

Strategic Beach Management Plan:
Central Atlantic Coast Region

Division of Water Resource Management

Florida Department of Environmental Protection

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Table of Contents

Introduction – Central Atlantic..... 1

Cape Canaveral..... 1

 Strategies for Inlets and Critically Eroded Beaches 2

 Kennedy Space Center, Brevard County, V065-V090 2

 Canaveral Inlet, Brevard County, V167-R1 2

 Canaveral and Cocoa Beach (North Reach), Brevard County, R1-R53 4

 Patrick Air Force Base, Brevard County, R53-R75.3..... 4

 Satellite Beach and Indian Harbour (Mid-Reach), Brevard County, R75.3-R118 5

 Indialantic to Spessard Holland park (South Reach), Brevard County, R118-R139..... 6

 South Brevard County, R139 –R202 7

 Regional Strategies for Beach and Inlet Management..... 7

 Sponsors and Funding..... 7

 Project Coordination 8

 Environmental Protection 8

 Sand Sources 8

 Additional Information 9

 References..... 11

Indian River Coast..... 14

 Strategies for Inlets and Critically Eroded Beaches 14

 Sebastian Inlet, Brevard R219 to Indian River County R1..... 14

 Countywide Studies and Projects, Indian River County..... 16

 Ambersand Beach, Indian River County, R1–R17..... 16

 Orchid Island and Wabasso Beach, Indian River County, R17-R51.3..... 18

 Vero Beach, Indian River County, R70–R86 18

 South County Beach, Indian River County, R99–R115.7 19

 Regional Strategies for Beach and Inlet Management..... 20

 Sponsors and Funding..... 20

 Project coordination 20

 Environmental Protection 20

 Sand Sources 21

 Innovative Projects..... 21

Additional Information	21
References.....	24
St. Lucie Beaches	26
Strategies for Inlets and Critically Eroded Beaches	26
Fort Pierce Inlet, St. Lucie County, R33-R34.....	26
Fort Pierce, St. Lucie County, R34–R46	27
Regional Strategies for Beach and Inlet Management.....	29
Sponsors and Funding.....	29
Project Coordination	29
Environmental Protection	29
Sand Sources	30
Additional Information	30
References.....	33
Treasure Coast	35
Strategies for Inlets and Critically Eroded Beaches	35
Walton Rocks, St. Lucie County, R80-R90.3.....	35
South St. Lucie County Beaches, St. Lucie County, R98-R115+1000 (County Line).....	35
Hutchinson Island, Martin County, R1-R34.3.....	36
Bathtub Beach and Sailfish Point, Martin County, R34.3-R40	37
St. Lucie Inlet, Martin County, R44-R45	38
Jupiter Island, Martin County, R45–R111	39
Regional Strategies for Beach and Inlet Management.....	41
Sponsors and Funding.....	41
Project Coordination	41
Environmental Protection	41
Sand Sources	42
Additional Information	42
References.....	45
Appendix - Acronyms	i



Jupiter Island Beach Nourishment Project, 2016. Photo courtesy of the Town of Jupiter Island.

Introduction – Central Atlantic

The Central Atlantic Coast Region has a total of 136.6 miles of beaches of which, 82.9 miles are critically eroded and 45.6 miles are actively managed. There are also four inlets within the Central Atlantic Region, all of which have an [inlet management plan](#). For additional beach management or project information, see the current [Critically Eroded Beaches Report](#), the [joint coastal permits](#) by county or the [local government funding requests](#) by county. Each subregion listed below will have the 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 Reference or Range (R monument) for the critical erosion area. For inlets, river entrances or passes, the title, the county, and the adjacent R monuments will be stated. On federal lands near Cape Canaveral, virtual (V) monuments are used to identify project locations. 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 and for background information, see the Strategic Beach Management Plan’s Introduction.

[Strategic Beach Management Plan’s Introduction](#)

[Northeast Atlantic Coast Region](#)

[Southeast 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 three hurricanes, Hermine, Matthew and Irma during the 2016 and 2017 Atlantic Hurricane Seasons. To see additional information for strategies and funding to address recovery for the beaches and dunes, see the “[Hurricane Damage Assessment Report for 2016: Florida’s Beaches and Dunes](#)”. For the 2017 Hurricane season, see the “[Hurricane Irma Post-Storm Beach Conditions and Coastal Impact in Florida](#)” report. The post-storm survey data has been fully

analyzed and an updated list of critically eroded beaches is in the Critically Eroded Beaches Report.

Cape Canaveral

The Cape Canaveral subregion has 71.6 miles of beaches, extending from the Volusia–Brevard County line to the Sebastian Inlet at the Brevard–Indian River County line, as shown in Figure 1. There are 41.2 miles of critically eroded beaches in this subregion, of which 17.2 have been restored and maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes, and the effects of Canaveral Inlet. The most erosive storms in recent years were Hurricane David in 1979, northeasters in November and December 1981, the Thanksgiving Day northeaster of 1984, Hurricane Erin (1995), Hurricanes Floyd and Irene (1999), Tropical Storm Gabrielle (2001), Hurricanes Frances and Jeanne (2004), Hurricanes Ophelia and Wilma (2005), Subtropical Storm Andrea, October northeasters and Tropical Storm Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016) and Hurricane Irma (2017).

Strategies for Inlets and Critically Eroded Beaches

Kennedy Space Center, Brevard County, V065-V090

Kennedy Space Center was established in 1962 as a launch facility, and has been operating in that capacity for over 50 years at Cape Canaveral. In 2012, a 4.7-mile segment along Kennedy Space Center’s shoreline (V065-V090) was classified as critically eroded, and threatening manned spacecraft facilities, launch pads, Phillips Parkway and buried infrastructure. A truck haul using upland sand that was stockpiled in the Cape Canaveral Air Force Station, placed 85,000 cubic yards (cy) in Spring 2014 to rebuild and reinforce dunes in the Kennedy Space Center. Additional beach and dune restoration is being investigated and currently the [DRAFT Environmental Assessment for KSC Shoreline Protection Project of March 2015](#) is under review for evaluating the best alternatives for shoreline protection.

Strategy: Coordinate beach and dune erosion control activities with the Kennedy Space Center.

Canaveral Inlet, Brevard County, V167-R1

In 1939, the Florida Legislature created the Canaveral Port District, which obtained funding authority in 1941. In 1945, the U.S. Congress, under the Rivers and Harbors Act, authorized construction of a deep-water harbor and channel on the recurving shoreline immediately south of Cape Canaveral. Canaveral Inlet was constructed in 1951 as part of the federal **Canaveral Harbor Navigation Project** at Port

Canaveral. The port and harbor construction was completed in September 1954. The lock that connects the west turning basin to the barge canal was constructed in 1965. Maintenance dredging of the entrance channel generally occurs on an annual or biannual basis with placement of the dredged material within a nearshore or offshore disposal area. The high percentage of fine grain sediment in the dredged material has precluded beach placement. The Sand Bypass I project was constructed in 1995, which bypassed 930,000 cy to R1 to R8. The Sand Bypass II project was constructed in 1998, which bypassed 1,000,000 cy of sand using material from the nearshore or beach zone north of the inlet and placing it on the beach south of the inlet between R3 and R14. Sand-tightening improvements to the south jetty were completed in 1995. The Florida Department of Environmental Protection (Department or DEP) adopted an inlet management plan (IMP) in 1996 to implement strategies for bypassing objectives and comprehensive monitoring. The Strategic Beach Management Plan of 2008 further adopted a minimum average annual bypassing objective of 156,000 cy to be placed to the south of Port Canaveral Inlet. Dredging was performed in 2004 to remove material shoaled in during Hurricane Frances. Sand-tightening construction and a 300-ft seaward extension of the north jetty were completed in November 2005. Sand bypassing was completed in December 2007 for the Sand Bypass III project, with placement of 750,000 cy between R3.5 and R10. Sand bypassing occurred again in the spring of 2010 for the Sand Bypass IV project, with placement of 683,100 cy between R2.3 and R3, and also between R4 and R12.6. A study was completed in 2014 to update the inlet's sediment budget. DEP subsequently adopted the [Port Canaveral Inlet Management Plan](#) (2014). The next and fifth sand bypassing event (SB-V) is scheduled for 2017. Learn more about [Port Canaveral projects and history](#).

Strategy: Follow the strategies listed in the updated (2014) Port Canaveral IMP. (1) Continue the existing comprehensive beach and inlet hydrographic monitoring program. (2) Continue the authorized inlet sand bypassing protocol. (3) The average annual bypassing objective shall achieve a minimum placement of 156,000 cy per year. (4) In order to bypass the natural net annual longshore sediment transport (approximately 210,000 cy), in addition to the minimum bypassing quantity in Strategy #3, an additional quantity equal to at least 54,000 cy per year equivalence of beach quality material shall be placed between R20 and R75, with priority placement south of R42. (5) All suitable material from maintenance dredging the Canaveral Harbor Entrance and the south jetty sediment trap containing less than 20 percent fines shall be placed in the authorized nearshore disposal area in the vicinity of R28 to R38 offshore from Cocoa Beach.

Canaveral and Cocoa Beach (North Reach), Brevard County, R1-R53

This is a 9.4-mile segment of critically eroded beach in central Brevard County from the south jetty at Canaveral Inlet (R1) to the south limits of Cocoa Beach (R53). The project history for this segment of shoreline is described in Table 1. The federal Brevard County Shore Protection Project was constructed in 2001. The project design consists of a beach berm at elevation +9 ft NGVD to protect the existing dune and upland development. The project is authorized until 2050. Following the effects of the 2004 hurricane season, nourishment was accelerated and constructed during the spring of 2005. Due to erosion from Hurricane Sandy, the North Reach was nourished again in 2014, with the assistance of FCCE funds. The next nourishment was completed in April 2018 and placed approximately 825,616 cy of beach quality material in the North Reach from an offshore borrow site.

Table 1. Brevard County Shore Protection Project - North Reach project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
April 2001	3,140,000	Offshore - Canaveral Shoals II	R3-R53	9.1
May 2005	754,600	Offshore - Canaveral Shoals II	R4-R20 and R33-R45	5.9
April 2014	972,410	Offshore - Canaveral Shoals II	R6-R24 and R33-R54	7.4
April 2018	825,616 *	Offshore - Canaveral Shoals II	R3.5-R22.5 and R34-R54	8.7

* Contract/ Pay volume.

Strategy: Maintain the project through monitoring, inlet sand bypassing and nourishment.

Patrick Air Force Base, Brevard County, R53-R75.3

This is a 4.0-mile segment of critically eroded beach extending the length of Patrick Air Force Base. The project history for this segment of shoreline is described in Table 2. The Patrick Air Force Base Beach Restoration Project was constructed between December 2000 and April of 2001. Following the effects of the 2004 hurricane season, nourishment was accelerated and constructed during the spring of 2005. A dune restoration project was constructed in 2011, placing 51,200 cy of material along two miles of shoreline between R64.5 and R75.3. A small dune project occurred in 2014, placing 17,000 cy of material between R64.5 and R70.

Table 2. Patrick Air Force Base Beach Nourishment Project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
April 2001	600,000	Offshore - Canaveral Shoals II	R53-R70	3.2
March 2005	258,300	Offshore - Canaveral Shoals II	R54.5-R65	3.9
March 2005	63,200	Offshore - Canaveral Shoals II	R65-R75.4	2.0
2011	51,200	Nearshore north of Port Canaveral's north jetty	R64.5-R75.3	2.0
2014	17,000	Upland Mine	R64.5-R70	1.0

Strategy: Maintain the project through monitoring and nourishment.

Satellite Beach and Indian Harbour (Mid-Reach), Brevard County, R75.3-R118

This is a 7.7-mile segment of critically eroded beach beginning at the southern boundary of Patrick Air Force Base and extending to just north of Indialantic. This area includes the communities of Satellite Beach and Indian Harbour Beach (R80-R104). Following the effects of the 2004 hurricane season, the design and permitting of a beach restoration project at the Mid-Reach segment of the federal **Brevard County Shore Protection Project** is ongoing. The project is authorized until 2050. In the interim, dune restoration projects were constructed in 2005, 2006, 2008, 2009, and 2014. This work maintained the emergency protective berms partially funded by the state in 2005; 2008 and 2014 were fully funded by the Federal Emergency Management Agency (FEMA), with additional sand and vegetation in 2006/2009. Dune restoration occurred in 2014, placing 191,770 cy of material in the Mid-Reach in response to damages sustained during Hurricane Sandy. Between 2005 and 2014, these projects have placed a total of 814,253 cy of sand on the Mid-Reach shoreline. The Department issued a permit in December 2009 for the restoration project, and the federal permit was issued in 2012. The project has been delayed for modifying the design plans for the project. Construction of the reef modules is scheduled for completion by October 2018 or early 2019 and sand placement is scheduled for 2020/2021. The mitigation reef will be constructed first, followed by the beach restoration project.

Strategy: Construct and maintain the Mid-Reach segment of the Brevard County Shore Protection Project; nourish dune as needed; monitor.

Indialantic to Spessard Holland park (South Reach), Brevard County, R118-R139

This is a 3.8-mile segment of critically eroded beach beginning at Indialantic and extending to Spessard Holland Park. The project history for this segment of shoreline is described in Table 3. Beach restoration was initially conducted in 1980, but was not maintained. A subsequent beach restoration project was completed in two segments. Segment I (R122.5-R139) was completed between February and April 2002. Segment II (R118.3-R123.5) was completed between March and April 2003. Following the effects of the 2004 hurricane season, nourishment of this project, referred to as the South Reach segment of the federal Brevard County Shore Protection Project, was accelerated. The project design consists of a beach berm at elevation +9 ft NGVD to protect the existing dune and upland development. The project is authorized until 2050. Beach nourishments were constructed during the spring of 2005, spring 2010 and early winter of 2014. The next nourishment was completed in April 2018 and placed approximately 273,312 cy of beach quality material in the South Reach from an offshore borrow site.

Table 3. Brevard County Shore Protection Project - South Reach project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
1980	No data	Trident Submarine Base	Indialantic Beach	No data
April 2003	1,431,000	Offshore -Space Coast Shoals II and Canaveral Shoals II	R118.3-R139	3.8
April 2005	578,910	Offshore - Canaveral Shoals II	R118-R139	3.8
April 2010	650,000	Offshore - Canaveral Shoals II	R118-R139	3.8
February 2014	692,418	Offshore - Canaveral Shoals II	R118-R139	3.8
April 2018	273,312 *	Offshore - Canaveral Shoals II	R118.5-R127 and R132-R139	2.9

* Contract/ Pay volume.

Strategy: Maintain the project through monitoring and nourishment.

South Brevard County, R139 –R202

This is an 11.5-mile segment of critically eroded beach. Following the effects of the 2004 hurricane season, emergency protective berms were funded by FEMA and the Department. Dune restoration projects were constructed in 2005, 2006, 2008, 2009, and 2014 to maintain the emergency protective berms with additional sand and vegetation. Between 2005 and 2014, these projects have placed 447,312 cy of sand on the South Beaches of Brevard. The dune restoration that occurred in 2014 placed 47,262 cy of upland material in the South Beaches. A state and local feasibility study was initiated in 2007 to study economic costs and benefits of storm-damage reduction associated with construction of an erosion control project along the 14.5-mile shoreline (R139-R219) of the Southern Brevard County study area. The study concluded that there were two shoreline reaches with potential net storm damage reduction benefits that are greatest, relative to project costs from a beach nourishment project. The two reaches are Reach A from R139 to R149.3 (1.8 miles), which is south of the existing South Reach project area, and Reach C between R164.5 to R176 (2.2 miles). Construction of a nearshore placement project in Reach A (R141-R151) has been permitted for the South Beaches. The proposed project is to place approximately 150,000 cy of beach compatible material in the nearshore at water depths of -24ft to -11ft NAVD 88. The South Beaches received emergency dune restoration due to Hurricane Matthew beginning in late October 2016, with upland sand placement in the amount of 99,384 cy between R143 to R213, the project was completed in March 2017.

Strategy: Maintain the dune project; construct a nearshore placement project and monitor.

Regional Strategies for Beach and Inlet Management

Sponsors and Funding

This subregion contains the governmental entities of Brevard County, the cities of Cape Canaveral, Cocoa Beach, Satellite Beach, Indian Harbour Beach, Melbourne, Indialantic, Melbourne Beach, the Canaveral Port Authority and the U.S. Army Corps of Engineers (USACE). The beaches of Cape Canaveral are within the [Canaveral National Seashore](#), Kennedy Space Center and Cape Canaveral Air Force Base. Patrick Air Force Base includes 4 miles of shoreline on Canaveral Peninsula. Participants with the Department as sponsors of beach management projects include [Brevard County](#), the [Canaveral Port Authority](#), and the [USACE](#). The sand bypass projects at Port Canaveral in 1995, 1998, 2007, and 2010 were carried out by the USACE, and were 100 percent federally funded. The USACE agreed to provide 100 percent federal cost share for construction of the North Reach in 2009, due to the results of

the independent coastal expert (ICE) study. 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 erosion control projects 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 the implementation of maintenance dredging and sand bypassing at Canaveral Inlet, which should and has been coordinated as much as possible with nourishment of the Brevard County Shore Protection Project. The USACE has acknowledged that 100 percent of the North Reach and Canaveral Inlet Sand Bypassing “construction costs” are federal responsibility to mitigate the impacts of the Canaveral Inlet impacts. The coordination between the Canaveral Port Authority, Brevard County and USACE represents one of the state’s better examples of regional sediment management (RSM) to bypassing inlet material (R1-R14) and maintaining the North Reach Shore Protection Project (R1-R53) of Brevard County.

Environmental Protection

The protection of marine turtles, right whales, beach mice, shorebirds and the nearshore hardbottom and sabellariid worm reef communities are primary environmental concerns within this subregion. The timing of construction activities has been restricted during the annual marine turtle nesting season (May 1 through October 31). The [Archie Carr National Wildlife Refuge](#) is within – and in close proximity to – the beach projects of this subregion. Project design and method of construction may be restricted to avoid or minimize adverse impacts to the listed species and their habitat. The operation of hopper dredges is restricted to avoid adverse impacts to marine turtles and right whales. The boundaries of project activities have been limited to avoid impacts to hardbottom and worm reef communities.

Sand Sources

Sand sources identified in a previous study and during design of the inlet bypassing and beach restoration projects appear to contain sufficient material for nourishment during the next 15 years. The Canaveral Shoal is estimated to contain more than 100 million cubic yards of beach compatible sand. However, borrow sources more conveniently located offshore of central and southern Brevard County are being investigated. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas (DMMA) and the maintenance dredging of the navigation

project has been incorporated into the maintenance of the beach restoration projects since the mid-1990s.

There is continued coordination between the Department, the USACE, [Bureau of Ocean Energy Management \(BOEM\)](#) and local governments to use best management practices with these offshore resources, and also determine where sand borrow sites are located offshore along the Atlantic shoreline. For additional information on sand sources, the Department manages the [Regional Offshore Sand Source Inventory \(ROSSI\)](#) database.

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 principals and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida's 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



Figure 1. Map of the beaches of Brevard County, including Cape Canaveral. View an [interactive map](#) or [COASTS imagery](#).

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Indian River Coast

There are 22.4 miles of beaches in the Indian River Coast subregion, which extends from Sebastian Inlet to the Indian River–St. Lucie County line, as shown on Figure 2. There is a total of 15.7 miles of critically eroded beaches in this subregion, of which 11.0 miles have been restored and maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes, and the effects of Sebastian Inlet. The most erosive storms in recent years were Tropical Storm Gilda (1973), a northeaster in October of 1974, Hurricane David (1979), the Thanksgiving Day Northeaster of 1984, the Halloween Day Northeaster of 1991, Hurricane Erin (1995), Hurricanes Floyd and Irene (1999), Tropical Storm Gabrielle (2001), Hurricanes Frances and Jeanne (2004), Hurricane Wilma (2005), and Subtropical Storm Andrea, October northeasters, Tropical Storm Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016) and Hurricane Irma (2017).

Strategies for Inlets and Critically Eroded Beaches

Sebastian Inlet, Brevard R219 to Indian River County R1

Sebastian Inlet is a man-made tidal inlet that was constructed in its present position in 1948, and is maintained by the Sebastian Inlet District. Sebastian Inlet State Park encompasses both the north and south sides of the inlet. Maintenance dredging of the channel and sediment impoundment basin (sand trap) occurs regularly, with placement of suitable material on the downdrift beaches south of the inlet. The Department adopted the [Sebastian Inlet Management Study Implementation Plan](#) in March 2000, which prescribed a bypassing requirement of 70,000 cy per year. The Department convened a new Technical Advisory Committee (TAC) in June 2004 for Sebastian Inlet. After examining available data, reports and analyses related to Sebastian Inlet, its sediment budget, and its impact on adjacent shorelines, the TAC recommended an updated bypassing objective of 90,000 cy on an average annual basis. This objective was never established in an updated inlet management plan, but was adopted within the strategies in the 2008 strategic beach management plan. In an effort to meet the bypassing objective, the District places material from dredging of the navigation channel and sand trap on the downdrift beaches. In addition to placement of maintenance dredge material, sand from upland sources has been placed on the beaches south of the inlet to meet the bypassing requirement. Recent efforts by Sebastian Inlet District have included the construction of the 300,000 cy capacity Dredge Material Management Area (DMMA) in 2011 to allow for more efficient processing of dredge material, re-alignment of the

inlet channel to improve navigability and increase dredge maintenance intervals, and expansion of the existing sand trap to increase structure efficiency and capacity.

Sebastian Inlet District has also implemented a comprehensive beach and inlet monitoring and modeling program to quantify inlet processes. This effort includes biannual surveys of the inlet and adjacent beaches, collection of local wave and water level data, and modeling of inlet processes. Placements within the DMMA consist of a range of material (silt/clay, sand and rock) that is not immediately beach compatible. The DMMA allows for sorting and screening of this material to recover beach compatible material, which is subsequently placed on the beach. Learn more about [Sebastian Inlet projects](#) and the [inlet history](#) from the District's web pages.

Following the impacts of Hurricane Francis and Jeanne in 2004, a project was constructed in the spring of 2007 between R4 and R17, using approximately 85,700 cy of beach quality sand that was dredged from the sediment impoundment basin of Sebastian Inlet. Additional material was placed on the beach south of the inlet in 2007 in the amount of 204,900 cy, from an offshore sand source that was placed on the beach south of the inlet. A newly constructed sediment impoundment basin, or Dredge Material Management Area (DMMA), was constructed in 2011 within Sebastian Inlet State Park that is capable of holding up to 30,000 cy of dredge material. Maintenance dredging of the sand trap and channel in the amount of 141,251 cy and 119,851 cy was placed on the beach and the remainder (21,400 cy) was placed in the DMMA in 2012 for phase I of the project. The beach quality material was placed along the beaches south of the inlet between R4 – R8.5. Additional material of 34,600 cy was placed on the beach between R8.5 and R17 in 2013.

The Sebastian Inlet District removed 160,539 cubic yards of material from the Sebastian Inlet interior sand trap in 2014 through hydraulic excavation. Of this volume, 111,242 cubic yards of beach compatible material and was placed on the beach between R3 and R7. The remaining 49,297 cubic yards was placed in the DMMA. The Sebastian Inlet District performed a Screening and Truck Haul Beach Placement Project in February 2015 using material stored in the DMMA, which resulted in approximately 55,818 cubic yards of material being placed on the downdrift beaches between R11 and R17. The Sebastian Inlet District later placed 30,742 cy of material from the DMMA between R10 and R17 in 2017 in response to Hurricane Matthew.

Strategy: Continue to bypass suitable sediment to the beaches south of the inlet from dredging of the inlet sand trap and from alternative sources as needed, to meet or exceed an average annual placement objective of 90,000 cy; maintain beaches south of the inlet that have been restored; implement a

comprehensive beach and inlet monitoring program and based on the data, update the sediment budget and inlet management plan.

Countywide Studies and Projects, Indian River County

In 1986, the federal Indian River County Shore Protection Project was authorized for the Atlantic shoreline of Sebastian Inlet State Park (1.7 miles) and the City of Vero Beach (1.7 miles), with periodic nourishment. Studies completed in 1987 showed that it was economically feasible to extend the Vero Beach segment northward 0.9 miles to Tracking Station County Park. The project has not been implemented to date. A limited re-evaluation report of the Vero Beach segment was completed in 2000 by the USACE.

In 1988, the Indian River County Board of County Commissioners adopted a [Beach Preservation Plan](#), which has been updated in 1998, 2008, and 2015. This plan divided the county into eight sectors. The updated plan proposed restoration and maintenance of beaches that have been impacted by the presence of Sebastian Inlet, and beach restoration and maintenance of critically eroded beaches within the remainder of the county. In 1999, a feasibility study of beach management alternatives was performed, along with preliminary engineering and design for beach and dune restoration. As of 2016, most of the alternatives contained in this plan have been implemented. Based upon available records from 1978 to present, the county, Sebastian Inlet District, City of Vero Beach and private residents have placed approximately 3.6 million cy along the county's shoreline. Of this volume, approximately 2.2 million cy have been placed since 2002. After Hurricane Matthew (2016), Indian River County placed a total of 112,500 cy of upland material for emergency dune and beach repair between R10 and R105.4. The strategy for each segment of shoreline in Indian River County is presented below.

Ambersand Beach, Indian River County, R1–R17

This is a 3.1-mile segment of critically eroded beach immediately south of Sebastian Inlet that includes Sebastian Inlet State Park (R1-R4) and unincorporated Ambersand Beach (R4-R17). This segment of beach includes Sector 1 (R1-R11) and Sector 2 (R11-R17) in the county's Beach Preservation Plan. Sand from inlet bypassing is placed within the area from R4 to R17. The non-federal **Ambersand Beach Nourishment Project** was initially constructed from February to April of 2003 by Indian River County using an offshore sand source. The project design consisted of a beach berm at elevation +9 ft NGVD, and a dune crest elevation at +14 ft NGVD that constitutes six years of advance nourishment to protect the existing dune and upland development. During this 2003 project, approximately 536,600 cy of beach quality sand was placed between R3.5 and R17. The project constructed 6.6 acres of

artificial reef to mitigate for adverse impacts to 3.8 acres of nearshore hardbottom. A physical and environmental monitoring program was implemented in conjunction with project construction.

Following the impacts of Hurricane Francis and Jeanne in 2004, FEMA funded the construction of emergency protective berms. The project was constructed in the spring of 2007 between R4 and R12, using approximately 85,700 cy of beach quality sand that was dredged from the sediment impoundment basin of Sebastian Inlet. Additional material in the amount of 204,900 cy from an offshore borrow source was placed on the beach between R4 and R17 in December 2007. Maintenance dredging of the Sebastian Inlet sand trap and channel in the amount of 119,851 cy was placed on the beach in 2012 between R4 and R8.5 for phase I of the project. Additional material was placed on the beach between R8.5 and R17 in 2013 in the amount of 34,600 cy. Material in the amount of 111,200 cy was placed on the beach between R4 and R7 in 2014. Phase II maintenance dredging was completed in February 2015 to remove sand and rock from the sand trap, and beach compatible material of approximately 55,818 cy was placed in the Ambersand project area between R11 and R17. See project history in Table 4.

Table 4. Ambersand (Sectors 1 & 2) Project placement history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
April 2003	536,600	Offshore	R3.5-R17	2.6
April 2007	85,700	Inlet	R4-R12	1.5
December 2007	204,900	Offshore	R4-R17	2.5
2012	119,851	Inlet	R4-R8.5	0.9
2013	34,600	Inlet	R8.5-R17	1.6
2014	111,242	Inlet	R3-R7	0.8
February 2015	55,818	Inlet	R11-R17	1.1

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

Orchid Island and Wabasso Beach, Indian River County, R17-R51.3

This area includes 6.4 miles of critically eroded beaches in northern Indian River County. This segment includes Sector 3 (R17-R55) in the county's Beach Preservation Plan. This area was severely impacted by Hurricanes Floyd and Irene (1999), Hurricanes Frances and Jeanne (2004), and Hurricane Sandy (2012). Dune restoration projects were constructed at the county parks of Treasure Shores (R25), Golden Sands (R32), and Wabasso Beach County Park (R39) in 2005, following each major storm to supplement the emergency protective berms funded by FEMA. The County later constructed a beach restoration project titled the Indian River County Sector 3 Beach and Dune Restoration Project, that was constructed in three separate phases. The first phase was completed in 2010, which placed 267,182 cy; the second phase was completed in 2011, which placed 207,491 cy; and the third phase was completed in 2012, which placed 85,919 cy. The Sector 3 Project spans 6.6 miles of shoreline between R20 and R55 that had a total placement of approximately 560,592 cy of beach quality sand from upland sand mines. R51.3 through R55 is outside the state's designated critically eroded area, and this portion of the restoration project was not cost-shared by the state. The dune crest elevation of +12ft NAVD was from R25 to R27, and the dune crest elevation at R28 to R55 was +15ft NAVD.

The project sustained damages during Hurricane Sandy. Emergency dune repairs were constructed in Orchid Beach, Wabasso Beach Park, and Golden Sands Park under the Department's Emergency Order, with placement of 15,000 cy in 2013. An additional amount of 10,000 cy of sand was placed in the southern Sector 3 private project area (R51.3 –R55) through the Emergency Order. The repair project was constructed in winter 2014/2015, and placed a total of 173,068 cy of upland sand within the fill the template (R24 to R55) landward of the mean high water (MHW), and another 9,363 cy of sand seaward of the MHW between T38 and R40. A permit required mitigation reef (approximately 1.7 acres) is planned for construction in 2017. The next beach nourishment is planned for 2023/2024.

Strategy: Maintain the dune and beach restoration project through monitoring and nourishment.

Vero Beach, Indian River County, R70–R86

This is a 3.1-mile segment of critically eroded beach along the City of Vero Beach that includes a portion of Sector 4 (R55-R72) and all of Sector 5 (R72-R86) in the county's Beach Preservation Plan. Seawalls have been constructed through much of the sector.

This area was severely impacted by Hurricanes Frances and Jeanne (2004). Following the effects of the 2004 hurricane season, emergency protective berms were constructed using funds from FEMA. A dune restoration project consisting of additional sand and vegetation was constructed in 2005 to supplement the emergency protective berms being funded by FEMA. Another dune restoration project was conducted at the Conn Beach Access in March 2008. The County's Beach Preservation Plan recommends beach nourishment for the Sector 5 segment. The County is currently developing a feasibility study and environmental assessment, for USACE's and the Department's review, in order to determine the preferred alternative to manage this segment of critically eroded beach.

Strategy: Maintain the dune restoration project; develop design alternatives for environmentally acceptable beach management.

South County Beach, Indian River County, R99–R115.7

This is a 3.1-mile segment of critically eroded beach in southern Indian River County. This segment of beach includes most of Sector 7 (R97-R108) and a portion of Sector 8 (R108-R119) in the county's Beach Preservation Plan. Seawalls have been constructed along much of the area. This area was severely impacted by Hurricanes Floyd and Irene (1999) and Hurricanes Frances and Jeanne (2004). Following the effects of the 2004 hurricane season, emergency protective berms were constructed using funds from FEMA. A dune restoration project consisting of additional sand and vegetation was constructed in 2005 to supplement the emergency protective berms funded by FEMA. The Indian River County Sector 7 Beach Restoration Project was completed in the spring of 2007, which placed approximately 348,500 cy of beach quality sand between R97 and R108 using an offshore borrow site. Sixty-three percent of the total volume of sand was placed at the northern portion (R97-R102) of the project area, and was designed to be wider than the southern portion (R102-R108) to serve as a feeder beach. The northern portion (42 percent of total length) of the project has shown significant loss of material that was placed, while the southern portion has shown gain due to the feeder beach effect. The county is pursuing a permit to construct a beach nourishment project in Sector 7 and is scheduled for the winter of 2019/2020.

Strategy: Maintain the beach restoration project through monitoring and nourishment.

Regional Strategies for Beach and Inlet Management

Sponsors and Funding

This subregion contains the governmental entities of [Indian River County](#), the City of Vero Beach, the [Sebastian Inlet District](#) and the [Florida Inland Navigation District](#), all of which are participants with the Department as sponsors of beach management projects, except the City of Vero Beach. [Indian River County's beach preservation plan](#), dated February 2015, highlights the county's initiatives to preserve and manage their coastline. The [Division of Recreation and Parks](#) manages the Sebastian Inlet State Park and McLarty State Museum (R1-R11). 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 the coordination of placement of sand from bypassing activities at Sebastian Inlet with construction and maintenance of beach and dune restoration and nourishment projects. Previous Intracoastal Waterway maintenance dredging activities near Sebastian Inlet have not placed sand on the beaches, and neither does FIND's Long-Range Dredge Material Management Plan specifically identify the future beach placement of dredged material; however, further coordination of future projects may provide the opportunity for beach placement of dredged material

Environmental Protection

The protection of marine turtles, right whales, shorebirds, beach mice, and the nearshore hardbottom and sabellariid worm reef communities are primary environmental concerns within this subregion. Construction activities are not permitted during marine turtle nesting season (May 1 – October 31), and must adhere to specific permit conditions during the beginning and end of season from March 1 to April 30 and November 1 to November 30. The [Archie Carr National Wildlife Refuge](#) is in close proximity to the beach projects of this subregion. Project design and method of construction are restricted to avoid or minimize adverse impacts to the federal and state listed species and their habitat, as well as hardbottom communities. The Sebastian Inlet sediment impoundment basin is located within the boundaries of the [Indian River – Malabar to Vero Beach Aquatic Preserve](#). Projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than

in non-aquatic preserve waters during permitting and construction, to ensure preservation of the existing conditions.

Sand Sources

Sand sources to meet the needs of future projects in this subregion over the next 15 years have not been updated. An updated regional sand search and inventory should be performed to locate and characterize beach compatible sand. Sebastian Inlet District places material from an upland source on the downdrift beaches when sufficient material is not available from the channel and sediment impoundment basin (sand trap) for bypassing.

There are the North, Central, and South borrow areas offshore that contain sand for nourishment. The South borrow area has been used before, in 2003 (Ambersand Project) and 2007 (Sector 7). Both the North and Central borrow areas need additional geotechnical investigation to consider their use. There is continued coordination between the Department, the [USACE](#), [BOEM](#), and local governments to use best management practices with these offshore resources, and also determine where sand borrow sites are located offshore along the Atlantic shoreline. For additional information on sand sources, the Department manages the [Regional Offshore Sand Source Inventory \(ROSSI\)](#) database.

Innovative Projects

In 1996, PEP Reef™ experimental submerged breakwaters were installed along a segment of shoreline in Vero Beach (R80-R83). An evaluation report of the structures' performance, based upon a physical monitoring program, was published in 2003 by the independent third-party reviewer. The reviewer concluded that the PEP Reef's™ effect on attenuating wave energy was comparable to the effect of the natural hardbottom. After 34 months of monitoring, the beach in the vicinity of the PEP Reef™ lost volume. Based on the Department's assessment, the beneficial effects of the PEP Reef™ were not proven. The PEP Reef™ remains in place.

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 principals and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida's 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

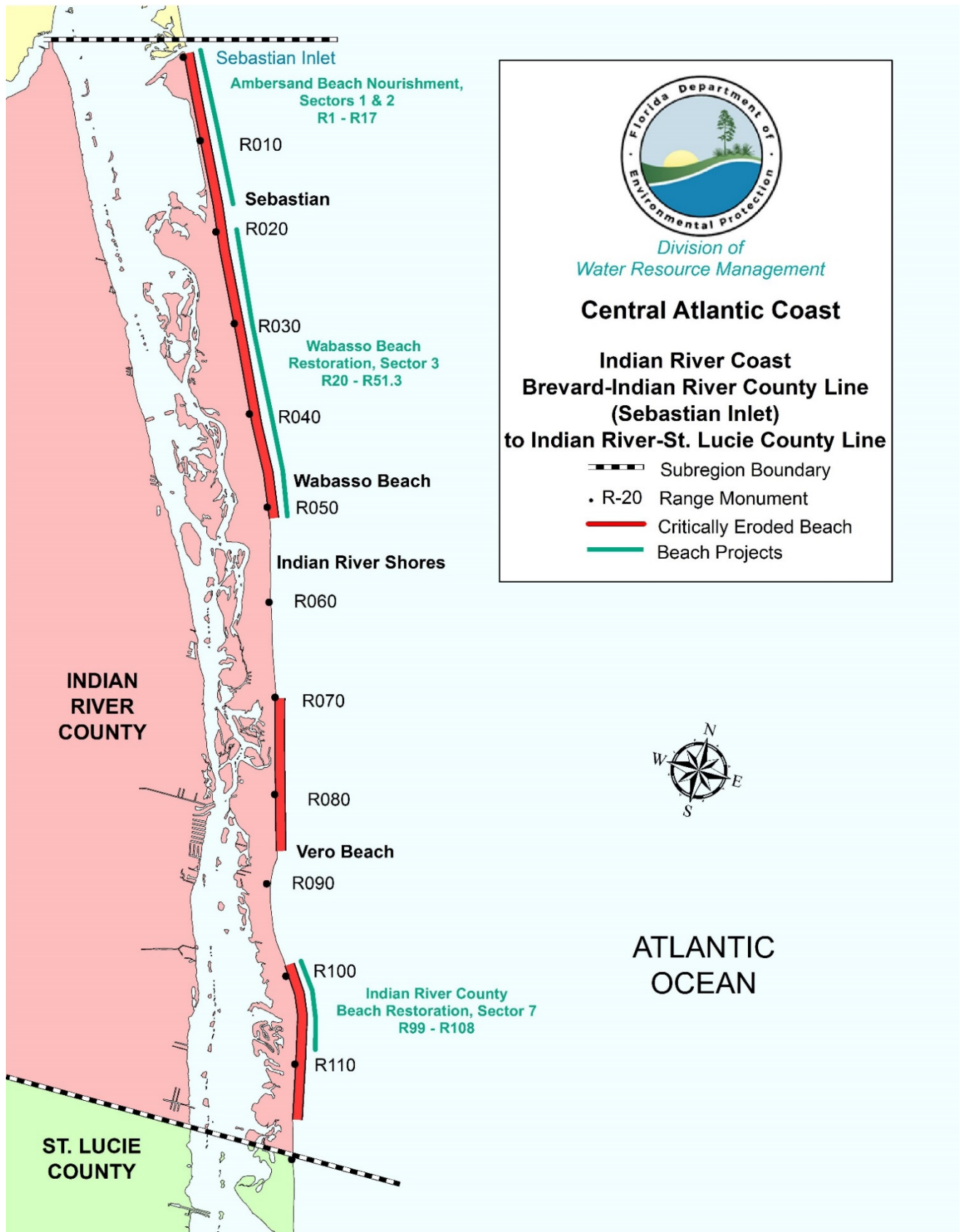


Figure 2. Map of Indian River County within the Central Atlantic Coast. View an [interactive map](#) or [COASTS imagery](#).

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St. Lucie Beaches

There are 14.8 miles of beaches in the **St. Lucie Beaches** subregion, which extends from the Indian River–St. Lucie County line to R80 in St. Lucie County, as shown on Figure 3. There are 2.3 miles of critically eroded beaches in this subregion, of which 2.3 miles are maintained.

Erosion is attributed to frequent northeasters, occasional tropical storms and hurricanes, and the effects of Fort Pierce Inlet. The most erosive storms in recent 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, October northeasters, Tropical Storm Noel (2007), Tropical Storm Fay (2008), Hurricane Sandy (2012), Hurricane Matthew (2016) and Hurricane Irma (2017).

Strategies for Inlets and Critically Eroded Beaches

Fort Pierce Inlet, St. Lucie County, R33-R34

Fort Pierce Inlet, part of the federal Fort Pierce Harbor Navigation Project, was constructed in 1920–1921, initially dredged in 1938, and deepened in 1995. Maintenance dredging of the entrance channel has been conducted, with disposal of the beach compatible dredged material on the adjacent downdrift beach south of the inlet for the following years: 1978, 1987, 1989, 1990, 1994, 1995, 1998, and 2014. Construction of a spur jetty attached to the south jetty was completed in 1997. The [Fort Pierce Inlet Management Study Implementation Plan](#) was adopted by the Department in 1997. A feasibility study was conducted in 2005 to evaluate potential sand bypassing at Ft Pierce Inlet. Feasibility study and design alternatives for the Ft Pierce Inlet sand trap have been considered by St. Lucie County, and the design of a sand trap was considered (alternative 2) with a capacity of 203,000 cy. The Department issued a Joint Coastal Permit in May 2016 for the construction (Phase 1) of a 60,000-cy sediment impoundment basin to periodically bypass the beach compatible material from the basin to the south side of Ft. Pierce inlet. The county is conducting a sand tracer study in 2016/2017 that will use benign fluorescent sand tracers to evaluate the patterns of deposition over time and spatially to determine the transport pathways and quantities. The tracer work is intended to support the impoundment basin project, and will provide valuable data in updating the sediment budget for Ft. Pierce Inlet. The tasks for updating the sediment budget are in the beginning phases with collection of topographic and hydrographic beach profile surveys and inlet bathymetry, along with analysis of historical inlet shoreline changes. The updated sediment budget is scheduled for completion in 2018.

Strategy: Bypass all beach compatible navigation channel maintenance dredging material to downdrift beaches south of the inlet; place supplemental material (from upland sources or offshore sources) on the downdrift beaches south of the inlet, such that the combined total of material from all sources equals or exceeds 130,000 cy on an average annual basis; construct a sediment impoundment basin (sand trap) within the inlet to facilitate bypassing of sand from the inlet to the downdrift beaches; implement a comprehensive beach and inlet monitoring program and, based on the data, update the sediment budget; based upon an updated sediment budget, update the Inlet Management Plan.

Fort Pierce, St. Lucie County, R34–R46

This is a 2.3-mile segment of critically eroded beach at Fort Pierce extending south of the inlet, and the project history for this segment of shoreline is described in Table 5. In 1971, the federal Fort Pierce Shore Protection Project restored 1.3 miles of shoreline immediately south of the inlet (R34-R41), using sand from a borrow area located 2,000 feet offshore of the project area. The initial project design consists of a beach berm at elevation +8.9 ft NGVD that constitutes ten years of advanced nourishment to protect the existing dune and upland development. Section 934 Reauthorization Report, approved by USACE in 1996, updated the nourishment cycle to seven years. Subsequently, a Limited Reevaluation Report (LRR) was approved by the USACE in 2007, which changed the frequency of future nourishments from a seven-year to a two-year nourishment cycle. The project is authorized until 2020. The local government is seeking a new 50-year project authorization for the Ft. Pierce Shore Protection Project, which will involve conducting a General Reevaluation Report (GRR) with the [USACE](#). The GRR is scheduled to have a draft completion date by the end of 2016 and a final GRR by the end of 2017.

Nourishment has been conducted using dredged material from maintenance of the Fort Pierce Inlet navigation channel. Additionally, nourishment was conducted in 1980 using sand from a borrow area located 2,500 feet offshore of the project area. Three sand-filled geotextile fabric tubes were placed as groins within 1,000 feet of the south jetty in 1994 to address the ongoing erosion problem. In 1997, a jetty spur was constructed on the south jetty to accumulate sand south of the south jetty. The geotextile groins began to deteriorate and were eventually removed. In 1999, the shoreline was nourished using sand from a borrow area located three miles offshore at Capron Shoal, with subsequent nourishment utilizing the same source in 2003, 2004, 2005, 2007, 2009, 2012, and 2013. The 1999 project included construction of 5.0 acres of artificial reef, sea oat planting, and exotic vegetation removal from Coon Island, as a multi-component mitigation to offset adverse impacts to 8.9 acres of nearshore hardbottom.

The nourishment project acts as a feeder beach for an additional one mile beyond the 1.3-mile placement area. Performance monitoring of the beach has demonstrated that the placement of sand within the 1.3-mile project area maintains the entire critically eroded area.

Following the effects of the 2004 hurricane season, maintenance nourishment was conducted from April to June of 2005. The 2005 nourishment event placed approximately 616,000 cy of beach quality sand from R34 to R41. Nourishment from 2007 through 2013 used material from the offshore borrow site (Capron Shoal), except in 2011 when an upland sand source was used for emergency response. Material was placed in the project template in 2014 as a part of the FCCE inlet dredging project. Additional material in the amount of 319,091 cy was placed on the beach in 2015, between R34 to R38. The next nourishment is planned for April 2018 with an approximate volume of 385,000 cy of material from offshore.

Table 5. Fort Pierce Shore Protection Project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
July 1971	718,000	Offshore	R34 to R41	1.3
1980	346,000	Offshore	R34 to R41	1.3
March 1999	830,000	Capron Shoal	R34 to R41	1.3
April 2003	336,000	Capron Shoal	Fort Pierce Inlet to R36	0.42
April 2004	406,000	Capron Shoal	Fort Pierce Inlet to R36.5	0.51
May 2005	616,000	Capron Shoal	R34 to R41	1.3
April 2007	503,800	Capron Shoal	R34 to R41	1.3
May 2009	189,600	Capron Shoal	R34 to R35.4	0.27
April 2011	62,000*	Upland Sand	R34 to R35	0.20
March 2012	499,800	Capron Shoal	R34 to R38	0.82
May 2013	431,301	Capron Shoal	R34 to R38	0.82
April 2014	164,100	Inlet and IWW	R34-R35.5	0.28
May 2015	319,091	Offshore	R34 to R38	0.82

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
May 2018	385,000*	Offshore	R34 to R38	0.82

**Emergency Response for 2011 project and *approximate volume for the 2018 project.*

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

Regional Strategies for Beach and Inlet Management

Sponsors and Funding

This subregion contains the governmental entities of [St. Lucie County](#), the City of Fort Pierce, the [Florida Inland Navigation District](#), and the [USACE](#), which are all participants with the Department as sponsors of beach management projects, except the City of Fort Pierce. 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 coordinating the placement of sand from bypassing activities at Fort Pierce Inlet, with construction and maintenance of the beach and dune restoration project.

Environmental Protection

The protection of marine turtles, right whales, shorebirds, and the nearshore hardbottom and sabellariid worm reef communities and their habitat are primary environmental concerns within this subregion.

The timing of construction activities has been restricted during the marine turtle nesting season of May 30 through October 31 in the northern portion (R34-R37) and May 15 through October 31 through the southern portion (R37-R41). Project design and method of construction are restricted to avoid or minimize adverse impacts to the federal and state listed species and their habitat. The boundaries of project activities are limited to avoid impacts to hardbottom and worm reef communities.

Sand Sources

During planning and design of the Fort Pierce Shore Protection Project, a sufficient quantity of sand for completion of initial restoration and nourishment for the next 15 years was identified in Capron Shoal. A regional sediment management strategy that uses beach quality sand from upland dredged material management areas and the maintenance dredging of the navigation project should be incorporated into the maintenance of the beach restoration project. 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 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 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 (year 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](#) and local governments to use best management practices with these offshore resources. For additional information on sand sources, the Department manages the [Regional Offshore Sand Source Inventory \(ROSSI\)](#) database.

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 principals and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida's 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

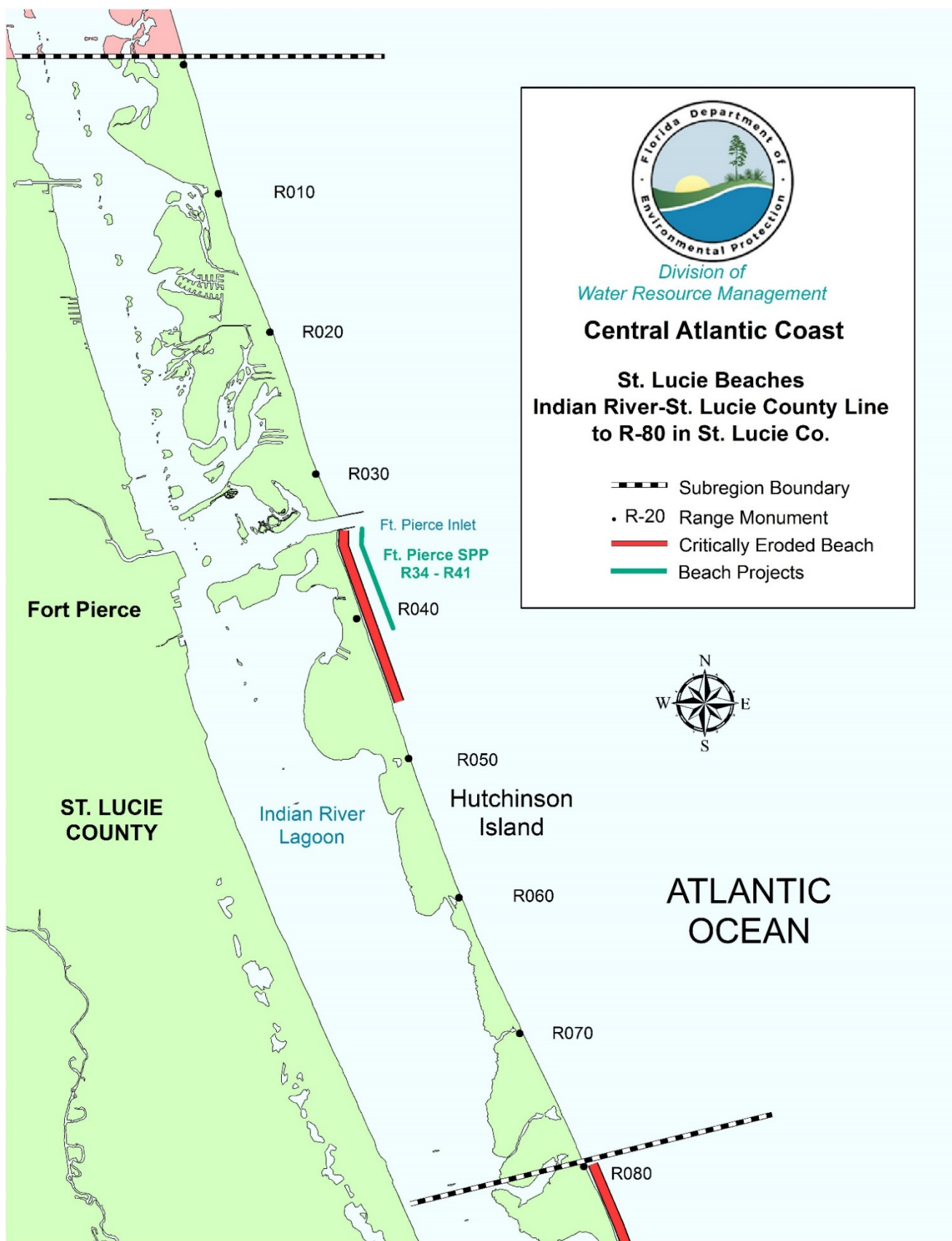


Figure 3. Map of St. Lucie County beaches. View an [interactive map](#) or [COASTS imagery](#).

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Treasure Coast

There are 27.8 miles of beaches in the Treasure Coast subregion, which extends from R80 in St. Lucie County to the Martin–Palm Beach County line, as shown on Figure 4. There are 23.3 miles of critically eroded beaches in this subregion, of which 14.9 have been restored and maintained.

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

Strategies for Inlets and Critically Eroded Beaches

Walton Rocks, St. Lucie County, R80-R90.3

This segment includes 1.9 miles of critically eroded beaches on Hutchinson Island in southern St. Lucie County, where the St. Lucie Nuclear Power Plant facilities, Walton Rocks County Park, and private condominium developments are located. This segment is predominantly within the U.S. Fish and Wildlife Service – Coastal Barrier Resources Act – Unit P11, in which the Power Plant Facilities and the Sand Dollar Shores and Dune Walk Condominiums are excluded. This area was severely impacted by Hurricanes Frances and Jeanne (2004). In 2004, the U.S Army Corps of Engineers initiated a feasibility study to evaluate a beach restoration project from R77 to just south of R115 (the Martin County line). In 2007, dune restoration was conducted from R88 to R90. In 2012, at the St. Lucie Nuclear Power Plant facilities, a steel sheet-pile seawall along 350 ft. of coast at R81 was constructed to protect the nuclear power plant’s cooling water intake canal.

Strategy: Maintain the dune restoration.

South St. Lucie County Beaches, St. Lucie County, R98-R115+1000 (County Line)

This is a 3.4-mile segment of critically eroded beach on Hutchinson Island in southern St. Lucie County along private residential condominium developments. This area was severely impacted by Hurricane Irene (1999) and Hurricanes Frances and Jeanne (2004). In 2004, the USACE initiated a feasibility study, which encompasses R77 to just south of R115 (the Martin County line). An Environmental Impact Statement and sand search were completed by the County in conjunction with the planning and

design for a non-federal project on South St. Lucie County Beaches, completed in 2013. The county identified the St. Lucie Shoal as a sand source for the 2013 non-federal restoration project area and any future federal projects. Work by St. Lucie County was applied as a credit against an ongoing federal feasibility study for the proposed future federal project. In 2005 and 2006, an emergency dune restoration project was constructed from R97.7 to R114, using 160,000 cy of sand. The dune project was impacted by the passage of Hurricane Sandy shortly before the full beach restoration project was scheduled to begin, so storm repairs were designed to be completed in conjunction with the restoration. Restoration was completed in May 2013 between R98 through R115 + 1000 (County Line), with 635,164 cy of sandy material from an offshore borrow site placed along 3.4 miles of critically eroded beach. Construction of a 1.89-acre mitigation reef was initiated in 2013 to mitigate for hardbottom impacts. Construction of the mitigation reef was completed in 2015. The project has a ten-year nourishment interval, and the next nourishment is expected to occur by 2023 as a federal project. St. Lucie County is seeking to pursue a federally authorized project for this segment of shoreline, in coordination with the federally authorized Martin County Shore Protection Project just south of the South St. Lucie Project area. The [USACE](#) completed the Draft Integrated Feasibility Study and Environmental Assessment in April 2016 of St. Lucie County's southern 7.4-mile shoreline between R77 and R115/ County Line. The study will determine the final alternatives or tentatively selected plan (TSP) for the project area and is scheduled for final approval by summer 2017.

Strategy: Maintain and monitor the beach restoration project.

Hutchinson Island, Martin County, R1-R34.3

This is a 5.7-mile segment of critically eroded beach along southern Hutchinson Island fronting private residential development and county beach access parks. The federal Martin County Shore Protection Project provides for beach restoration and periodic nourishment along the northernmost 4.2 miles of the county shoreline (R1-R23). The local sponsor is Martin County. The federal project design consists of a beach berm at elevation +8.0 ft NGVD to protect the existing dune and upland development, and the project history for this segment of shoreline is described in Table 6. The project is authorized until 2046. Beach restoration was completed in April 1996, including an extension of the beach fill from R23 to R25 as a non-federal (locally preferred) project feature.

South of the federal project template, this critically eroded area was severely impacted by Hurricanes Frances and Jeanne (2004), as the eye of both storms made landfall near the House of Refuge (R29.5). From R25 to R26, emergency protective berms were constructed using funds from FEMA. A dune restoration project with vegetation was constructed in 2005 to supplement the emergency protective berms funded by FEMA, with approximately 94,000 cy of upland sand by way of a truck haul between R25 and R34. Hutchinson Island beaches were nourishment again with approximately 400,000 cy of material from an offshore borrow site and completion of the project was in April 2018.

Table 6. Martin County Shore Protection Project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
April 1996	1,340,000	Offshore	R1-R25	4
January 2001	178,000	Offshore	R16.2-R22.3	1.2
February 2002	126,000	Offshore	R13.5-R16.2	0.5
April 2005	885,000*	Offshore	R1-R25.6	4.2
May 2013	613,017	Offshore	R1-R25	4.0
April 2018	400,000	Offshore	R1-R25	4.0

*This volume combines the beach nourishment (R1–R25.6) and dune restoration volumes (R25 – R25.6).

Strategy: Maintain the project through monitoring and nourishment; determine environmentally acceptable alternatives for beach management for the area between R25 and R34.3.

Bathtub Beach and Sailfish Point, Martin County, R34.3-R40

Bathtub Beach and Sailfish Point (R34.3-R42.3) are south of the federal shore protection project area on Hutchinson Island, with a 1.0-mile segment (R34.3 to R40) of critically eroded beach at both Bathtub Beach and Sailfish Point. This critical erosion area added a 0.4-mile segment to their critical erosion area in 2015, which now reaches down to R40 for design integrity of the beach nourishment project. Both Bathtub and Sailfish Point encountered severe erosion from the 2004 hurricane season. A total of approximately 218,600 cy of sand has been placed directly within the study area shoreline (R35-R42) between December 2004 and February 2012. Bathtub Beach between R34 and R36 has received the placement of approximately 85,711 cy of sand from 2008 through 2013 by Martin County using an upland sand source. The county and the community of Sailfish Point obtained a permit in October 2015

to construct a beach nourishment project between R34.3 and R37.8 (Bathtub Beach), and a restoration project between R37.9 and R40 (Sailfish Point). The beach restoration project was completed in May 2016 and placed 325,400 cy of material on the 1,350-foot segment of Bathtub Beach and the 3,550-foot segment of Sailfish Point. Due to erosion from Hurricane Matthew, beach nourishment occurred again and was partially completed in May 2017 between R34.5 to R38 in the amount of 75,500 cy. The material came from inlet borrow area A and the Sailfish Point Navigation and Entrance Channel for the 2017 activities. Due to erosion from Hurricane Irma, the Bathtub Beach project was completed in April 2018 and placed a total of 140,000 cy between R34.5 and R36.

Strategy: Maintain the project through monitoring and nourishment; bypass material in accordance with the updated IMP.

St. Lucie Inlet, Martin County, R44-R45

St. Lucie Inlet was originally cut by local interests in 1892, and the inlet federal navigation project has been maintained since 1916. Between 1980 and 1982, construction of the south dog leg section of the north jetty, the sand impoundment basin, the detached breakwater south of the channel, and the south jetty were completed, which essentially established the current configuration of the St. Lucie Inlet. Following the 1982 improvements, maintenance dredging of the entrance channel was conducted at approximately four-year intervals, with placement along the one-mile segment of shoreline immediately south of the inlet. The exception occurred in 1996, when dredged material was placed within a nearshore disposal area.

The St. Lucie Inlet Management Study Implementation Plan was adopted by the Department in 1995. Inlet sand bypassing in 1997 included the transfer of beach compatible dredged material from the FIND's M-5 Dredged Material Management Area and from the adjacent Intracoastal Waterway channels to the beaches south of the inlet (R59-R65, R75-R82). Sand from a portion of the inlet flood shoal was transferred to the beaches south of the inlet (R78-R84, R92-R100) within the Town of Jupiter Island in 1999.

The USACE's St. Lucie Inlet Design Memorandum and Final Environmental Assessment (2000) identified both navigation and sand bypassing improvements. The project modifications include elevating the crest height of the north jetty beginning seaward of the weir section and ending at the southeasterly jetty extension, constructing a modified sediment impoundment basin, and disposing of maintenance dredge material in the following order of priority: on the beach beginning 5,000 feet south

of the inlet or into the nearshore south of the inlet at a depth of less than -16 feet NGVD. The nearshore disposal option is normally used in emergency dredging situations. The construction of the sediment impoundment basin was completed in August of 2002. The north jetty rehabilitation, completed in 2009, increased the height of the jetty to +8ft MLW. An updated sediment budget for St. Lucie Inlet was prepared for Martin County in 2014. Several local stakeholders and the Department have reviewed and analyzed the 2014 sediment budget, with the intent of adopting an updated IMP.

The updated [St. Lucie Inlet Management Plan](#) was adopted by the Department in January of 2016, and provides new strategies and new bypass objectives. A brief summary of the five strategies is listed below.

Strategy: Continue the existing comprehensive beach and inlet hydrographic monitoring program to evaluate performance and impact of existing bypassing and nourishment projects, and to update and define the inlet sediment budget; modify the inlet sand transfer protocol to permit the placement of inlet dredge material along the Atlantic beaches, both to the north and to the south of the inlet, within designated critically eroded areas between R34.5 and R111; the initial target bypassing quantities shall be the average annual placement of 161,000 cubic yards to the south and 34,000 cubic yards to the north; material excavated from the inlet system, including the sediment impoundment basin, the federal navigation channel and transition area, the Sailfish Point Marina channel and the inlet's ebb, flood and interior shoals, shall generally be the source of sediment for meeting the target bypassing quantities in Strategy 3; the nearshore placement of inlet dredge material shall generally not be conducted except for emergency dredging in the federal navigation channel only, and when placed in nearshore water depths less than -12 feet (MLW).

Jupiter Island, Martin County, R45–R111

This is an 11.5-mile segment of critically eroded beach south of St. Lucie Inlet along Jupiter Island, which includes the St. Lucie Inlet State Park and the Hobe Sound National Wildlife Refuge (NWF). The project history for this segment of shoreline is described in Table 7. The non-federal Jupiter Island Beach Nourishment Project (R75-R117) placed sand along a portion of the Town of Jupiter Island's shoreline using an offshore borrow source in 1973-74. The project design consists of a beach berm at elevation +9.9 ft NGVD to protect the existing dune and upland development. Nourishment of discrete segments of the Town's shoreline using offshore borrow areas was conducted on a three to four-year basis through 1996. In 1999, the St. Lucie Inlet flood shoal sand transfer project bypassed material to the Hobe Sound NWR segment of shoreline north of the Town of Jupiter Island. This area has sustained

historic erosion, overwash, and breakthrough threats to the environmentally sensitive Peck’s Lake and the culturally significant Joseph Reed Mound archeological site. Nourishment was initiated in the spring of 2006 and completed in 2007, due to damages sustained from the 2004 hurricane season. A summary of dredging events on Jupiter Island are presented below. Due to Hurricane Matthew (2016), the Town has received a grant from FEMA to assist with the next planned nourishment event in 2019/2020.

Table 7. Jupiter Island Beach Nourishment Project history.

Date Completed	Volume (cy)	Sand Source	Project Location (by R monument)	Length (mi.)
1973-1974	3,488,759	Nearshore borrow area	R82-R111	4.9
1977-1978	1,327,289	Nearshore borrow area	R87-R110	2.5
1983	1,000,000	Nearshore borrow area	R89-R95 and R102-R106	1.7
1987	2,234,869	Nearshore borrow area	R76-R81 and R87-R100 and R105-R111	3.1
1990	585,308	Offshore	R96-R102 and R106-R111	1.8
1991	414,812	Offshore	R77-R81 and R91-R98	1.7
1993	203,736	Offshore	R106-R111	0.8
1995-1996	1,741,134	Offshore	R76-R105	4.9
2002-2003	1,519,561	Offshore	R75-R84 and R88-R113 and Nearshore	5.8
2006-2007	1,706,711	Offshore	R76-R84 and R89-R111	5.1
2012	1,150,858	Offshore	R76-R84 and R91-R108	4.3
April 2016	1,670,455	Offshore	R76-R84 and R91-R113	4.9

Source: Gahagan & Bryant Associates and ATM for year 2016.

Strategy: Maintain the project through monitoring and nourishment; continue inlet sand bypassing in accordance with the updated IMP.

Regional Strategies for Beach and Inlet Management

Sponsors and Funding

This subregion contains the governmental entities of [St. Lucie County](#), [Martin County](#), the [Town of Jupiter Island](#), the [Florida Inland Navigation District](#), and the [USACE](#), which are all participants with the Department as sponsors of beach management projects. St. Lucie Inlet State Park and Hobe Sound National Wildlife Refuge are located on northern Jupiter Island. 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 potential coordination to provide for future concurrent nourishment of the South St. Lucie County Beaches with Martin County's Shore Protection Project that could provide an opportunity for future cost savings. In addition, coordination of maintenance dredging activities at St. Lucie Inlet and the Intracoastal Waterway with the inlet sand bypassing activities to enhance the eroded adjacent beaches and optimize the maintenance of the Jupiter Island beach restoration project.

Environmental Protection

The protection of marine turtles, right whales, shorebirds, and hardbottom/reef communities and their habitats are primary environmental concerns within this subregion. Project design and method of construction are restricted to avoid or minimize adverse impacts to the federal and state listed species and their habitat. The westward portion of the federal navigation channel at St. Lucie Inlet is surrounded by the boundaries of the [Jensen Beach to Jupiter Inlet Aquatic Preserve](#). While the federally authorized navigation channel is not classified as part of the aquatic preserve, projects located within and near the aquatic preserve boundaries require additional protection, including more stringent water quality standards than in non-aquatic preserve waters, during permitting and construction to ensure preservation of the existing conditions.

Sand Sources

The sand source for nourishment of the South St. Lucie County Beach Restoration project has been the St. Lucie Shoal, located offshore of St. Lucie and Martin County line. The sand source for nourishment of the federal Martin County Shore Protection project has been the Gilbert Shoal, located offshore of northern Martin County and the St. Lucie Shoal (borrow area B) offshore of the St. Lucie County/Martin County Line. Additional borrow area sites A and B are located offshore of Jupiter Island. 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 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 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 (year 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](#), 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 principals and statutes followed to help guide the state's management strategies
- Comprehensive list of Florida's 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

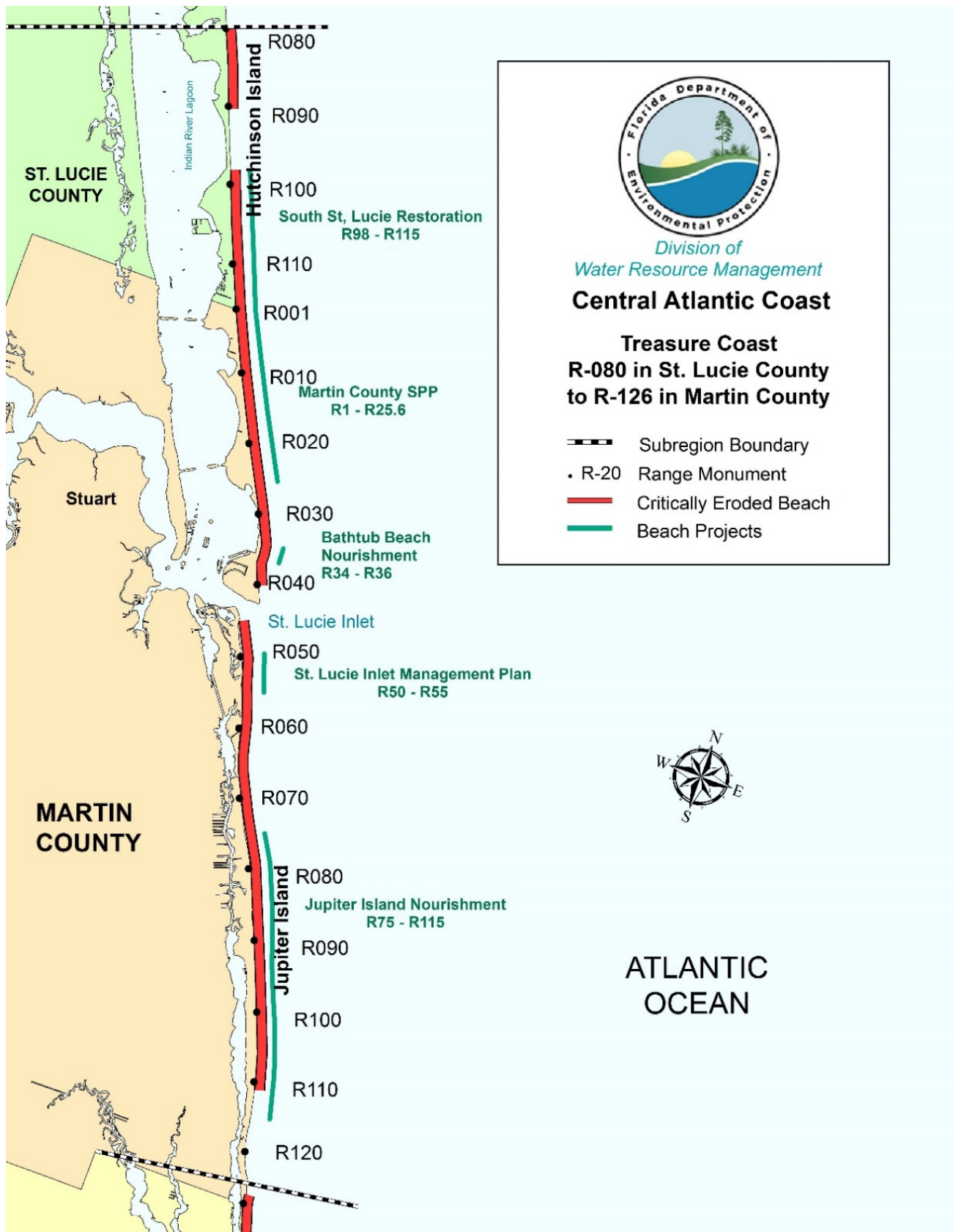


Figure 4. Map of the beaches located within the Treasure Coast in St. Lucie and Martin Counties. View an [interactive map](#) or [COASTS imagery](#).

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Appendix - Acronyms

Acronyms associated with the Florida Department of Environmental Protection’s Strategic Beach Management Plan:

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
- CSRSM – 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
- HSDR – Hurricane and Storm Damage Reduction
- LPP – Locally Preferred Plan
- LRR – Limited Reevaluation Report
- MMP – Marine Minerals Program
- NGVD 29 – National Geodetic Vertical Datum of 1929
- NAVD 88 – National American Vertical Datum of 1988
- NPS – National Park Service
- NWF – National Wildlife Refuge

- NEPA – National Environmental Policy Act
- NOAA – National Oceanic and Atmospheric Administration
- NHC – National Hurricane Center
- NWF – National Wildlife Refuge
- ODMDS - Ocean Dredge Material Disposal Site
- OCS – Outer Continental Shelf
- RSM – Regional Sediment Management
- SAJ – South Atlantic District, Jacksonville
- 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
- BCS – Beaches and Coastal Systems
- BIP – 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 Wildlife Commission
- 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
- OCULUS – DEP’s Electronic Document Management System
- OGC – Office of General Counsel
- R – Range or Reference Survey Monument/Survey Marker
- 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