000 cy. The next nourishment is planned for FY 2028/2029.

**Table 10.** Central Boca Raton Beach Nourishment Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| April 2004 | 747,000 | Offshore | R-216 to R-222 | 1.5 |
| March 2006 | 325,000 | Ebb Shoal | R-216 to R-222 | 1.5 |
| March 2017 | 514,000 | Offshore | R-216 to R-222 | 1.5 |

**Strategy:** Maintain the North and Central projects through monitoring and nourishment using sand from offshore sources; monitor the remaining critically eroded beach located between the north and central project portions of Boca Raton.

**Boca Raton Inlet, Palm Beach County, R222-R223**

This inlet is maintained by the City of Boca Raton. A city-owned hydraulic dredge transfers sand from the inlet channel to the downdrift beach south of the inlet to maintain an average channel depth of approximately -6 ft MLW. The Department adopted the Boca Raton Inlet Management Study Implementation Plan in 1997 that established an annualized bypassing objective of 71,300 cy, which has been achieved. The Department and local sponsor initiated a study in October 2002 to update the inlet sediment budget and validate the bypassing objective and inlet management practices. In 2004, the bypassing objective was revised and increased to 83,000 cy per year, which was formally adopted in the 2008 SBMP. The bypassing objective is achieved through a combination of maintenance dredging using the city-owned dredge and nourishment of downdrift beaches using the inlet ebb shoal as a borrow source. In conjunction with the Central Boca Raton Beach Restoration Project, the weir in the north jetty was relocated 50 ft seaward. The north jetty, which was damaged in the 2004 hurricane season, was rehabilitated in 2008. The Department conducted a regional sediment budget analysis in 2015 and determined the inlet sand bypassing activities have balanced the sediment budget of Boca Raton Inlet and Hillsboro Inlet with the adjacent beaches. It is recommended that biennial, synoptic surveys of the beaches and inlets be conducted to develop an updated sediment budget. The city continues to perform on-going maintenance dredging of the inlet bypassing of sand to the southern beaches of inlet. The city completed maintenance on the north jetty on September 2021 with placement of limestone rock within the original jetty footprint to restore the structure to an elevation of +5 ft. NAVD 88. From July 2021 to June 2022, the city has bypassed a total of 22,100 cy to the South Inlet Park beach. The city dredged in 2023 and bypassed approximately 55,500 cy from the inlet channel to the South Boca Raton beach. To see additional bypass volumes for Boca Raton Inlet,

see the Department's Annual Inlet Report.

**Strategy:** Through a combination of mechanical sand bypassing by the city-owned dredge and nourishment of the South Boca Raton project using the ebb shoal as a borrow source, bypass sediment to downdrift beaches to meet an annualized bypassing objective of 83,000 cy; update the sediment budget and the inlet management plan; evaluate options of beach placement locations at South Boca Raton Beach, Deerfield Beach and Hillsboro Beach.

**South Boca Raton, Palm Beach County, R223-R227.9**

This is a 1-mile segment of critically eroded beach in the City of Boca Raton. The project history for this segment of shoreline is described in Table 11. The local sponsor is the City of Boca Raton. In July 1985, the construction of the non-federal **South Boca Raton Beach Nourishment Project** was completed using sand from the ebb tidal shoal of Boca Raton Inlet. The project restored a beach berm at elevation +8.4 ft NAVD 88 and consists entirely of advance nourishment to maintain the historic 1975 shoreline position and to serve as a feeder beach that bypasses sand to the downdrift shore. Subsequent nourishment in 1996 and 2002 also used the ebb tidal shoal. The length of the 2002 project was extended to the south county line and is the current project limit. Construction of 2.4 acres of artificial reef was completed in 2002 to mitigate for adverse impacts to 2.4 acres of nearshore hardbottom from the 1996 and 2002 project. The third nourishment was completed in March 2010. Significant erosion occurred in October 2012 due to Hurricane Sandy, and the fourth nourishment was completed in 2013. An interim project was constructed in 2017 in response to impacts from Hurricane Matthew.

The project design specifies a six-year interval between nourishment events. A physical and environmental monitoring program is being conducted. The project has met its performance goal of preserving a beach berm seaward of the 1975 shoreline through the nourishments and inlet sand bypassing to the downdrift shore. A collaborative beach nourishment project was recently completed in April 2023 with a total approximate placement of 389,000 cy of inlet ebb shoal material on the beaches in the City of Boca Raton, City of Deerfield Beach and the Town of Hillsboro Beach between R223.3 in Palm Beach County down to R12.4 in Broward County. Of the 411,343 cy of dredged material from the ebb shoal, the City of Boca Raton south beaches received approximately 209,643 cy between R223.3 to R227.9 in 2023. An additional amount of 55,500 cy was dredged by the city that was bypassed from the inlet channel to the South Boca Raton beach. The next nourishment is planned for FY 2029/2030.

**Table 11.** South Boca Raton Beach Nourishment Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| July 1985 | 221,000 | Ebb Shoal | R223.3-R225.6 | 0.6 |
| December 1996 | 220,000 | Ebb Shoal | R223.3-R225.6 | 0.6 |
| April 2002 | 343,000 | Ebb Shoal | R223.3-R227.9 | 0.96 |
| March 2010 | 183,800 | Ebb Shoal | R223.3-R227.9 | 0.96 |
| December 2013 | 168,900 | Ebb Shoal | R223.3-R227.9 | 0.96 |
| March 2017 | 134,100 | Ebb Shoal | R223.3-R227.9 | 0.96 |
| April 2023 | 209,643 | Ebb Shoal | R223.3-R227.9 | 1.0 |

**Strategy:** Maintain the project through monitoring and nourishment using inlet channel and ebb shoal material.

***Regional Strategies for Beach and Inlet Management***

**Sponsors and Funding**

Two federally authorized Beach Erosion Control Projects in Palm Beach County provide for federal cost sharing, although most of the county projects are federally authorized: Palm Beach Island between the Lake Worth and South Lake Worth Inlets was authorized in 1958 and the remainder of the county projects north of Lake Worth Inlet and south of South Lake Worth Inlet were authorized in 1962. The City of Delray Beach constructs its project with reimbursement funding provided by the state and federal government. In 1991, USACE federal participation in the Delray Beach project was extended to 50 years following completion of initial construction. The City of Boca Raton constructs the North Project with reimbursement funding provided by the state and federal government but has not sought federal funds for the Central or South projects. Palm Beach County has participated with the municipalities in the collection and processing of monitoring data in this subregion. Palm Beach County's Shoreline Protection Plan, dated 2014, highlights the county's initiatives to preserve and manage its coastline.

Project cost estimates may be found in the Beach Management Funding Assistance Program-Long Range Budget Plan.

**Project Coordination**

Regionalization is the funding and coordination of multiple beach 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. Jointly soliciting bids for the nourishment of Delray Beach and Boca Raton beach segments.
2. A regional monitoring data collection and processing program to be used by the local sponsors for project monitoring required by permits.
3. Studying bypassing alternatives at Boca Inlet with the Towns of Deerfield Beach and Hillsboro Beach in Broward County.

**Environmental Protection**

The protection of marine turtles and hardbottom habitat are the primary environmental concerns within this subregion. Sensitive areas for shorebirds include Boca Raton beaches. These areas are subject to change as conditions change, and coordination with FWC shorebird staff is encouraged during project development. The timing of construction is restricted during the marine turtle nesting season of March 1 through October 31. Project design and method of construction are restricted to avoid or minimize adverse impacts to marine turtles and hardbottom habitat. Artificial reefs were constructed as mitigation to offset impacts to nearshore hardbottom caused by the North and South Boca Raton projects. A physical and environmental monitoring program is being conducted to verify the expected effects of the projects.

**Sand Sources**

Geophysical and geotechnical investigations took place in 2003-2006 for the North Boca Raton Beach Nourishment Project to prepare for the 2010 nourishment event. Upon completion of the 2016/2017 Central Boca Raton Beach Nourishment Project, the City of Boca Raton depleted all permitted and viable offshore sand resources for the North and Central segments. The city later conducted a geotechnical sand search in 2018 that assisted with developing new offshore borrow sites between R190 and R193 and further described in the issued JCP permit (0261499-11-JM) of

January 2019. The new borrow sites are titled BA IV, BA V, and BA VI in the permit sketches.

Since there are limited sand resources existing in State waters in Southeast Florida, the Department and USACE completed the Sediment Assessment and Needs Determination (SAND) study. This study was conducted in a collaborative manner, and it was reviewed by and vetted through all the participating stakeholders. The SAND study indicates that the regional offshore supply of sand in state and federal waters is more than adequate to meet the volumetric needs of all the beach nourishment projects in the five southeastern coastal counties - St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade - for the next 50 years (through 2062), according to Ousley et al. (2014). Subsequently, the Department analyzed the need for sand over the next 10 to 20 years for the five southeastern counties and determined that approximately 20 to 30 million cy will be needed for beach nourishment projects. Due to the narrow continental shelf adjacent to Florida's southeastern shoreline, it is expected that some counties may need to look for sand resources in upland sand mines and/or offshore borrow sites in neighboring counties. Miami-Dade County has already initiated this process.

Coordination is recommended between the Department, USACE, BOEM and local governments to use best management practices with these offshore resources. For additional information on sand sources, the Department manages a database named the Regional Offshore Sand Source Inventory (ROSSI).

**Additional Information**

The introduction of the state's Strategic Beach Management Plan provides additional background information on the Department's Beach Management Programs and includes overviews of:

- The principles and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida inlets
- 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
- Beaches, Economics and Tourism

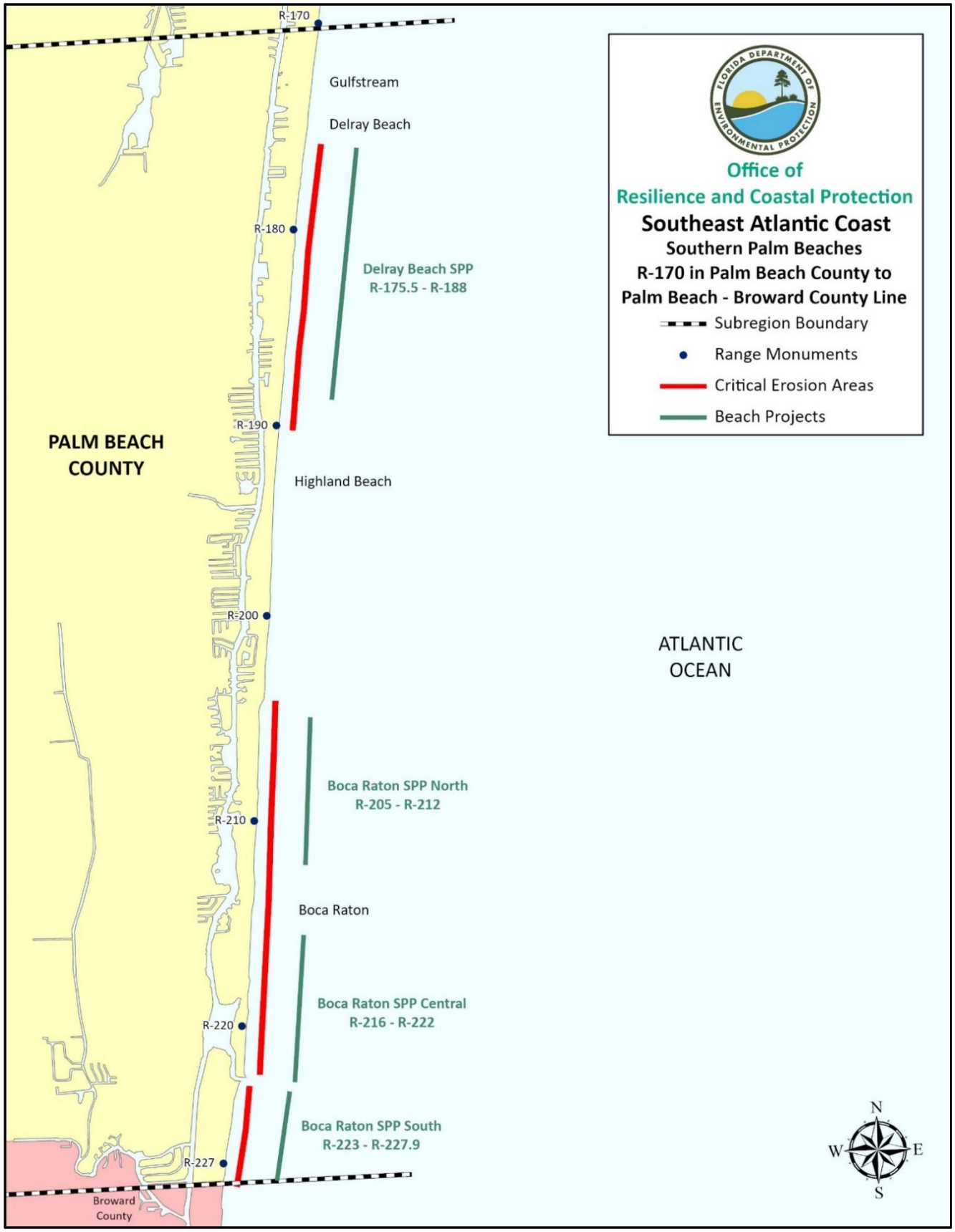


**Figure 3.** Map of Southern Palm Beaches subregion of the Southeast region of Florida. View an interactive map.

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## *Broward – Miami-Dade Beaches*

There are 38.9 miles of beaches in the **Broward through Miami-Dade Beaches** subregion, which extends from the Palm Beach-Broward County line (R1) to Government Cut, in Miami-Dade County (R74.4), as shown on Figure 4. There are 21.3 miles of critically eroded beaches in Broward County, of which 13.8 miles are restored and maintained. There are 14.5 miles of critically eroded beaches in this subregion of Dade County, of which 13.4 miles are restored and maintained.

Erosion is attributed to frequent winter northeasters, occasional tropical storms and hurricanes, and the effects of Boca Raton Inlet, Hillsboro Inlet, Port Everglades Entrance Channel, and Bakers Haulover Cut. The most erosive storms in recent years were Hurricane Andrew (1992), Hurricane Wilma (2005), Subtropical Storm Andrea (2007), October northeasters (2007), Tropical Storm Noel (2007), Hurricane Sandy (2012), Hurricane Matthew (2016), Hurricane Irma (2017), and Hurricane Dorian (2019).

### *Strategies for Inlets and Critically Eroded Beaches*

#### Deerfield Beach and Hillsboro Beach, Broward County, R3-R23

This is a 3.8-mile segment of critically eroded beach that includes south Deerfield Beach and Hillsboro Beach south to Hillsboro Inlet. The project history for this segment of shoreline is described in Table 12. Some armoring exists in Hillsboro Beach, and in Deerfield Beach there are fifty-seven groins comprised of king piles spaced approximately 100 ft. apart with rubble mounds acting as the "T" sections of the groins. Beach restoration and nourishment have been conducted along southern Deerfield Beach to northern Hillsboro Beach (R5-R12.5). The inlet sand bypassing activity at Boca Raton Inlet and material placed for the South Boca Raton project aids in maintaining the beach at northern Deerfield Beach, but the southern beaches of Deerfield Beach and northern beaches of Hillsboro Beach require nourishment. The southern portion of Hillsboro Beach is relatively stable but remains critically eroded. Segment I of Broward County is located between R1 (Northern Broward County Line) and R24 (Hillsboro Inlet), but a federal feasibility study has not yet been completed for this segment.

The initial 1972 non-federal beach restoration project at Hillsboro Beach (R7-R12) was constructed using sand from an offshore borrow site. The non-federal **Hillsboro Beach Nourishment Project** (R6- R12) was completed again in 1998, 2008/ 2009, 2011, 2015, 2018, 2020, 2023, and 2025. The

local sponsors are the City of Deerfield Beach and the Town of Hillsboro Beach. The original project design consisted of restoration of a 30-foot beach berm at an elevation of +9 ft NGVD plus beach fill equivalent to ten years of advance nourishment. The beach nourishment event in 1998 placed 555,000 cubic yards from an offshore borrow site along the project area. The 1998 project also included modifications to three existing groin structures at the south end of Deerfield Beach to improve project performance at the north end of the project. Significant material has been eroded from the beach berm along the northern 2,000 ft of Hillsboro Beach, and monitoring surveys demonstrated the highly erosional nature of this segment. The truck haul beach nourishment in 2008 placed a total of 10,350 cy at R7, and additional material was placed in Deerfield Beach due to Hurricane Wilma in 2008/2009. The beach nourishment event in 2011 placed 339,151 cy of material from an offshore borrow site on Hillsboro Beach. Nourishment was completed again in the spring of 2015, when 45,600 cy of upland material was placed on the beach. In 2018, upland material in the amount of 33,613 cy was placed between R6.6 and R9. Upland material was placed again in March 2020 with the approximate amount of 68,980 cy between R6.7 and R9.5. A collaborative beach nourishment project was recently completed in April 2023 with a total approximate placement of 389,000 cy of Boca Raton Inlet ebb shoal material on the beaches in the City of Boca Raton, City of Deerfield Beach and the Town of Hillsboro Beach between R223.3 in Palm Beach County down to R12.4 in Broward County. Of the 411,343 cy, the Deerfield and the Hillsboro beaches received approximately 201,700 cy between R5 to R12.5. The Hillsboro beaches received approximately 64,500 cy of upland material between R6.8 to R12 with the dune work being completed in March 2025. Since October 2020, Deerfield and Hillsboro jointly target a 5-year nourishment interval. These historical beach restoration and nourishment efforts have not been able to sufficiently mitigate the highly erosional nature of southern Deerfield Beach and northern Hillsboro Beach. Therefore, a permit application has been submitted to the Department in 2026 to update the beach fill template for the critically eroded beaches from R3 to R23.

**Table 12.** Deerfield Beach and Hillsboro Beach Nourishment Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| August 1972 | 360,000 | Offshore | R7-R12 | 1.0 |
| March 1998 [1] | 50,000 | Offshore | R6-R6.6 | 0.8 |
| March 1998 | 555,000 | Offshore | R6-R12 | 1.2 |
| June 2008 | 10,350 | Upland | R7 | 0.1 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2008 [1] | 8,314 (dune only) | Upland | R5-R6.6 | 0.3 |
| 2009 [1] | 7,378 | Upland | R2.7-R4.7 | 0.4 |
| April 2011 [1] | 12,364 | Offshore | R5.3-R6.6 | 0.3 |
| April 2011 | 339,151 | Offshore | R6.4-R-12.4 | 1.1 |
| April 2015 [1] | 24,980 | Upland | R6-R6.6 | 0.1 |
| April 2015 | 45,600 | Upland | R6.3-R7.7 | 0.2 |
| March 2018 | 33,770 | Upland | R6.8-R9 | 0.4 |
| March 2020 | 68,980 | Upland | R6.8-R9.5 | 0.5 |
| April 2023 | 201,700 | Boca Raton Inlet Ebb Shoal | R5-R12.4 | 1.4 |
| March 2025 | 64,500 | Upland | R6.8-R12 | 1.0 |

[1] Sand placement at Deerfield Beach – DFB, (Southern DFB in 2008 with 8,314 cy at SE 5th [R5] to SE 10th Street [R6.6] and (Northern DFB in 2009 with 7,378 cy at Pier [R-2.7] to SE 4th Street [R4.7]) due to Hurricane Wilma (2005) using FEMA funds.

**Strategy:** Maintain the project through monitoring and nourishment and in coordination with sand bypassing activities; conduct a feasibility study to clearly determine the causes of erosion and to develop design alternatives to address the erosion.

**Hillsboro Inlet, Broward County, R24-R25**

Hillsboro Inlet is a stabilized inlet maintained by the Hillsboro Inlet District. A district-owned hydraulic dredge transfers sand from the inlet channel and sediment settling basin to the downdrift beach south of the inlet. The Department adopted the Hillsboro Inlet Management Study Implementation Plan in September 1997. The plan established an annualized bypassing objective of 120,000 cy, which has been achieved. In December 2002, the District completed the expansion of the exterior entrance channel and excavation of a sediment impoundment basin within the channel to elevation -20 ft NGVD. The project included construction of 1.6 acres of artificial reef to mitigate adverse impacts to 0.4 acre of nearshore hardbottom. The Department conducted a regional sediment budget analysis in 2015 and determined the inlet sand bypassing activities have balanced the sediment budget of Boca Raton Inlet and Hillsboro Inlet with the adjacent beaches. It is recommended that biennial synoptic surveys of the beaches and inlets be conducted, and after the collection of sufficient data, a sediment budget then be prepared using a methodology from the USACE's Coastal

Engineering Manual. See the department's Annual Inlet Report for the annual inlet bypassing records.

**Strategy:** Continue to bypass sediment to downdrift beaches to meet an annualized bypassing objective of 120,000 cy; implement a physical monitoring program and update the sediment budget and the inlet management plan.

**Pompano Beach to Fort Lauderdale, Broward County, R25-R77**

This is a 10-mile segment of critically eroded beach partially within the area of influence of Hillsboro Inlet. It includes the communities of Pompano Beach, Sea Ranch Lakes, Lauderdale-by-the-Sea, and Ft. Lauderdale. Restoration and nourishment have been conducted within this segment, and the project history for this segment of shoreline is described in Table 13. Numerous bulkheads and retaining walls also exist along this stretch of coast. Minimizing or avoiding impacts to nearshore hardbottom may determine the feasibility and scope of beach restoration along remaining portions of the shoreline.

In 1970, restoration of Pompano Beach (R32-R49), **Segment II** of the USACE's federal **Broward County Shore Protection Project**, was completed using sand from an offshore borrow site. The project is authorized until 2026. The beach berm was constructed at elevation +9 ft NGVD and extended the 1970 MHW shoreline seaward by 134 ft.

In 1983, restoration and nourishment of Pompano Beach and Lauderdale-By-The-Sea (R25-R53) was constructed using sand from offshore borrow sites. The beach berm was constructed at elevation of +9 ft NGVD and extended the existing MHW shoreline seaward by 45 ft. The 1983 nourishment project provided storm protection during Hurricane Andrew, and the advance nourishment significantly exceeded the five-year performance expectation; however, nourishment is now needed to maintain storm protection and recreational benefits. Additional erosion occurred in this area during the 2004, 2005, and 2012 hurricane seasons.

Design and permitting were completed in 2004 for nourishment of Pompano Beach and Lauderdale-By-The-Sea (R36-R43), and restoration of northern Fort Lauderdale (R51-R72) (also collectively known as the **Broward County Shore Protection Project – Segment II**) that expected to use 935,000 cy of sand from offshore borrow sites. The project was never constructed. The Pompano Beach design specified a berm at elevation +9 ft NGVD that would extend the MHW shoreline 100 ft seaward of the Erosion Control Line plus additional fill material equivalent to six years of advance nourishment. The beach fill design for the Fort Lauderdale reach called for a 20-foot seaward

extension of the 1998 MHW shoreline plus fill material equivalent to six years of advance nourishment. The project plan included 3.0 acres of artificial mitigation reef for permanent coverage impacts to 2.5 acres of nearshore hardbottom. The Notice to Proceed was withheld for the Segment II project to evaluate the performance of the 2006 beach nourishment for the Segment III project and the results of the post-project monitoring of the nearshore hardbottom offshore of Broward County. The permit expired for Segment II prior to constructing this portion of shoreline.

Hurricane Sandy in 2012 contributed to significant erosion along most of the project shoreline and extensively damaged 2,000 ft of SR A1A (R-65- R-67), the area's only hurricane evacuation route that is within the project limits. A small 20,000 cy beach fill project was constructed seaward of the damaged portion of SR A1A to offer limited protection to the roadway in advance of the proposed restoration project, which utilized an upland sand source. Also, a seawall was constructed by FDOT seaward of A1A between R65 and R67 to improve protection to the roadway following Hurricane Sandy impacts.

Although this roadway continues to be vulnerable to coastal storm impacts, the seawall constructed by FDOT was designed to be sufficient to protect the road from a 25-yr storm event. Due to the impacts from Hurricane Sandy, a FCCE construction project in 2014 was completed using 130,000 cy of upland material to restore the storm losses above the mean high-water line (MHWL) along the Segment II project boundary.

The Department issued a new permit for the Segment II (R25-R85) project in January 2014. Project construction began in January 2016 when truck-hauled sand was placed on two beach segments located at R36 to R41.3 and R51 to R72 and included both beach and dune fill placement along 4.9 miles of critically eroded shoreline. The dune features include a crest width of 10 ft and a crest height of 11 ft NAVD. Also, the Segment II project in 2020 constructed 6.8 acres of artificial reef in the nearshore between R44 and R46 as mitigation for direct impact to 4.9 acres of nearshore hardbottom. The permit also required a hardbottom monitoring plan to measure unanticipated impacts that could occur from the project. The 2016 Segment II Shore Protection Project was completed in two segments with approximately 1 mile (R36-R41.3) of beach and dune restored by placing approximately 146,896 cy of upland sand in March 2016. The second segment of the project was completed in December 2016 after turtle season with placement of 546,348 from an upland mine. A mitigation reef was constructed in 2022. Nourishment was completed again in April 2022 with the placement of 414,730 cy of upland sand over 8.9 miles of shoreline between R25 and R72. The next nourishment is

planned for 2027/2028.

**Table 13.** Pompano Beach - Lauderdale-By-The-Sea - Ft Lauderdale Beach Nourishment (Segment II) Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1970 | 1,076,000 | Offshore | R32-R49 | 3.2 |
| 1983 | 1,900,000 | Offshore | R25-R53 | 5.4 |
| 2012 | 20,000 | Upland | R65-R67 | 0.4 |
| 2014 | 130,000 | Upland | R25-R49 | 4.5 |
| 2015 | 865 | Upland | R71 | 0.1 |
| March 2016 | 146,896 | Upland | R36-R41.3 | 1.0 |
| December 2016 | 546,348 | Upland | R51-R72 | 4.0 |
| April 2022 | 414,730 | Upland | R25-R72 | 8.9 |

**Strategy:** Maintain the project through monitoring and nourishment using offshore or upland sand source.

**Port Everglades Inlet, Broward County, R85-R86**

Port Everglades Inlet (also known as the Port Everglades Entrance Channel) is a man-made, federally maintained navigation project and the entrance to Port Everglades. The entrance channel depth is -45 ft MLW. Rock spoil from a 1962 excavation of the inlet entrance channel was placed in the nearshore north of the inlet and acts as a partial littoral barrier to shoaling of the navigation channel. The Department adopted the Port Everglades Inlet Management Study Implementation Plan in May 1999.

The 1999 plan was updated and replaced by the June 2018 Port Everglades Inlet Management Plan. The updated plan of 2018 established on an average annual basis a target bypassing objective of 41,700 cy. In 2002, design of a spur groin attached to the south jetty and two groins located on the shore south of the inlet (in lieu of breakwaters) was completed as recommended in the adopted inlet management plan. Construction was conducted as part of the 2005/06 Broward County Shore Protection Project - Segment III described below. The most recent maintenance dredging events have occurred in 2006, 2013 and 2021.

In 2004 the department and Broward County completed a feasibility study of structural improvements to facilitate inlet sand bypassing. This study recommended modifications to the north jetty, construction of a sediment impoundment basin, and removal of the rock spoil located north of the inlet as recommended in the inlet management plan. Preliminary engineering was initiated in 2006 to refine the recommendations of the feasibility study, and a JCP application was submitted in 2008. However, the application was withdrawn, and the project was redesigned to address the blasting concerns of property owners immediately adjacent to the project and inlet. To address these concerns, a new application was submitted to the Department in the summer of 2014 that redesigned the sand trap to eliminate the need for blasting during construction. The proposed Port Everglades Deepening Project was put on hold in 2026 until environmental impacts and mitigation factors can be resolved. The sand trap construction commenced in October 2025 and tentatively is expected to be completed sometime in 2027. The sand trap construction event includes jetty improvements, interior groin construction and jetty extension. Sand bypassing took place in 2021 with the USACE's Operation and Maintenance (O&M) program dredging 74,239 cy from the Port's channel as shown in the Department's Annual Inlet Report.

**Strategy:** Comply with the 2018 IMP strategies:
1) Conduct a comprehensive beach and inlet hydrographic monitoring program;
2) Sand bypassing shall be performed from the Port Everglades navigation channel and sand trap to the adjacent ocean-fronting beaches to the south of the inlet between FDEP Reference Monuments R86 and R92;
3) On an average annual basis, the initial target inlet sand bypassing quantity shall be 41,700 cubic yards per year;
4) The source of sediment for meeting the target sand bypassing quantities in Strategy #3 above shall be the Port Everglades navigation channel and sand trap.

**Dr. Von D. Mizell-Eula Johnson State Park – Dania Beach – Hollywood – Hallandale Beach, Broward County, R86-R128**

This is an 8.1-mile segment of critically eroded beach partially within the area of influence of Port Everglades Inlet. This area includes Dr. Von D. Mizell-Eula Johnson Beach State Park (formerly known as John U. Lloyd Beach State Park) and the communities of Dania Beach, Hollywood, and Hallandale Beach, and the project history for this segment of shoreline is described in Table 14.

The City of Hallandale Beach first restored the southernmost 4,000 ft of Broward County shoreline

with 360,000 cy of sand from an offshore borrow site in 1971.

Beach restoration of Dr. Von D. Mizell-Eula Johnson Beach State Park (R85.7-R93), within the **Broward County Shore Protection Project – Segment III** was constructed in 1976 with placement of 1.09M cy of sand from offshore borrow sites. The federal project is authorized until 2026. The beach berm was constructed at elevation of +10 ft NGVD and extended the MHW shoreline 140 ft seaward. For the purpose of estimating costs, a five-year nourishment interval was considered. Nourishment occurred again in 1979 along with sand tightening of the south jetty. The beach berm was constructed at elevation +10 ft NGVD and extended the MHW shoreline 100 ft seaward, which included fill material equivalent to five years of advance nourishment. The project in 1989 provided storm protection during Hurricane Andrew, but the advance nourishment did not meet the five-year performance expectation.

Beach restoration of Dania Beach, Hollywood Beach, and Hallandale Beach (R101-R128), within the **Broward County Shore Protection Project-Segment III** was constructed in 1979 using 2M cy of sand from offshore borrow sites. The beach berm was constructed at elevation +7 ft NGVD and extended the MHW shoreline 178 ft seaward. For the purpose of estimating costs, a five-year nourishment interval was considered. Nourishment was conducted in 1991 with placement of 1.1M cy. The beach berm was constructed at elevation of +7 ft NGVD and extended the MHW shoreline 51 ft seaward. Additional fill material equivalent to eight years of advance nourishment was placed seaward of the design berm. The 1991 nourishment project provided storm protection during Hurricane Andrew the following year and the advance nourishment met the eight-year performance expectation, even though the beach berm had eroded significantly during the delay in nourishment.

Approximately 25,000 cy of upland sand was placed along 0.4 mile of shoreline in Hollywood in 2001, between R121 and R123. Nourishment of Dr. Von D. Mizell-Eula Johnson Beach State Park (R86-R92) and Dania Beach – Hollywood - Hallandale Beach (R98-R128) was completed in March 2006 using 1,850,000 cy of sand from offshore borrow sites along 6.82 miles of shoreline. The beach fill at the state park is constructed at an elevation of +9 ft NGVD and constitutes six years of advance nourishment. The beach fill design for Dania Beach - Hollywood - Hallandale consisted of a 50-foot extension of the MHWL shoreline seaward of the Erosion Control Line (ECL), plus fill material equivalent to six years of advance nourishment. The project included construction of 8.9 acres of artificial reef as mitigation for impacts to 7.6 acres of nearshore hardbottom. A physical and environmental monitoring program was conducted to verify avoidance of impacts to nearshore

hardbottom and the performance of the mitigation. The 2006 project also constructed a spur groin connected to the south jetty of Port Everglades Inlet, installed two T-head groins offshore of Dr. Von D. Mizell-Eula Johnson State Park to retain beach fill, and constructed artificial reef as mitigation.

The City of Hollywood completed an interim truck haul beach nourishment project (R107- R109 and R119-R124) in February 2012 to address hot spot erosion by placing 69,400 cy of sand on the beach and dune. The beach berm elevation was + 7 ft NGVD. An additional 116,000 cy was placed in 2013.

Broward County evaluated beach management strategies in 2015 to direct future management of Segment III. The Hollywood Truck Haul Project was completed in December 2017 for the North Segment in the amount of 6,020 cy and the South Segment was completed in February 2018 in the amount of 59,840 cy. A truck haul occurred again in May 2019 in the amount of 134,810 cy of sand placed onto the beach. The USACE's Operation and Maintenance (O&M) program dredged 74,239 cy from the Port's channel and placed the material in the Dr. Von Mizell-Eula Johnson State Park in 2021. The beach nourishment project for Segment III was constructed again from 2021 to 2024 in two phases. The first phase was only in the state park with 490,748 cy of upland material placed between R85.7 and R91.7 with completion in March 2023. The second phase was completed in April 2024 with 360,252 cy being placed between R98.4 to R128. Between January and May of 2026, additional dune work was completed for this segment of shoreline with the placement of 52,085 cy placed between R104 to R128 to complete the dune restoration work that was not completed in 2024.

**Table 14.** Dr. Von D. Mizell-Eula Johnson State Park - Hollywood - Hallandale Beach Nourishment (Segment III) Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1971 | 360,000 | Offshore | R124-R128 | 0.8 |
| 1976-1977 | 1,090,000 | Offshore | R85.7 (S. Jetty) - R93 | 1.5 |
| November 1979 | 2,000,000 | Offshore | R101-R128 | 5.2 |
| 1989 | 604,000 | Offshore | R85.7-R93 | 1.6 |
| August 1991 | 1,100,000 | Offshore | R101-R128 | 5.2 |
| 2001 | 25,000 | Upland | R121-R123 | 0.5 |
| 2005-2006 [1] | 1,850,000 | Offshore | R85.7-R92 and R98.3-R128 | 6.8 |

| | | | | |
|---|---|---|---|---|
| February 2012 [2] | 69,400 | Upland | R107-R109 and R119-R124 | 1.3 |
| 2013 | 116,000 | Inlet | R87-R90 | 0.8 |
| December 2017 | 6,020 | Upland | R100.3-R102 | 0.4 |
| February 2018 | 59,840 | Upland | R118.7-R123.8 | 1.0 |
| May 2019 | 134,810 | Upland | R85.7-R92 and R98.3-R128 | 6.8 |
| 2021 | 74,239 | Inlet | R85.7 (S. Jetty) - R90 | 0.8 |
| March 2023 | 490,748 | Upland | R85.7-R91.7 | 1.1 |
| April 2024 | 360,252 | Upland | R98.4-R128 | 5.7 |
| May 2026 | 52,085 (dune only) | Upland | R104-R128 | 4.6 |

[1] Includes the placement of 550,000 cy of mostly offshore sand along the State Park shoreline between R85.7-R92, of which 44,200 cy came from the inlet. An additional 1,300,000 cy of offshore sand was placed along Dania Beach, Hollywood, and Hallandale Beach shoreline between R99 and R128. Of the sand volume placed between R101 and R128, 188,000 cy was placed under a USACE contract as part of the 2004 FCCE (PL 84-99) Post-Storm Rehabilitation Project.

[2] The north segment of beach at R107 to R109 had a placement of 8,200 cy and in the south segment from R119 to R124, there was 61,200 cy placed on the beach.

**Strategy:** Maintain the project through monitoring and nourishment using sand from offshore, upland mines and inlet sources. Conduct a feasibility study for erosion control structures at Dr. Von D. Mizell-Eula Johnson State Park.

**Golden Beach – Sunny Isles – Haulover Beach Park, Miami-Dade County, R1- R26.7**

This is a 5.1-mile segment of critically eroded beach between the Broward-Dade County line and Baker's Haulover Cut/Inlet. Restoration and nourishment have been conducted in Sunny Isles (R7-R20) and Haulover Beach Park (R20-R26.7) as part of the federally authorized **Miami-Dade County Shore Protection Project**. The project history for this segment of shoreline is described in Table 15. The Sunny Isles segment of the project is authorized until 2038. The critically eroded beaches within Golden Beach (R1-R7) receive sand from spreading of the adjacent nourishment projects.

In 1987, restoration of the 1.3-mile long Haulover Park (R20-R26.7) was completed using 235,000 cy of sand from an offshore borrow area. The project restored a 50-foot-wide beach berm at elevation +8.2 ft NGVD. In 2002, the first nourishment of the project was deferred based upon monitoring

surveys that indicated additional beach fill was not needed at that time.

In 1988, restoration of Sunny Isles (R7-R20) was constructed using sand from an offshore borrow area. The project restored a 20-foot-wide beach berm at elevation +8.2 ft NGVD. Additional fill material equivalent to ten years of advance nourishment was placed seaward of the design berm. The loss of fill material spreading into Golden Beach required interim nourishment of northern Sunny Isles in 1994, but the project was delayed until 1997 following settlement of a legal challenge to the federal environmental authorization. Overall, the project has met performance expectations, except for the loss of beach fill at the north end of the project area. Nourishment was completed in December 2001, and a submerged nearshore breakwater was constructed near R7 and R-8 in February 2002 to improve the longevity of the project. The nearshore breakwaters require rehabilitation, and data gathering began by the USACE in 2019 to determine the best plan of action. Truck haul nourishment was conducted in 2009 in Sunny Isles using an upland sand source. Truck haul projects have continued from 2015 through 2021 for this project area (R7-R19.3).

The USACE completed a Limited Re-evaluation Report (LRR) and a National Environmental Policy Act (NEPA) Environmental Assessment in 2016 to utilize upland mined sand and Outer Continental Shelf (OCS) sand for the Sunny Isles project area. Permitting, design and construction utilizing upland sand was completed in January of 2018 by placing approximately 122,269 cy in two different segments of Sunny Isles. The next nourishment was completed in September 2021 with the placement of 269,994 cy between R7 to R19.3 from an upland sand source.

**Table 15.** Sunny Isles and Haulover Park Beach and Dune Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1955 to 1959 | 418,214 | Baker's Haulover Inlet | R19-R26 | 1.4 |
| 1960 | 180,000 | Offshore | R19-R26 | 1.4 |
| 1978 | 300,000 | Offshore | R20-R26 | 1.1 |
| 1980 | 43,163 | Baker's Haulover Inlet flood shoal | R19-R26 | 1.4 |
| 1984 | 35,000 | Baker's Haulover Inlet flood shoal | R19-R26 | 1.4 |
| 1987 | 235,000 | Offshore | R19-R26 | 1.4 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1988 | 1,320,000 | Offshore | R7-R20 | 2.4 |
| 1990 | 32,000 | Baker's Haulover Inlet ebb shoal | R7-R8.5 | 0.2 |
| 1994 | 24,560 | Baker's Haulover Inlet | R20-R25 | 0.9 |
| February 1997 [1] | 9,000 | Upland | R7-R8 & R10 & R16 | 0.3 |
| July 1997 | 80,130 | Offshore | R7-R10 | 0.6 |
| 2001-2002 [2] | 737,152 | Offshore | R6-R19 | 2.5 |
| July 2009 | 10,000 | Upland | R7-R10.5 | 0.6 |
| March 2014 | 35,000 | Baker's Haulover Inlet AIWW | R12-R16 | 0.8 |
| 2015 | 2,600 | Upland | R7-R9 | 0.4 |
| January 2018 | 93,052 | Upland | R7-R10 | 0.6 |
| January 2018 | 29,217 | Upland | R15-R17 | 0.4 |
| April 2018 | 28,500 | Upland | R12-R15 | 0.6 |
| February 2020 | 24,934 | Upland | R7-R10 | 0.6 |
| September 2021 | 269,994 | Upland | R7-R19.3 | 2.5 |

[1] The volume for the 1997 event had 5000 cy placed between R7-R8, 2000 cy placed at R10, and 2000 cy placed at R16.

[2] The volumes for Sunny Isles in 2001/2002 includes placement of 704,353 cy between R7-R19, with an additional amount of 2,799 cy placed northward to R6 for a 1000' taper into Golden Beach and an additional 30,000 cy placement along R7 to R8.5 following a 30-day stabilization period of the salient behind the newly constructed breakwater.

**Strategy**: Maintain the project through monitoring and nourishment.

### Baker's Haulover Inlet, Miami-Dade County, R26-R27

The entrance channel depth is -11 ft MLW at **Baker's Haulover Inlet,** a man-made inlet within a federally maintained navigation project. Extension of the south jetty was completed in 1975 during the Bal Harbour nourishment. Sand tightening and extension of the north jetty was completed in December 1986. Maintenance dredging of the navigation channel and the flood shoal have been conducted periodically, with the material placed on the adjacent beaches. The Department adopted the

Baker's Haulover Inlet Management Study Implementation Plan in September 1997, but a specific volume of sand as an average annual bypassing objective was not established. An inlet feasibility study was completed for the County in June 2019 that included an updated sediment budget. The Department developed an Updated Baker's Haulover Inlet Management Plan in August 2021.

**Strategy:** Comply with the five strategies of the updated IMP of 2021 that are listed below;
1) A comprehensive beach and inlet hydrographic monitoring program shall be conducted to evaluate the performance and impact of existing sand bypassing and nourishment projects and to periodically update the inlet sediment budget. This monitoring program shall include topographic and hydrographic surveys of the inlet system, its ebb and flood shoals, and adjoining beaches between FDEP range/reference monuments R7 and R38;
2) On an average annual basis, the initial minimum target inlet sand bypassing quantity shall be 36,900 cubic yards to the adjacent Atlantic beaches south of Bakers Haulover Inlet. This target quantity may be modified or updated based on a minimum of four years or more of monitoring data or additional inlet model studies indicating a change in the sediment budget;
3) Sand bypassing shall be performed from the Atlantic Intracoastal Waterway and Bakers Haulover Inlet federal navigation project channel and may be performed from the previously permitted Ebb Shoal Borrow Area, to be placed on the adjacent Atlantic beaches south of the inlet between FDEP Reference Monuments R27 and R32. The quantity of material to be bypassed from the navigation channels shall be based on available deposition quantities documented through the monitoring protocol of Strategy #1 above;
4) The proposed project investigated in the inlet management study was determined to be feasible by the preliminary modeling and economic analysis, which would include extension of the north jetty by 164 feet (50 meters) and sand bypassing from the beach immediately north of the inlet to the beach south of the inlet at a quantity not to exceed 30,000 cubic yards per year. Detailed engineering design and permitting shall be conducted prior to this beach bypassing with monitoring that shall specifically evaluate beach recovery north of the inlet and an analysis of public safety. The 2016 shoreline shall be the landward baseline to limit beach excavation, and the post dredging adjustment of the beach profile shall not erode into the federally mandated design berm of the beach erosion control and hurricane protection project. A detailed geotechnical analysis shall be conducted that shall include an evaluation of the design dredge depth. Detailed engineering design to extend the north jetty will include hydraulic modeling, public safety analysis, and environmental impact shall be conducted to develop an environmentally acceptable project. Should sand be entrapped seaward of the 2016 shoreline more than

the quantity necessary to meet the southerly target bypassing quantity, the excess sand may be bypassed to the proximate beach restoration project to the north;
5) Sand may be obtained from the inlet's ebb shoal or flood shoals for nourishment of adjacent eroding beaches or proximate beach restoration projects provided sufficient engineering design, geotechnical analyses, and environmental impacts analyses justify the excavation. Priority will be given to federal projects; however, beach fill placement between R27 and R32 shall be included in the target sand bypassing quantity.

**Bal Harbour, Miami-Dade County, R27-R31**

This is a 0.75-mile segment of critically eroded beach from Baker's Haulover Inlet to the Surfside municipal boundary. Beach restoration was completed for the segment as part of the federally authorized **Miami-Dade County Shore Protection Project**. The project was reauthorized in WRDA 2022, and the feasibility study estimates the new authorization will last until 2075. The project history for this segment of shoreline is described in Table 16.

In 1975, restoration at Bal Harbour (R27-R31) was completed by the local government on a federal reimbursement basis. The project included restoration of a 20-foot-wide dune at elevation of +10.7 ft NGVD and a 50-foot-wide level berm at elevation of +8.2 ft NGVD. Additional fill material equivalent to ten years of advance nourishment was placed seaward of the design berm. Though nourishment of several areas of the initial project was conducted between 1987 and 1990, the overall project has exceeded performance expectations. Nourishment of discrete segments of the project were conducted between 1997 and 2001 with subsequent full nourishment in 2003 using offshore material. The 2014 nourishment event (USACE Contract G) was completed using dredge material from the Baker's Haulover ebb shoal.

The USACE completed an LRR and a NEPA Environmental Assessment in 2016 to utilize upland mined sand and OCS sand for the Bal Harbor project area. The next nourishment is tentatively scheduled for 2027/2028 within the Bal Harbor Segment using material dredged from the flood shoals and IWW, and/or hauled from an upland sand mine.

The USACE has been working on the Miami-Dade Coastal Storm Risk Management (CSRM) Project feasibility study/report for congressional approval since 2018. The Recommended Plan is for approximately 6.1 miles of periodic beach nourishment, including dune and berm features, through Bal Harbour Village, the Town of Surfside, and portions of the City of Miami Beach as

well as a series of groins to be constructed in Bal Harbour. The plan recommends using sand that is already in the system and using newly identified offshore borrow sites offshore. In addition to providing economic benefits, this plan also contributes to the creation of habitat for nesting sea turtles and shorebirds through the restoration of the eroded beach and dune system. The report was signed by the USACE's General in September 2022. The recommended project received Congressional authorization in the Water Resources Development Act of 2022.

**Table 16.** Bal Harbour Segment, Miami-Dade County Shore Protection Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 1960 | 86,000 | Offshore | R27-R31 | 0.8 |
| 1961-1964 | 83,000 | Offshore | R27-R31 | 0.8 |
| 1968-1969 | 136,000 | Offshore | R27-R31 | 0.8 |
| July 1975 | 1,625,000 | Offshore | R27-R31 | 0.8 |
| 1990 | 225,000 | Offshore | R27-R31 | 0.8 |
| 1998 | 282,852 | Bakers Haulover Inlet & AIWW | R28-R31 | 0.6 |
| 2002 | 14,070 | Bakers Haulover Inlet | R27-R31 | 0.8 |
| 2003 | 188,000 | Bakers Haulover Inlet ebb shoal | R27-R31.5 | 0.9 |
| 2006 | 45,100 | Bakers Haulover Inlet flood shoal | R27-R31 | 0.8 |
| 2009 | 15,000 | Upland | R27-R28.8 | 0.34 |
| November 2010 | 33,080 | AIWW | R28-R29 | 0.2 |
| 2014 | 49,592 | Bakers Haulover Inlet | R27-R31 | 0.8 |
| January 2014 | 285,325 | Bakers Haulover Inlet ebb shoal | R27-R31 | 0.8 |
| December 2017 | 37,281 | AIWW | R28-R29 | 0.2 |
| April 2022 | 176,209 | Upland | R27-R31.5 | 0.9 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| 2022 | 144,219 | Bakers Haulover Inlet | R27-R31 | 0.8 |
| 2025/2026* | 100,500 | Upland | R27-R31.5 | 0.9 |

*FCCE nourishment with upland sand with approximate volume.

**Strategy:** Maintain the project through monitoring and nourishment; transfer sand from accreted beaches in areas of greatest need; complete a feasibility study to remove and replace erosion control groins.

**Surfside, Miami-Dade County, R31-R38**

This is a 1.3-mile segment of critically eroded beach from the southern boundary of Bal Harbour to the Miami Beach municipal boundary. Beach restoration was completed for the segment as part of the federally authorized **Miami-Dade County Shore Protection Project**. The project history for this segment of shoreline is described in Table 17. The restoration of the federally authorized Miami-Dade County Shore Protection Project at Surfside (R31-R38) was completed in January 1978, using sand from offshore borrow sites. The project included restoration of a 20-foot-wide dune at elevation +10.7 ft NGVD and construction of a 50-foot-wide level berm at elevation +8.2 ft NGVD. Additional fill material equivalent to ten years of advance nourishment was placed seaward of the design berm. Though nourishment of several areas of the initial project was conducted between 1987 and 1990, the overall project has exceeded performance expectations. Nourishment of discrete segments of the project was conducted between 1997 and 2001.

The USACE completed an LRR and a NEPA Environmental Assessment in 2016 to utilize upland mined sand and OCS sand for the Surfside project area. Nourishment began in August 2019 and was completed in February 2020 with placement of 324,845 cy of the upland sand between R31 and R36.5.

The USACE has been working on the Miami-Dade Coastal Storm Risk Management (CSRM) Project feasibility study/report for congressional approval since 2018. The Recommended Plan is for approximately 6.1 miles of periodic beach nourishment, including dune and berm features, through Bal Harbour Village, the Town of Surfside, and portions of the City of Miami Beach as well as a series of groins to be constructed in Bal Harbour. The plan recommends using sand that is already in the system and using newly identified offshore borrow sites offshore. In addition to

providing economic benefits, this plan also contributes to the creation of habitat for nesting sea turtles and shorebirds through the restoration of the eroded beach and dune system. The feasibility report was signed by the USACE's General in September 2022. The recommended project was reauthorized by Congress in WRDA 2022, and the feasibility study estimates the new authorization will last until 2075.

**Table 17.** Surfside Segment, Miami-Dade County Shore Protection Project history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| August 1978 | 2,640,000 | Offshore | R31-R38 | 1.5 |
| August 1999 | 590,000 | Offshore | R32-R36 | 0.8 |
| April 2014* | 12,800 | Upland | R32-R36 | 0.8 |
| February 2020 | 324,845 | Upland | R31-R36.5 | 1.0 |

*CCCL permit - dune project.

**Strategy:** Design and construct a dune restoration project; maintain the nourishment project through nourishment; transfer sand from accreted beaches in areas of greatest need; monitor.

**Miami Beach, Miami-Dade County, R38-R74.4**

This is a 7.35-mile segment of critically eroded beach from the southern boundary of Surfside to Government Cut, within the municipal boundary of Miami Beach. Beach restoration was completed for this segment as part of the federally authorized **Miami-Dade County Shore Protection Project**. The project history is described in Table 18. The project was authorized by Congress in 1975.

The restoration of the remaining federally authorized Miami-Dade County Shore Protection Project at Miami Beach (R38-R74) began in 1978 and was completed in January 1982, using sand from offshore borrow sites. The project included restoration of a 20-foot-wide dune at elevation +10.7 ft NGVD and construction of a 50 ft wide level berm at elevation +8.2 ft NGVD. Additional fill material equivalent to ten years of advance nourishment was placed seaward of the design berm. Though nourishment of several areas of the initial project was conducted between 1987 and 1990, the overall project has exceeded performance expectations. Nourishment of discrete segments of the project was conducted between 1997 and 2001.

The performance of the beach fill along the segment of shore north of 32nd Street, Miami Beach, has

not maintained the design beach width. Erosion by storm waves and tides is exacerbated by the seaward encroachment of the upland development relative to the adjacent shore. A 1994 nourishment project, interrupted by a legal challenge to the federal environmental authorization, was completed in 1997. To improve the longevity of the beach fill and maintain the design beach width of the project, three shore-attached breakwaters were constructed at 32nd Street (R59-R60) during May-July 2002.

Concurrently, transfer via truck haul was completed using 125,000 cy of sand from south Miami Beach (R67-R72) to the breakwater site and to a hotspot erosional area (R53.5-R56). In 2005 and 2007, with respective amounts of 35,000 and 30,000 cy of sand were placed via truck haul downdrift of the structures (R60-R61).

The performance of the beach fill along the segment of shore located near 55th Street, Miami Beach and 44th Street, Miami Beach has not maintained the design beach width. Erosion by storm waves and tides is exacerbated by the seaward encroachment of the upland development relative to the adjacent shore. During 2006, the county truck-hauled and placed approximately 30,000 cy of sand at the 55th Street segment (R48.7-R50.7) and approximately 50,000 cy of sand at the 46th Street segment (R53.7-R55.5).

In 2007, a sand transfer project was completed to excavate sand from the accretional beach at Lummus Park (R67-R72) and pump it north for placement between R53.5-R56. The sand transfer event was followed by a truck haul event in 2009 as an interim measure preceding the federal nourishment. Sand from an upland mine was placed in recurrent hotspots at 55th Street (R49.5-R50.5) and 46th Street (R53.7-R55.5) and a new hotspot at 64th Street (R43-R46.5).

In March 2011, DEP issued a JCP for the construction of the federal Contract E project. The permit authorized placement of sand from an offshore sand source onto the Miami Beach segment between R37.75-R46.25. The permit again authorized sand transfer from the dry sandy beach at Lummus Beach Park to hotspot locations at R53.7-R55.5 (46th Street) and R60-R61.1 (27th Street). Placement of the offshore material was completed in April of 2012 using 206,042 cy of sand. Transfer of material from Lummus Park was completed in September 2012, with a total of 141,159 cy of material placed. Learn more about the Miami Beach hotspot locations and the recent or current construction activities by the USACE to address coastal erosion.

In June 2003, the USACE selected a conceptual design through its innovative erosion control technology program (Section 227) for a Submerged Artificial Reef Structure to be located at 63rd

Street, Miami Beach (R46). DEP issued a Notice of Intent to issue a JCP for the construction of the **Reefball Breakwater Structures**, known as Contract H, in November 2011.

The USACE completed LRR and NEPA documentation in 2016 to utilize upland and OCS sand for the Miami Beach project area. A truck haul nourishment was completed in March 2017, placing 233,330 cy in two project segments at the 55th street area (R48.7-R50.7) and the 46th street area (R53.7-R55.5). The next truck haul beach nourishment for erosional hot spot areas between R43 to R61 was completed in May 2020, with a total placement of 269,830 cy of material. The 2022/2023 truck haul beach nourishment work for the erosional hot spot areas between R42.4 to R62.8 was completed in August 2023, with a total placement of 857,686 cy of material.

The USACE has been working on the Miami-Dade Coastal Storm Risk Management (CSRM) Project feasibility study/report for congressional approval since 2018. The Recommended Plan is for approximately 6.1 miles of periodic beach nourishment, including dune and berm features, through Bal Harbour Village, the Town of Surfside, and portions of the City of Miami Beach as well as a series of groins to be constructed in Bal Harbour. The plan recommends using sand that is already in the system and using newly identified offshore borrow sites offshore. In addition to providing economic benefits, this plan also contributes to the creation of habitat for nesting sea turtles and shorebirds through the restoration of the eroded beach and dune system. The USACE's General signed the feasibility report in September 2022. The recommended project from the report was reauthorized by Congress in WRDA 2022, and the feasibility study estimates the new authorization will last until 2075.

**Table 18.** Miami-Dade County Shore Protection Project - Miami Beach Segment history.

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| August 1979 | 1,530,000 | Offshore | R38-R46 | 1.5 |
| October 1980 | 3,177,100 | Offshore | R46-R58 | 2.4 |
| December 1981 | 2,200,000 | Offshore | R59-R66 | 1.4 |
| January 1982 | 2,400,000 | Offshore | R66-R74 | 1.9 |
| 1985 | 110,000 | Offshore | R42-R46 | 0.8 |
| 1985 | 50,000 | Offshore | R57-R60 | 0.6 |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| September 1994 | 122,096 | Offshore | R55-R56 | 0.2 |
| 1994 | 30,000 | Upland | R54-R59 | 0.9 |
| 1996 | 8,000 | Sand Transfer from R63-R70 | R54-R60 | 0.8 |
| July 1997 | 478,938 | Offshore | R53-R58 | 1.0 |
| 1997 | 35,000 | Upland | R54-R56 | 0.4 |
| 1997 | 50,000 | Upland | R57-R59 | 0.4 |
| 1998 | 18,000 | Upland | R44-R45 | 0.2 |
| August 1999 | 132,000 | Offshore | R73-R74 | 0.3 |
| 2001-2002 | 167,662 | Offshore | R44-R46.5A | 0.4 |
| 2002 | 125,000 | Sand Transfer from R59-R60 | R53.5-R56 and R60-R61 | 0.7 |
| 2005 | 35,000 | Upland | R60-R61 | 0.2 |
| 2006 | 30,000 | Upland | R48.7-R50.7 | 0.4 |
| 2006 | 50,000 | Upland | R53.7-R55.5 | 0.4 |
| December 2007 | 30,000 | Upland | R60-R61 | 0.2 |
| 2007 | 70,000 | Sand Transfer from R67-R72 | R43-R45 | 0.4 |
| 2009 | 10,000 | Upland | R43-R44.5 | 0.29 |
| 2009 | 10,000 | Upland | R48.7-R50.7 | 0.38 |
| 2009 | 3,000 | Upland | R53.7-R55.5 | 0.34 |
| 2012 | 206,042 | Offshore | R41.5-R46.3 | 0.9 |
| 2012 | 122,237 | Sand Transfer from Lummus Park (R64- R69) | R53.7-R54.7 | 0.55 |
| 2012 | 18,922 | Sand Transfer from Lummus Park (R64- R69) | R60-R61.1 | 0.55 |
| 2013 | 6,296 | Upland | Unknown | Unknown |
| 2014 | 31,365 | Upland | Unknown | Unknown |

| Date Completed | Volume (cy) | Source | Project Location (by R monument) | Length (mi) |
|---|---|---|---|---|
| May 2015 | 19,259 | Upland | R53.7-R55.5 | 0.34 |
| March 2017 | 233,330 | Upland | R49.5-R50.5 and R53.7-R55.5 | 0.60 |
| November 2018 | 29,230* | Upland | R43-R44 | 0.29 |
| May 2020 | 100,904 | Upland | R43-R46.5 | 0.66 |
| May 2020 | 68,366 | Upland | R49.5-R50.5 | 0.19 |
| May 2020 | 76,877 | Upland | R53.5-R55.5 | 0.39 |
| May 2020 | 23,683 | Upland | R60-R61 | 0.19 |
| October 2022 | 206,222 | Upland | R42.2-R46.3 | 0.8 |
| February 2023 | 198,061 | Upland | R48.7-R51.5 | 0.5 |
| April 2023 | 231,222 | Upland | R52.9-R56 | 0.6 |
| August 2023 | 222,181 | Upland | R59.6-R62.8 | 0.6 |

*Approximate volume.

**Strategy:** Maintain the project through monitoring and nourishment; transfer sand from accreted beaches to areas of greatest need.

**Government Cut, Miami-Dade County, R74 – R75**

Government Cut, a man-made inlet that was authorized by Congress in 1902, was constructed in 1905 as a navigable channel to connect the inland waters of the city of Miami with the Atlantic Ocean. Due to the construction of Government Cut, the southern portion of Miami Beach became an island known today as Fisher Island.

Government Cut is part of the federally authorized **Miami Harbor Navigation Project** and is the entrance to the Port of Miami. The navigation entrance channel depth in Government Cut is -52 ft MLW and -50 ft MLW in the inner channel. In 1983, the sand tightening of 1,200 ft of the seaward end of the north jetty was completed. In 1999, the remainder of the north jetty was sand tightened. The inlet channel and jetties act as a barrier to littoral sand transport to the downdrift beaches south of

the inlet by trapping sand in the channel or deflecting it offshore. Net southerly littoral drift arriving at Government Cut has been estimated to range from 24,000 cy per year to 49,000 cy per year. The low longshore transport rate and long jetties, coupled with sand transfer from Lummus Park beach, have prevented significant shoaling of the navigation channel. Maintenance dredging is not frequent but has coincided with channel deepening projects. The dredged material from deepening of the exterior and interior navigation channels and expansion of the turning basin has been used to create spoil islands that now contain residential or port facilities.

**Strategy:** Place all beach-compatible dredged material from maintenance of the navigation channel on the adjacent beaches.

***Regional Strategies for Beach and Inlet Management***

**Sponsors and Funding**

The Broward County Shore Protection Project was authorized in 1965 for federal participation in beach erosion control for the entire county in three designated segments. The local sponsor is Broward County. The project provides for a navigation feature at Hillsboro Inlet, which is inactive due to the non-federal improvements to the inlet. Segment I (R1-R24, north county line to Hillsboro Inlet) has not been constructed under the federal authorization. In 1996, extension of federal participation in Segment II (R25-R85) and Segment III (R86-R128) were approved for fifty years following the date of initial beach restoration, to 2020 and 2026, respectively. The local-state sponsors are authorized to design, permit and construct the project, then seek reimbursement of the federal cost-share.

The Miami-Dade County Beach Erosion Control and Hurricane Protection Project was authorized in 1975 for federal participation in shore protection projects from Haulover Beach Park (R20) through Miami Beach to Government Cut (R74). In 1988, Sunny Isles was included in the authorized project and is federally authorized until 2038, while the Miami–Dade portion of the project is federally authorized until 2025. The local sponsor is Miami-Dade County. Design, permitting, and construction are conducted by the USACE with reimbursement or advance payment by the local and state sponsors. Project cost estimates may be found in the 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. Broward County is attempting to implement this concept through contracting the construction of the next nourishment activities at three different segments of beach.

2. In Miami-Dade County, nourishment has been routinely conducted for different segments of beach under a single construction contract. Previous maintenance dredging material from Bakers-Haulover Inlet has been placed on the beach. In the future, the schedule of maintenance dredging should be coordinated with the need for nourishment.

3. Coordination with the USACE and Port of Miami and Port Everglades to minimize beach impacts of proposed Port improvements.

**Environmental Protection**

The protection of marine turtles, hardbottom and coral reef habitat, and seagrass beds are primary environmental concerns within this subregion. The timing of construction is restricted during the marine turtle nesting season of March 1 through October 31 in Broward County north of Port Everglades. In south Broward and Miami-Dade County, projects have been approved for construction during the nesting season. Project design and method of construction are restricted to avoid or minimize adverse impacts to marine turtles and hardbottom and reef habitat. Mitigation is required to offset permitted impacts to nearshore hardbottom caused by the restoration projects in Broward County, and a county-wide physical and environmental monitoring program is conducted to identify potential impacts to hardbottom and reef communities. Miami-Dade County conducts a county-wide marine turtle monitoring and protection program. Bakers-Haulover Inlet and Government Cut are located within the limits of the Biscayne Bay Aquatic Preserves. Projects located within and near the Aquatic Preserve boundaries require additional protection, including more stringent water quality standards outside the Aquatic Preserve's water boundaries, during permitting and construction to ensure preservation of the existing conditions.

**Sand Sources**

Since there are limited sand resources existing in state waters in Southeast Florida, the Department and USACE completed the Sediment Assessment and Needs Determination (SAND) study. This study was conducted in a collaborative manner, and it was reviewed by and vetted through all the participating stakeholders. The SAND study indicates that the regional offshore supply of sand in state and federal waters is more than adequate to meet the volumetric needs of all the beach nourishment projects in the five southeastern coastal counties - St. Lucie, Martin, Palm Beach, Broward, and Miami-Dade - for the next 50 years (through 2062), according to Ousley et al. (2014). Subsequently, the Department analyzed the need for sand over the next 10 to 20 years for the five southeastern counties and determined that approximately 20 to 30 million cy will be needed for beach nourishment projects. Due to the narrow continental shelf adjacent to Florida's southeastern shoreline, it is expected that some counties may need to look for sand resources in upland sand mines and/or offshore borrow sites in neighboring counties. Miami-Dade County has already initiated this process. The USACE completed LRR and NEPA documentation in 2016 to utilize upland and OCS sand for the Miami Beach project area.

Coordination is recommended between the Department, USACE, BOEM and local governments to use best management practices with these offshore resources. For additional information on sand sources, the Department manages a database named the Regional Offshore Sand Source Inventory (ROSSI).

**Additional Information**

The introduction of the state's Strategic Beach Management Plan provides additional background information on the Department's Beach Management Programs and includes overviews of:

- The principles and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida inlets
- 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
- Beaches, Economics and Tourism

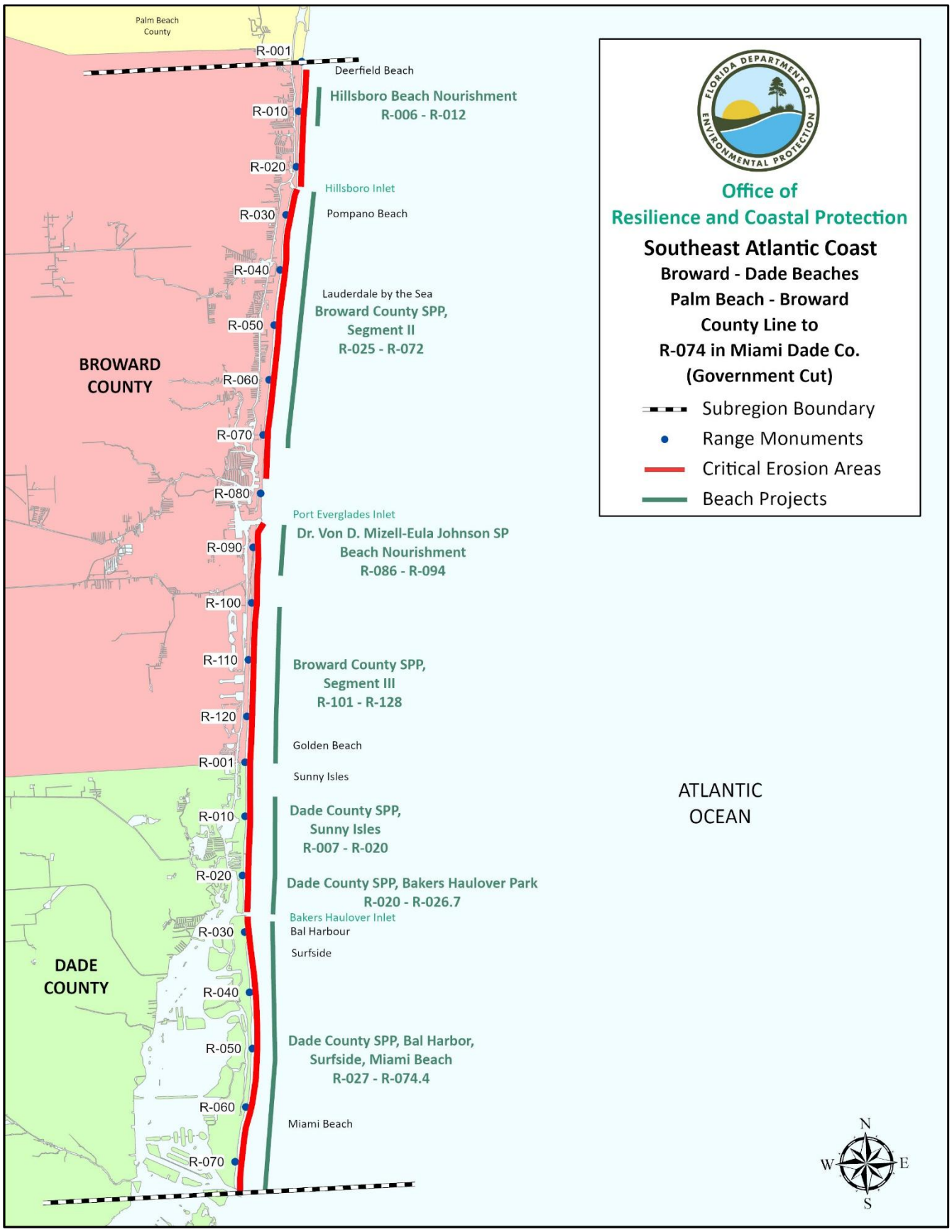


**Figure 4.** Map of Broward and Miami-Dade Beaches subregion. View an interactive map.

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## *Southern Barriers*

There are 6.4 miles of beaches in the **Southern Barriers** subregion, which extends from Fisher Island (R75) to Cape Florida (R113), as shown on Figure 5. The area includes Fisher Island, Virginia Key, and Key Biscayne, which are separated by Norris Cut and Bear Cut and from the mainland by Biscayne Bay. There are 3.3 miles of critically eroded beaches in this subregion on Virgina Key and on Key Biscayne.

Erosion is attributed to occasional tropical storms and hurricanes, the downdrift influence of shore protection structures, and the effects of the inlets. The most erosive storms in recent years were Hurricane Andrew (1992), Hurricanes Rita and Wilma (2005), Subtropical Storm Andrea (2007), October northeasters (2007), Tropical Storm Noel (2007), Hurricane Matthew (2016), and Hurricane Irma (2017).

### *Strategies for Inlets and Critically Eroded Beaches*

#### Norris Cut (R78-R79) and Bear Cut (R88-R89), Miami-Dade County

Norris Cut and Bear Cut are stable, natural coastal inlets. Navigational dredging has not been conducted at Norris Cut and Bear Cut, although terminal groins have been constructed on Norris Cut to stabilize beaches on Fisher Island and Virginia Key, and two separate groin fields have been installed along the Bear Cut shoreline of Virginia Key.

The federally authorized **Virginia Key Beach Erosion Control Project** (R79-R88) restored a 50-foot-wide beach berm at elevation of +6 ft MLW along 1.3 miles of the beach using 176,800 cy of sand obtained from an offshore borrow area in 1969. Groins were constructed and 110,000 cy of beach compatible dredged material from Government Cut was placed between R79 and R84 in April 1974. Timber groins (R84-R87) were constructed along the Bear Cut inlet shore of Virginia Key, some in 1948 and the remainder in 1956. Dade County installed concrete pilings and wood panel groins on the inlet shore of southern Virginia Key fronting Bear Cut in 1965. The rehabilitation of the existing groins, construction of three additional groins, and placement of a small amount of beach fill placed by truck from an existing stockpile were completed in 2003. This project is not located within the bounds of a critically eroded beach but is described here as a previous beach management project near the critically eroded beaches.

A privately funded beach erosion control project on **Fisher Island** (R75-R78) was constructed in

1991. The project consisted of the placement of 25,000 cy of imported oolitic aragonite sand and construction of eight rock T-head groins. This project is not located within the bounds of a critically eroded beach but is described here as a previous beach management project near the critically eroded beaches.

**Virginia Key, Miami-Dade County, R84-R88**

This is a 0.8-mile segment of critically eroded beach along the Virgina Key shoreline. Due to erosion concerns a dune project is being considered at the local level to address beach and dune conditions.

**Strategy:** Conduct feasibility study for design and permitting to construct a dune project that is environmentally feasible, monitor.

**Key Biscayne, Miami-Dade County, R101-R113**

This is a 2.5-mile segment of critically eroded beach that includes the Village of Key Biscayne and Bill Baggs Cape Florida State Park. Beach restoration has been conducted, and the project history for this segment of shoreline is described in Table 19.

The federally authorized **Biscayne Beach Erosion Control Project** was constructed at Crandon Park on northern Key Biscayne in conjunction with the Virginia Key project in 1969. The project restored a 50-foot-wide berm at elevation of +7 ft NGVD along two segments of shore (R92.5-R96 and R99-R101) using 196,300 cy of sand from a borrow area located immediately offshore.

Under the provisions of the 1965 Rivers and Harbors Act, the **Key Biscayne Shore Protection Project** was federally authorized in 1985. In 1987 the federal Key Biscayne Shore Protection Project (R101-R113.7) restored 2.4 miles of beaches (excluding a gap at R111-R112.3) using 420,000 cy of sand from an offshore borrow area located one mile southeast of Cape Florida. The project restored a 25-foot-wide berm at the Village of Key Biscayne and a 20-foot-wide berm at Cape Florida State Park, both at an elevation of +7 ft MLW, and provided additional beach fill equivalent to seven years of advance nourishment. A terminal groin was also constructed at the south end of Bill Baggs Cape Florida State Park (R113.7). The project met its performance expectations by preserving a beach through the seven-year nourishment interval. Damage caused by Hurricane Andrew to the terminal groin and adjacent revetment protecting the Cape Florida Lighthouse was repaired in 1994. The federal project was de-authorized in 1990.

In August 2002, a non-federal beach nourishment project at **Village of Key Biscayne** (R101-R108)

was completed along 1.3 miles of beaches using 121,000 cy of sand from an offshore borrow site approximately 4,000 ft offshore from the southern tip of Key Biscayne. The beach fill has a construction berm width of 35 ft at elevation +7 ft NGVD. A physical and environmental monitoring program was conducted to verify avoidance of impacts to nearshore seagrass beds.

Significant erosion was sustained in 2005 along Key Biscayne from Hurricanes Rita and Wilma. In addition, the seawall and revetment protecting the Cape Florida Lighthouse was damaged by Wilma. The Village nourished portions of the dune in 2008 using an upland sand source. The next nourishment of the project shoreline between R101+300 and R107+600 was completed in 2012 using 37,500 cy of sand from an upland sand source. Due to Hurricane Matthew, nourishment was completed in May 2017 with placement of 27,064 cy of upland material on the beach between R101.7 and R107.8. The Village began a beach management feasibility study in 2017 to determine a more prudent path forward in combating beach erosion. The 2021 beach nourishment was constructed with 31,000 cy of upland sand placed between R102 and R107.8. The 2024 beach nourishment project was constructed with 25,400 cy of upland sand that was placed between R103.5 and R107.8.

The USACE has been working on the Miami-Dade Coastal Storm Risk Management (CSRM) Project feasibility study/ report for congressional approval since 2018. The Recommended Plan is for approximately 6.1 miles of periodic beach nourishment, including dune and berm features, through Bal Harbour Village, the Town of Surfside, and portions of the City of Miami Beach as well as a series of groins to be constructed in Bal Harbour. The plan recommends using sand that is already in the system and using newly identified offshore borrow sites offshore. In addition to providing economic benefits, this plan also contributes to the creation of habitat for nesting sea turtles and shorebirds through the restoration of the eroded beach and dune system. The signing of the report in September 2022 by the USACE General means the recommended project could receive Congressional authorization in a future Water Resources Development Act.

The USACE feasibility report described above is an interim response for the Key Biscayne area. Implementation of the plan for the Key Biscayne Segment is contingent upon local efforts to address back bay flooding such that the benefits for the Key Biscayne Segment are realized. The Miami-Dade Back Bay Coastal Storm Risk Management Feasibility Study by the USACE, discusses a pump station installation at the Village of Key Biscayne and there has been discussion in planning meetings of continued beach nourishment and a reinforced dune with a steel sheet pile dune core wall from R101.3 to R107.8 with a northern tie back wall.

**Table 19.** Key Biscayne Beach Nourishment Project history.

| Date Completed | Volume (cy) | Borrow Source | Project Location (by R Monument) | Length (mi) |
|---|---|---|---|---|
| 1969 | 196,300 | Offshore | R92.5-R96 and R99-R101 | 1.0 |
| 1987 | 420,000 | Offshore | R101-R111 and R112.3-R113.7 | 2.4 |
| 2002 | 121,000 | Offshore | R101-R108 | 1.3 |
| 2008 | 2,400* | Upland | R103-R107 | 0.8 |
| 2012 | 37,500 | Upland | R101.3-R107.6 | 1.2 |
| May 2017 | 27,064 | Upland | R101.7-R107.8 | 1.2 |
| May 2021 | 31,000 | Upland | R102 and R107.8 | 1.0 |
| April 2024 | 25,400 | Upland | R103.5-R107.8 | 0.8 |

**Dune only*

**Strategy:** Maintain the project through monitoring and nourishment; conduct a feasibility study to design and permit a hybrid reef.

***Regional Strategies for Beach and Inlet Management***

**Sponsors and Funding**

In 1962, a federally authorized shore protection project by the USACE was approved for 1.8 miles of beaches on Virginia Key and 1.9 miles of beaches on northern Key Biscayne. The project was authorized for ten years from completion of initial construction, which occurred in 1969. In 1985, under the provisions of the 1965 Rivers and Harbors Act, nourishment of 2.3 miles of beaches on southern Key Biscayne and construction of a terminal groin was federally authorized. The project was de-authorized in 1990. The local sponsor was Miami-Dade County. Subsequent activities on Virginia Key have been sponsored by the City of Miami, owner of the island. The Village of Key Biscayne has been the local sponsor since the 2002 nourishment. Project cost estimates may be found in the 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.

Coordination of nourishment at Key Biscayne with other projects in the area may not be practical because a pipeline dredge is used for this project and a hopper dredge is used for other projects in the area. When future maintenance dredging of Government Cut is required, placement of beach compatible sand on the beach of Key Biscayne should be considered.

**Environmental Protection**

The protection of marine turtles, shorebirds and seagrass beds are primary environmental concerns within this subregion. Sensitive areas for shorebirds include Crandon Beach. Additionally, emergent shoals are utilized by resident and migrating birds. These areas are subject to change as conditions change, and coordination with FWC shorebird staff is encouraged during project development. Project design and method of construction are restricted to avoid or minimize adverse impacts to marine turtles and seagrass beds; however, construction of the Key Biscayne project during the marine turtle nesting season has been approved. Norris Cut and Bear Cut are located within the limits of the Biscayne Bay Aquatic Preserves. Projects located within and near the Aquatic Preserve boundaries require additional protection, including more stringent water quality standards outside the Aquatic Preserve's water boundaries, during permitting and construction to ensure preservation of the existing conditions.

**Sand Sources**

Upland sand has been identified and permitted as an alternative to offshore sand for the Key Biscayne Project. For additional information on sand sources, the Department manages a database named the Regional Offshore Sand Source Inventory (ROSSI).

**Additional Information**

The introduction of the state's Strategic Beach Management Plan provides additional background information on the Department's Beach Management programs, including overviews of:

- The principles and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida inlets
- 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
- Beaches, Economics and Tourism

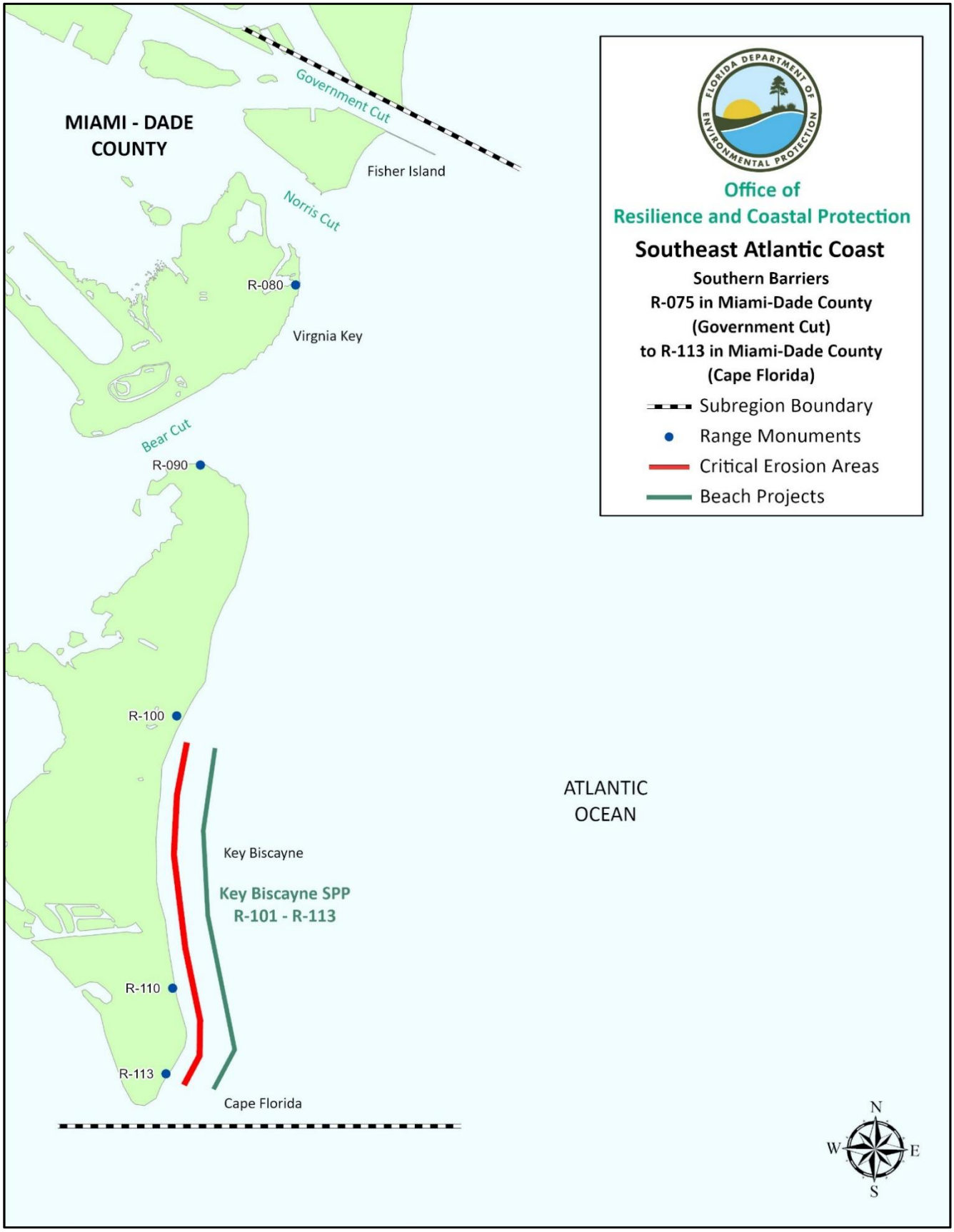


**Figure 5.** Map of Southern Barriers subregion of the Southeast region of Florida. View an interactive map.

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