September 2018

DRAFT ENVIRONMENTAL ASSESSMENT

FLOOD CONTROL AND COASTAL EMERGENCIES ACT (FCCE) TRUCK HAUL AND PLACEMENT OF SAND ON BROWARD COUNTY SHORE PROTECTION PROJECT (SPP) SEGMENT III

BROWARD COUNTY, FLORIDA-

US Army Corps of Engineers
JACKSONVILLE DISTRICT

US Army Corps of Engineers
JACKSONVILLE DISTRICT

PROPOSED FINDING OF NO SIGNIFICANT IMPACT

ENVIRONMENTAL ASSESSMENT FOR FLOOD CONTROL AND COASTAL EMERGENCIES ACT (FCCE) TRUCK HAUL AND PLACEMENT OF SAND ON BROWARD COUNTY SHORE PROTECTION PROJECT (SPP) SEGMENT III IN BROWARD COUNTY, FLORIDA

The U.S. Army Corps of Engineers, Jacksonville District (Corps) has conducted an environmental assessment in accordance with the National Environmental Policy Act of 1969, as amended (NEPA). The Corps assessed the effects of the following actions in the Environmental Assessment (EA), dated September 2018, for the Flood Control and Coastal Emergencies Act (FCCE) truck haul and placement of sand on Broward County Shore Protection Project (SPP) Segment III in Broward County, Florida. The project's potential impacts were previously analyzed in the Final Environmental Impact Statement for the Broward County Shore Protection Project, Segments II and III (May 2004).

The Corps evaluated a final array of three alternatives, including the Preferred and No Action Alternatives. The Preferred Alternative consists of the truck haul and placement of sand on critically eroded shoreline above the Mean High Water line (MHW) from Florida Department of Environmental Protection (FDEP) monuments R-86 to R-94 and R-98 to R-128 in response to erosion resulting from the passage of Hurricane Irma last September. The protective berm design is 50 feet wide at a variable elevation of 8.4 to 5.4 feet North American Vertical Datum 1988 (NAVD88). Approximately 123,200 cubic yards (CY) of sand will be placed above MHW. Sand would be truck hauled to the project location from two proposed commercial upland sand source mines: Ortona Mine and Witherspoon Mine.

Congress authorized the Broward County, Florida Beach Erosion Control and Storm Damage Reduction Project in Section 301 of the River and Harbor Act of 1965 (P.L. 89-298). Congress authorized periodic nourishments for 50 years from the date of initial construction in Section 506 of the Water Resources Development Act of 1996 (P.L. 104-303). The project authorization included beach erosion control and periodic renourishment for 15.6 miles of the shoreline of Broward County (R-25 to R-128, Segments II and III). The project provides for initial beach fill of adequate width and elevation and periodic nourishment county-wide, as needed. Each of the three segments were authorized to be constructed independently of each other as three separate usable parts. Segment III is further broken down into three portions: Dr. Von D. Mizell-Eula Johnson State Park (Park), city of Hollywood, and city of Hallandale. Initial construction

of the Park portion of Segment III occurred in late 1976 and early 1977. That project extended along approximately 1.52 miles of shoreline between R-86 and R-94. The physical performance of the 1977 project was assessed in 1988 as part of the planning for the project's first renourishment in 1989. The Park's first renourishment occurred in 1989, with additional renourishment in 2005 – 2006. The Hollywood and Hallandale project reach was originally constructed in 1979 and was fully renourished in 2006.

All practicable means to avoid and minimize adverse environmental effects are incorporated into the Preferred Alternative. Environmental commitments as detailed in the EA will be implemented to minimize potential impacts. Pursuant to the Endangered Species Act, the Corps has requested concurrence on the Corps determinations for potential effects to federally listed threatened and endangered species in the project area. Consultation is requested under the U.S. Fish and Wildlife Services (USFWS) 2015 Statewide Programmatic Biological Opinion (SPBO) for Shore Protection Activities along the Coast of Florida and the USFWS 2013 Programmatic Piping Plover Biological Opinion (P3BO).

Pursuant to the Coastal Zone Management Act, a Federal Consistency Determination (FCD), found in Appendix B of the EA, has been submitted to the FDEP for the State of Florida's review and concurrence. Prior to project implementation, the Corps will comply with any requirements identified by FDEP that are required for the project to be consistent to the maximum extent practicable with the Florida's Coastal Zone Management Plan. The placement of sand above MHW does not require a Clean Water Act Section 401 water quality certificate or a Section 404(b)(1) evaluation (40 CFR Part 230).

Consultation for the Preferred Alternative has been initiated with the Florida State Historic Preservation Officer and the appropriate federally-recognized tribes in accordance with the National Historic Preservation Act and consideration given under the National Environmental Policy Act. The Corps has determined that the Preferred Alternative will have no effect on historic properties eligible or potentially eligible for listing in the National Register of Historic Places; however, consultation is ongoing. Consultation will be completed prior to project implementation.

The Corps completed this EA in accordance with NEPA and the Corps' implementing regulations at 33 CFR Part 230. The draft EA, proposed FONSI, and associated appendices for the proposed project will be circulated for public review and comment for a 15 day comment period, and sent to pertinent agencies and interested parties and stakeholders. All applicable laws, executive orders, and regulations were considered in the evaluation of the alternatives. It is my proposed determination that the Preferred Alternative would not significantly affect the quality of the human environment; therefore,

preparation of an Environmental Impact Statement is not required.

Date: _____

_____
Andrew D. Kelly Jr.
Colonel, U.S. Army
District Commander

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ENVIRONMENTAL ASSESSMENT FOR
FLOOD CONTROL AND COASTAL EMERGENCIES ACT (FCCE)
TRUCK HAUL AND PLACEMENT OF SAND ON
BROWARD COUNTY SHORE PROTECTION PROJECT (SPP) SEGMENT III IN
BROWARD COUNTY, FLORIDA

1 PROJECT PURPOSE AND NEED

1.1 PROJECT DESCRIPTION

In response to damages from the passage of Hurricane Irma in September 2017, the U.S. Army Corps of Engineers, Jacksonville District (Corps) proposes to truck haul and place sand along 6.8 miles of critically eroded shoreline of the Broward County Shore Protection Project (SPP) Segment III.

Segment III of the Broward County SPP is located in Broward County, Florida, which is approximately 23 miles north of Miami Beach on the southeastern coast of Florida (*see* **Figure 1** for the project vicinity map). Segment III is further broken down into three portions: Dr. Von D. Mizell-Eula Johnson State Park (Park), Hollywood, and Hallandale. Although the original Segment III authorization limits extend approximately 8.1 miles, from Port Everglades to the Broward-Dade county line, only 6.8 miles have been constructed. The constructed portions of Segment III are located between Florida Department of Environmental Protection (FDEP) monuments R-86 to R-94 and R-98 to R-128 (*see* **Figure 1** for the Broward County SPP project extents map and **Figure 2** for the Segment III project extents map). The municipalities within the segment include Dania Beach, Hollywood, and Hallandale.

Approximately 123,200 cubic yards (CY) of sand will be placed along the project above mean high water (MHW) from FDEP monuments R-86 to R-94 and R-98 to R-128. The protective berm design is 50 feet wide at a variable elevation of 5.4 to 8.4 feet (NAVD88) (*see* **Figure 3** for example cross sections). Sand will be truck hauled to the project location from two proposed commercial upland sand source mines: Ortona Mine and Witherspoon Mine, which were previously evaluated in 2013 and 2015 Environmental Assessments (EAs) for the truck haul and placement of sand on Broward County SPP Segment II. The Corps is restricted from requiring contractors to purchase sand from specific mines; however, a sand specification is included in the contracting bid package which requires the contractor's sand to meet a certain set of criteria, consistent with the State of Florida sand rule for sand quality. Sand in the proposed upland mines is compatible with the native beach material and meets the State of Florida's sand rule for sand quality (Rule 62B-41.007(2)(j), F.A.C.).

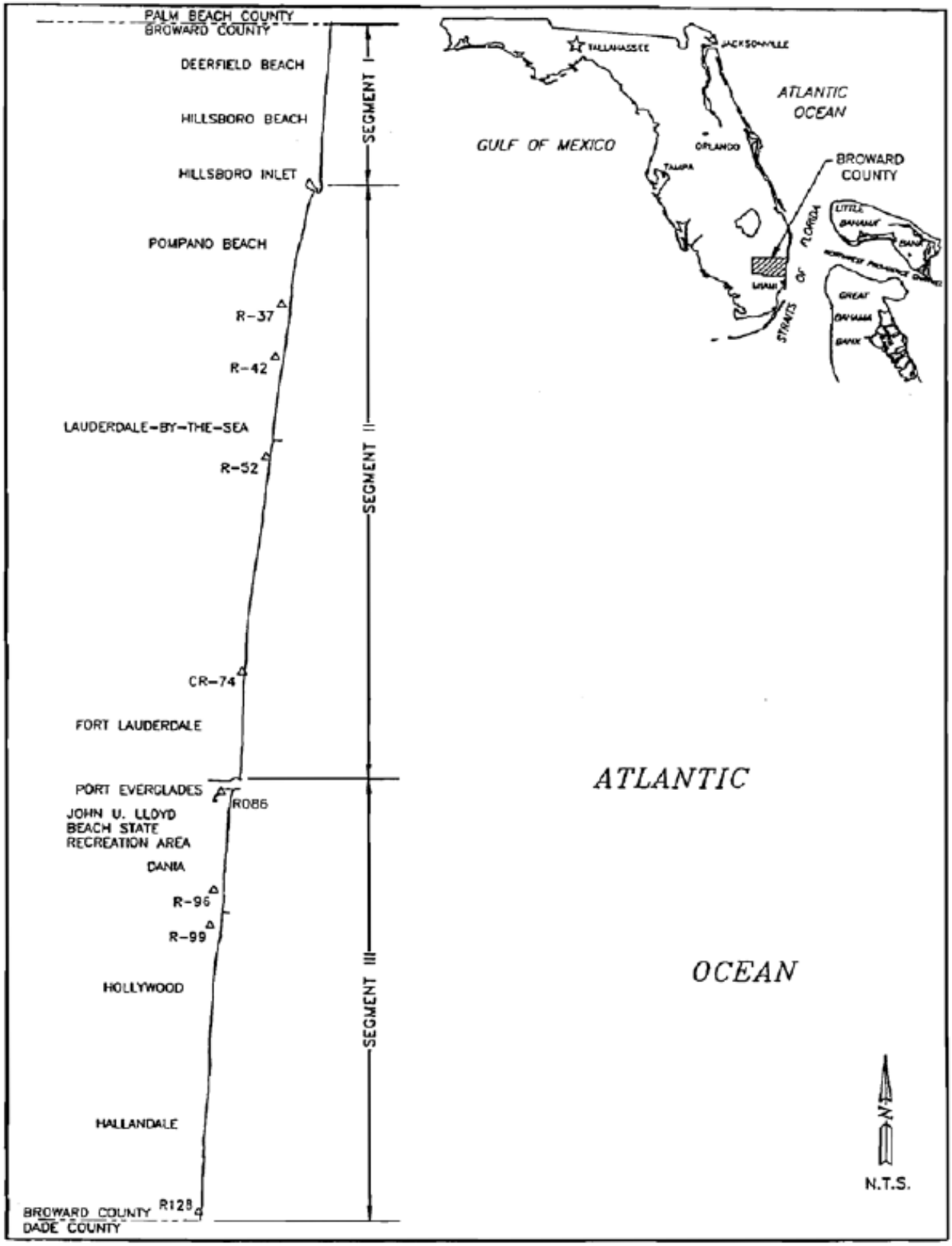

Figure 1. Broward County SPP extents map.
(SOURCE: Corps 2018.)

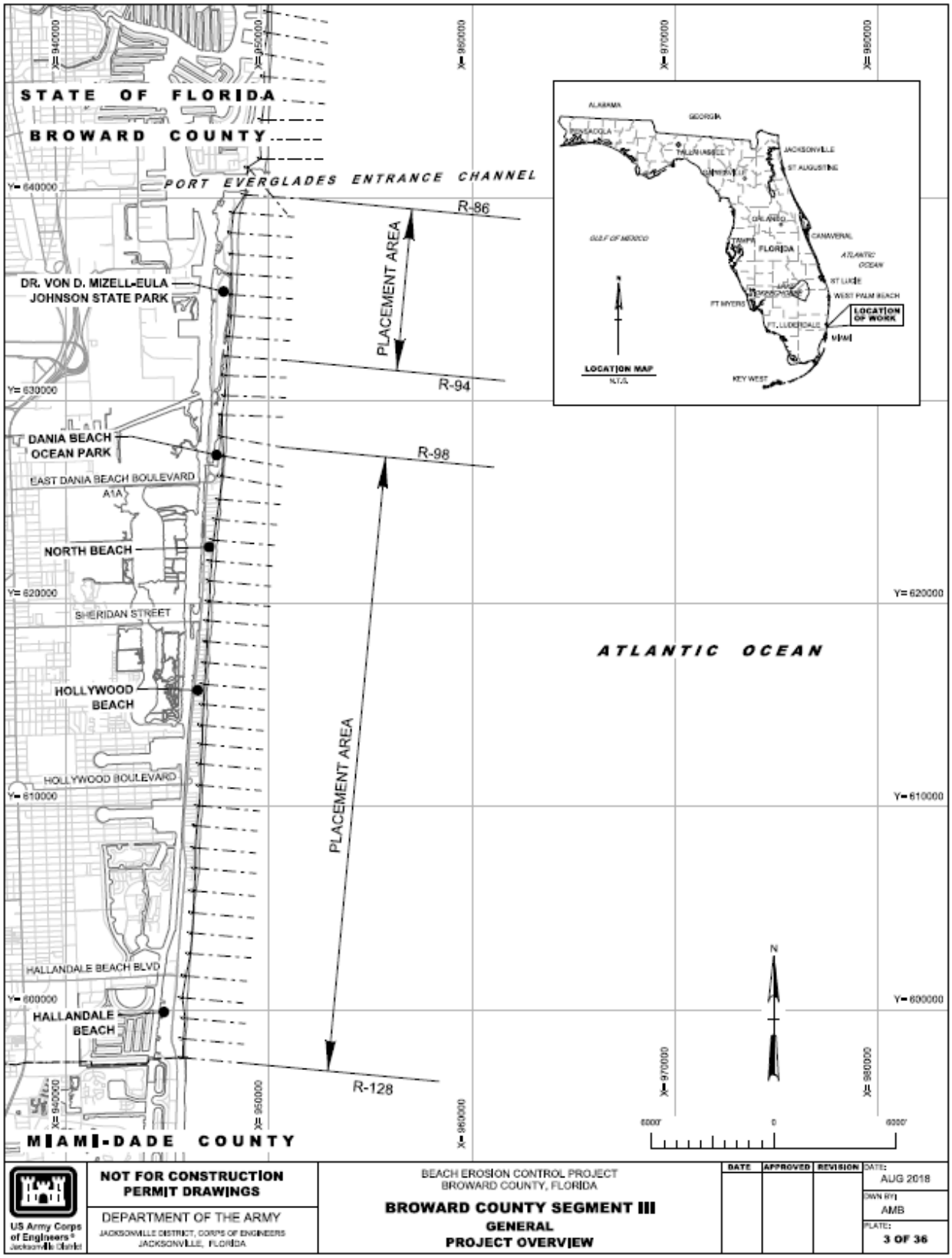

Figure 2. Broward County SPP Segment III project extents map.

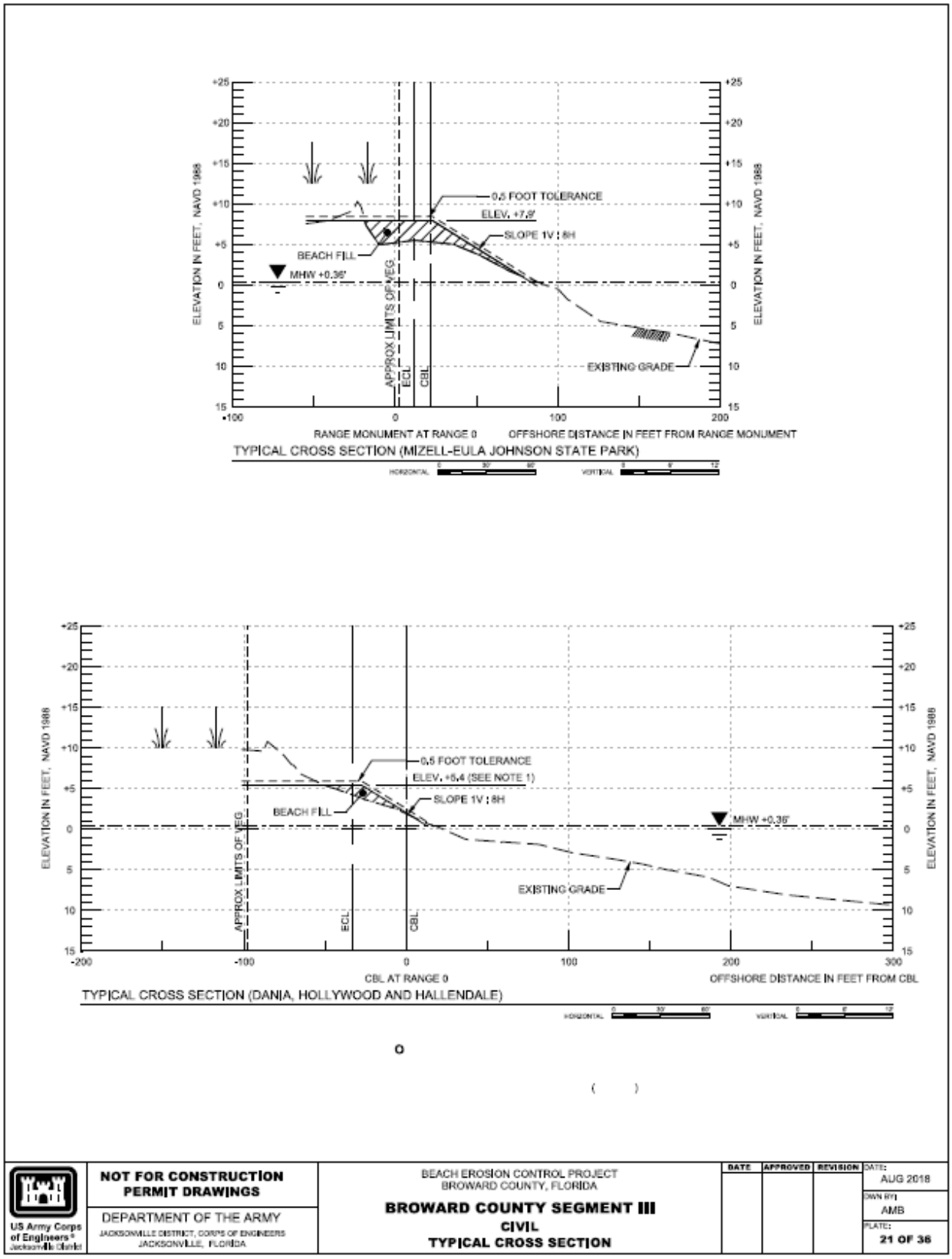

Figure 3. Typical project cross sections.

1.2 PROJECT AUTHORITY

Congress authorized the Broward County, Florida Beach Erosion Control and Storm Damage Reduction Project (now called the Broward County SPP) in Section 301 of the River and Harbor Act of 1965 (P.L. 89-298). The authorization included beach erosion control and periodic renourishment for 15.6 miles of the shoreline of Broward County (R-25 to R-128, Segments II and III). The project provides for initial beach fill of adequate width and elevation and periodic nourishment county-wide, as needed. Each of the three segments were authorized to be constructed independently of each other as three separate usable parts. Federal participation was limited to the first 10 years of project life. The project was authorized for construction by local interests, with subsequent reimbursement of the Federal share of project costs. Section 506 of the Water Resources Development Act of 1996 (P.L. 104-303) authorizes periodic nourishments for 50 years from the date of initial construction for Segment III.

A General Reevaluation Report (GRR) and Final Environmental Impact Statement (FEIS) was approved in May 2004 that modified the authorized project for the remainder of the project life for Segment III (until 2026). The periodic nourishment interval period for Segment III was estimated at six years, with an estimated 780,000 CY. The Department of the Army and Broward County, represented by the Mayor of the Board of County Commissioners, executed a Project Cooperation Agreement on September 29, 2004 providing for the initial periodic nourishment of Segment III. Federal participation for Segment III expires in 2026. Additional authorization for the project is included in Public Law 84-99 for Flood Control and Coastal Emergency (FCCE) rehabilitation of federal storm damage reduction projects.

1.3 PROJECT NEED OR OPPORTUNITY

Hurricane Irma made landfall along the Southwest Florida coast as a major, category 3 hurricane on September 10, 2017 and traveled northward along the Florida peninsula for the next 24 hours with hurricane force winds stretching nearly from coast to coast and tropical storm force winds extending much further beyond that. The storm had devastating consequences on Federal coastal storm risk management projects causing extensive beach and dune erosion along several hundred miles of Florida coastline. Due to the intensity and size of the storm coupled with a nor'easter in the time prior to tropical storm force wind arrival, high-energy waves and elevated water levels (storm surge and wave setup) affected areas far from the core of the storm over a duration of greater than a day. The combination of high waves and water levels over a long duration creates the potential for extensive beach erosion.

The goal of the project is to restore this section of Segment III to the design profile template and ensure the beach serves to reduce storm-induced impacts to inland infrastructure. In general, the shoreline along Segment III protects a densely developed area containing a combination of hotel/motel complexes, single family residential, commercial, and recreational developments. The protective value of the beaches along the previously constructed area of Segment III has been significantly reduced due to the impacts from Hurricane Irma. This has resulted in an increased damage potential through both direct wave attack as well as increased flooding risk to structures and roads.

A Project Implementation Report (PIR) for Segment III was prepared under Public Law 84-99 in response to the Hurricane Irma. Based on the pre- and post-storm survey data, portions of Segment III experienced erosion into the authorized design berm during Hurricane Irma. The eroded MHW line leaves portions of the project more vulnerable to future erosional events and coastal storm damage. The PIR determined that Segment III requires material to be placed on the beach to restore the beach profile to design profile template above the MHW line.

1.3.1 STORM-INDUCED BEACH VOLUME CHANGE

A site inspection conducted by Corps staff on September 14, 2017 indicated that some erosion had occurred in the project area as a direct result of Hurricane Irma. (*See* **Figure 4** for an example of post-storm shoreline conditions at the Park portion of the project area. *See* **Figure 5** for an example of post-storm shoreline conditions at the Hollywood/Hallandale portion of the project area.)

Figure 4. Post-storm shoreline conditions (looking south) along the Park portion of Segment III.
(SOURCE: Corps site visit, September 14, 2017.)

Figure 5. Post-storm shoreline conditions (looking south) in the Hollywood/Hallandale portion of Segment III.
(SOURCE: Corps site visit, September 14, 2017.)

Broward County's consultant, Olsen Associates, Inc., performed a volumetric change analysis to quantify the degree of storm damage to the project area from the hurricane. The most recent survey to use as a pre-storm survey for the Park portion of the project area (R-86 to R-94) was light detection and ranging (LIDAR) data, which was collected post Hurricane Matthew in November 2016. The most recent survey to use as a pre-storm survey for the Hollywood/Hallandale portion of the project area (R-101 to R-128) was a beach profile survey conducted for the City of Hollywood by Applied Technology and Management in July 2017, about two months before Hurricane Irma. Morgan & Eklund Inc. under contract to Olsen Associates, Inc. conducted the post-Irma beach survey for both portions of the project in October 2017. The pre- and post-storm survey profiles were compared and volumes were calculated using the average end area method.

Figure 6 shows a cross section beach profile in the Park portion of the Segment III project and **Figure 7** shows a profile in the Hollywood/Hallandale portion of the Segment III project. In general, both portions of the project experienced erosion into the upper berm area with some accretion below mean low water.

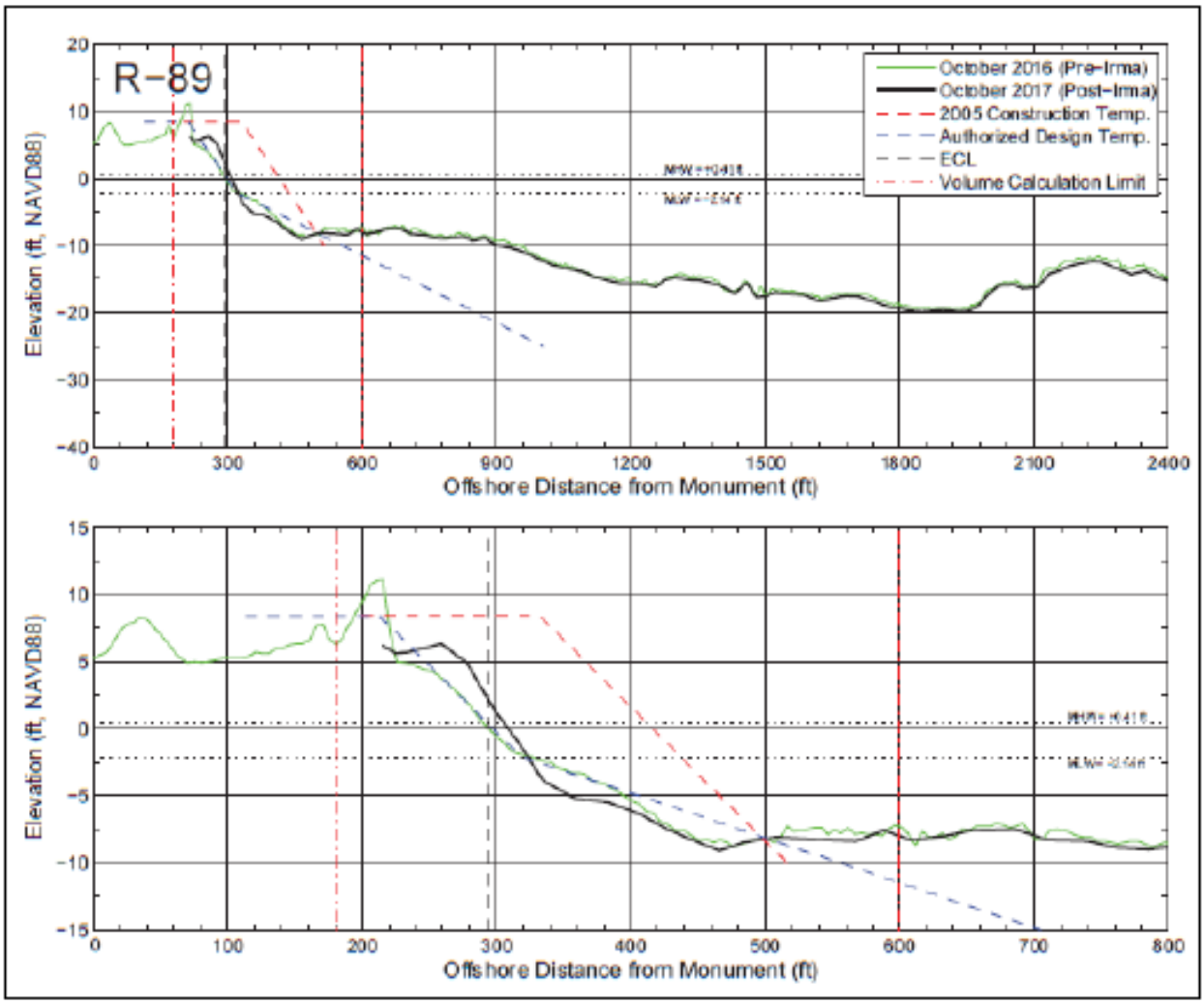

Figure 6. Profile at R-89 in the Park portion of the project area.
(SOURCE: Olsen Associates, Inc.)

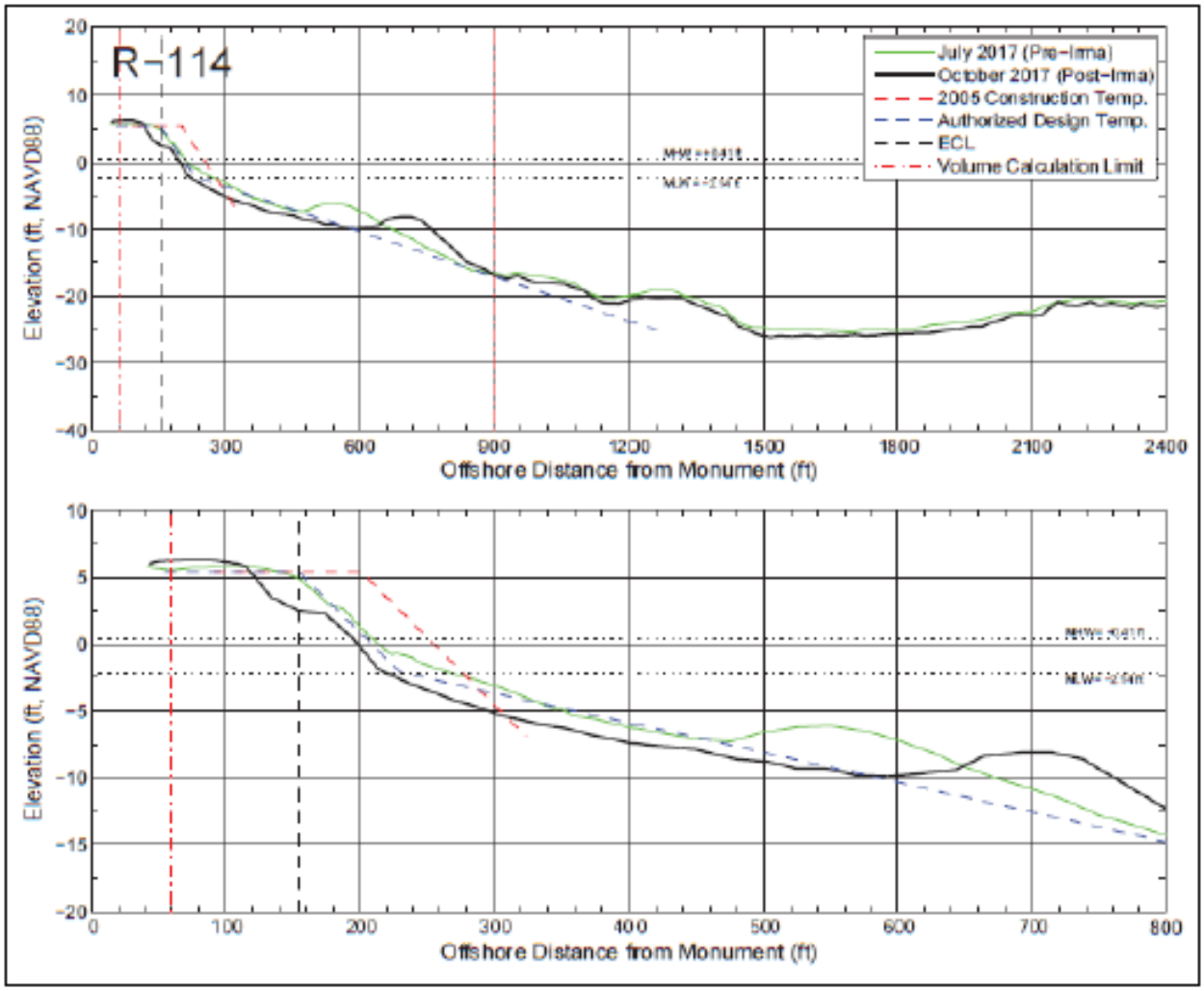

Figure 7. Profile at R-114 in the Hollywood/Hallandale portion of the project area.
(SOURCE: Olsen Associates, Inc.)

Based on the Storm Erosion Index analysis, the Corps determined there is sufficient evidence to support that Hurricane Irma met the necessary criteria under Engineer Regulation (ER) 500-1-1, paragraph 5-20, to be considered an extraordinary storm and thus eligible for FCCE funding.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

Corps 2018. Draft Addendum to the 2018 Project Information Report for the Rehabilitation Effort for the Segment III of the Broward County Shore Protection Project. Broward County, Florida. June 2018.

Corps 2018. Project Information Report. Rehabilitation Effort for Segment III of the Broward County Shore Protection Project. Broward County, Florida. April 2018.

Corps 2015. Environmental Assessment and Finding of No Significant Impact on Broward County Shore Protection Project Segment II. Prepared for Broward County and U.S. Army Corps of Engineers by CB&I Coastal Planning & Engineering, Inc. and Olsen-Associates, Inc., October 27, 2015.

Corps 2013. Environmental Assessment and Finding of No Significant Impact – FCCE Placement of Sand on Broward County Segment II, Broward County, Florida. Jacksonville District, August 3, 2013.

Corps 2004. Final Environmental Impact Statement for the Broward County Shore Protection Project, Segments II and III. Jacksonville District. Record of Decision, May 11, 2004.

1.5 DECISIONS TO BE MADE

There are two decisions to be made within this EA. The first decision is whether to complete truck haul renourishment of Broward County SPP Segment III. The second decision is to determine whether the truck haul and placement of sand above MHW on Segment III of Broward County SPP will result in significant effects on the human environment. The need for mitigation measures or best management practices (BMPs) to reduce any potentially adverse effects, particularly in regard to associated activities, will be determined based upon the analysis contained within this EA. If no significant impacts are identified during the National Environmental Policy Act (NEPA) process, the Corps will sign the Finding of No Significant Impact (FONSI) and move forward with the Preferred Alternative. If significant impacts are identified, the Corps may choose to implement mitigation measures to reduce the impacts to a lower-than-significant threshold and sign a mitigated FONSI, prepare a Notice of Intent to prepare an Environmental Impact Statement (EIS), or not implement the Preferred Alternative.

This document concludes that the project as described in Alternative 1, the Preferred Alternative, is in the public interest and would not significantly affect the quality of the human environment. Alternative 1, the Preferred Alternative, will not require compensatory mitigation; however, implementation of Alternative 2 would require compensatory mitigation. (See Chapter 4 for detailed discussion on the effects of the Preferred Alternative.) Environmental commitments, as discussed in Chapter 6, will be included in the contract specifications. In addition, the Corps and its contractors commit to avoiding and minimizing adverse effects during construction activities.

1.6 SCOPING AND ISSUES

1.6.1 SCOPING AND RELEVANT ISSUES

The Corps identified the following issues as relevant to the Preferred Alternative and appropriate for further evaluation:

- Effects to Federally listed species;
- Effects to beach vegetation during construction;
- Effects to nearshore hardbottom due to material placement and equilibration;
- Upland truck traffic impacts associated with truck haul operations.

A summary of the effects of all alternatives considered is included in **Table 2** of Chapter 2 (Alternatives).

1.6.2 ISSUES ELIMINATED FROM FURTHER ANALYSIS

The Corps did not identify any issues for elimination.

1.7 PERMITS, LICENSES, AND ENTITLEMENTS

The proposed project is subject to the Coastal Zone Management Act (CZMA). The Corps has determined that the Preferred Alternative is consistent to the maximum extent practicable with the enforceable policies of the Florida Coastal Management Program. **Appendix B (CZMA FCD)** includes the Federal Consistency Determination (FCD). The placement of sand above MHW does not require a Clean Water Act Section 401 water quality certification or a Section 404(b)(1)

evaluation (40 CFR Part 230). Section 6 (Environmental Commitments) and Section 7 (Compliance with Environmental Requirements) of this EA describe the Corps' coordination efforts and how it has complied with environmental regulations, policies, and permits applicable to this project. **Appendix A (Environmental Correspondence)** includes pertinent correspondence.

2 ALTERNATIVES

The alternatives section is perhaps the most important component of this EA. It describes the No Action Alternative, the Preferred Alternative, and other reasonable alternatives that were evaluated. **Table 2** presents the beneficial and adverse environmental effects of the project alternatives and placement options in comparative form. Section 4 (Environmental Effects) discusses the alternatives and placement options in more detail, providing a clear basis for choice to the decision maker and the public. The Preferred Alternative best meets the project objective and constraints, has the least environmental concerns, and is economically justified.

2.1 DESCRIPTION OF ALTERNATIVES

2.1.1 NO ACTION ALTERNATIVE (STATUS QUO)

The No Action Alternative, as discussed in section 2.1.1 of the 2004 GRR/FEIS and carried forward into this EA, would allow erosion to continue unabated and provides no solution to the existing erosion and shore protection problems. As explained in the FEIS, the No Action Alternative would be a viable option in under-developed areas; however, these types of areas do not exist in Broward County. Accretion is not expected to occur as a result of the heavily developed nature of the shoreline. An estimation of storm damages and benefits for the Broward Segment III project was provided in the 2004 GRR/FEIS. In the analysis, it was estimated that the Segment III beaches protect a total value of shorefront infrastructure of $542,765,000.00. The 2004 GRR/FEIS recommends renourishment on a 6 year interval. The most recent renourishment was completed in 2006-2007. The next scheduled full renourishment is 2020.

2.1.2 ALTERNATIVE 1 (PREFERRED ALTERNATIVE) – FCCE ONLY: TRUCK HAUL RENOURISHMENT ABOVE MHW ADDED INTO THE PROJECT LIFECYCLE

Alternative 1, the Preferred Alternative, is the FCCE placement of sand restoring the design profile above MHW without the simultaneous placement of sand associated with the full renourishment of Segment III. Due to resources offshore of the project area, extensive surveys and environmental coordination will need to occur for a full renourishment, which is scheduled for 2020. This alternative was designed based on the 2013 Segment II FCCE truck haul and sand placement project following Hurricane Sandy. By mimicking the Segment II truck haul renourishment, potential effects to benthic and marine resources will be avoided and the placement of sand above MHW will be implementable upon receipt of emergency funds by avoiding potential effects to resources in the project area.

Post-storm analysis of the beach determined that no more than 123,200 CY of sand need to be placed above MHW between FDEP Monuments profile (approximately 34,000 CY in the Park portion and 89,200 CY in the Hollywood/Hallandale portion). In addition, the placement of sand above MHW does not require a Clean Water Act Section 401 water quality certificate, as previously determined in conjunction with the 2013 Segment II FCCE project. The need for Clean Water Act Section 401 coordination would delay the completion of design and start of construction upon receipt of FCCE funds. Renourishment above MHW will stabilize the project until the full renourishment can be completed in 2020. Separate authorizations under applicable Federal and state laws will be obtained for the 2020 scheduled nourishment.

2.1.3 ALTERNATIVE 2 – FCCE PLACEMENT CONGRUENT WITH RENOURISHMENT OF THE FULL CONSTRUCTION TEMPLATE

Alternative 2 is the emergency placement of FCCE material on the project restoring the design profile out to the full construction template. This work would be completed as part of the local sponsor's previously scheduled full renourishment. The 2004 GRR/FEIS confirmed that for the entire Segment III, periodic nourishments of 780,000 CY were planned every 6 years. The Segment III project is scheduled to be renourished in 2020. Based on the pre- to post-storm volume changes, the volume needed to restore and maintain the design template through the next storm season is approximately 683,900 CY. The volume needed to restore the full construction template volume is estimated to be 1,015,400 CY. Due to marine resources in the project area and absence of recent cultural resources surveys, extensive surveys and coordination will need to occur prior to construction of Alternative 2, which would delay the start of construction. This alternative, while feasible, does not align well with the project's emergency need to stabilize the shoreline and reduce the risk for additional impacts to inland infrastructure and, therefore, is not the preferred alternative.

2.2 TRUCK HAUL RENOURISHMENT METHODOLOGY

Both Alternatives 1 and 2 involve the truck haul and placement of commercially mined upland sand between R-86 to R-94 and R-98 to R-128. Utilizing a truck-haul approach for a beach fill project involves several steps, which include offloading material at the stockpile staging area, transferring of material from a stockpile to an off road dump truck, dumping of sand on the beach and finally, spreading of material and grooming to the design shape.

In addition to work hours, other limitations include truck availability, traffic congestion on the roads and at access points and the time associated with re-handling and movement of sand on the beach. Alternatives 1 and 2 both require beach access points large enough to allow passage of dump trucks and heavy machinery. For transport to the Segment III shoreline, the project will likely employ a 'mixed fleet' of long-haul road trucks including two-axle and six axle dump trucks. Long-haul road trucks are capable of transporting 15 to 20 CY of material and, when fully loaded, have a gross weight of approximately 20 to 27 tons, respectively. It is preferred that, where possible, the access areas be large enough to employ a circular entrance and exit pattern to prevent congestion and maximize efficiency. In extreme cases, in which space at the access point is too limited to allow efficient transfer from long-haul road truck to off road truck, a conveyor system may be used. However, this method slows production and should remain a last resort. It is also preferred that multiple access sites be simultaneously used to increase productivity, although no more than three are recommended. Use of more than three sites can potentially increase traffic and communication difficulties, thereby decreasing productivity (Olsen Associates, Inc. 2012). The Corps will work extensively with Broward County to identify beach access areas.

When sand from the mine is loaded onto the trucks, the initial volume occupies 10 – 20% more volume than the compacted in-situ material on the beach. This difference in volume is due to "bulking" or fluffing" as the sand is disturbed. It is the bulked material volume that is actually delivered to the beach site. After the sand is placed on the beach, the initial volume will gradually consolidate to the anticipated and permitted design volume due to grading, settling, and exposure to weather.

2.3 SAND SOURCE SELECTION

The sand brought to the project must meet the State of Florida's sand rule (Rule 62B-41.007(2)(j), F.A.C.). As discussed in the 2013 Corps' EA because there are not upland sand sources in Broward County with clean, beach compatible material in sufficient quantities for this project,

potential upland sources beyond the County were considered. Due to a larger mean grain size and smaller fines content, upland sand is expected to be more stable on the beach (Olsen Associates, Inc. 2012). Proposed sediment quality guidelines are provided in **Table 1**:

Table 1. Broward Count SPP Segment III sediment quality guidelines (from the 2013 EA for Broward County SPP Segment II FCCE project.

Sediment Parameter	Compliance Value
Mean Grain Size (mm)	0.35-0.65
Silt Content (% passing #230 sieve)	<5%
Gravel Content (% not passing #4 sieve)	<5%
Color (allowable moist Munsell Value)	≥7
Carbonate Content	≥ 10%

Broward County conducted an evaluation of fourteen upland sand mines (Corps 2013) for the truck haul renourishment of Segment II. These evaluations included sand sample analyses and site visits to each mine. The fourteen mines selected for investigation were chosen based on usage for past projects and recommendations from government entities having experience with upland sand mine use. This evaluation is adopted for the FCCE project. Each mine was assessed based on compliance with the quality guidelines outlined in **Table 1**, sediment characteristics, location relative to Broward County, compliance with state and federal laws and method of transport available. Broward County determined that four mines out of the fourteen mines were most suitable for Broward County. Two of these mines currently meet all of the required criteria for use as part of the federal renourishment. If the contractor chooses to use an alternative mine, that mine must possess all required state and federal permits, complete pertinent reviews, and must meet the Corps' project specifications and the sand criteria stated in **Table 1**.

2.4 COMPARISON OF ALTERNATIVES

Table 2 summarizes the major features and consequences of each alternative, including the Preferred Alternative and the No Action alternatives. Refer to Section 4 (Environmental Effects) for a more detailed discussion of effects of alternatives.

Table 2. Summary comparison of alternatives' effects.

Environmental Factor (Section of EA)	Alternative 1	Alternative 2	No Action Alternative
General Environmental Setting (4.1)	Protection to upland and shorefront infrastructure. Maintained/improved recreation and tourism.	Alternative 2 would result in a wider beach than Alternative 1 which would provide more protection and opportunities for recreation than Alternative 1.	Continued erosion and loss of beach and dune habitat.
Vegetation (4.2)	Stabilized dune and beach habitat, which will increase available habitat for vegetation recruitment and growth.	Same as Alternative 1.	Continued erosion and loss of beach and dune habitat for vegetation recruitment and growth.

Environmental Factor (Section of EA)	Alternative 1	Alternative 2	No Action Alternative
Threatened and Endangered Species (4.3)	May affect but not likely to adversely affect piping plover, rufa red knot, nesting sea turtles, and American crocodile. Increased beach habitat for nesting and foraging activities for piping plovers and rufa red knots. Likely to adversely affect nesting sea turtles but not likely to jeopardize the continued existence of the species. Potential temporary effects during construction could include: vehicle strikes of animals or nest destruction, barriers created by heavy machinery on the beach, vehicle tracks interfering with sea turtle hatchlings trying to reach the water, sand compaction, or unfavorable beach design for sea turtle nesting. No effect to Florida manatees, smalltooth sawfish, Nassau grouper, giant manta ray, or corals.	May affect but not likely to adversely affect piping plover, rufa red knot, and American crocodile. Increased beach habitat for nesting and foraging activities for piping plovers, and rufa red knots. Likely to adversely affect nesting sea turtles but not likely to jeopardize the continued existence of the species. Potential temporary effects during construction above MHW could include: vehicle strikes of animals or nest destruction, barriers created by heavy machinery on the beach, vehicle tracks interfering with sea turtle hatchlings trying to reach the water, sand compaction, or unfavorable beach design for sea turtle nesting. Potential temporary effects during construction below MHW could include: burial of macroalgae communities important for sea turtles, relocation or burial of corals or hardbottom near the project area, potential mortality/stress caused by temporarily elevated turbidity and/or sedimentation on nearby corals. Project may affect but is not likely to adversely affect American crocodile, Florida manatees, smalltooth sawfish, Nassau grouper, and/or giant manta rays due to the truck haul approach and low probability the species will be in the project area.	No effect on American crocodile, Florida manatee, Nassau grouper, giant manta ray, or smalltooth sawfish. Exposure of nearshore rock outcroppings which may be habitat for coral colonization. Continued erosion and loss of beach and dune habitat for beach jacquemontia and nesting and foraging activities for piping plovers, rufa red knots, and sea turtles.

Environmental Factor (Section of EA)	Alternative 1	Alternative 2	No Action Alternative
Fish and Wildlife Resources (4.4)	Temporary avoidance and/or displacement during construction activities. Potential for vehicle strikes during construction activities. Long-term benefits due to the creation of habitat for use by flora and fauna in the area.	Same as Alternative 1. Placement of material below MHW could affect nearshore hardbottoms and unvegetated habitat through turbidity and sedimentation. Affects would be offset with in-kind compensatory mitigation.	Continued loss and/or degradation of available habitat.
Essential Fish Habitat (EFH) (4.5)	No effect.	Fill of nearshore habitat and coverage of nearshore bottom. Mitigation may be needed for unavoidable effects to corals and/or hardbottom.	Potential for increased exposure of nearshore rock outcroppings that could serve as EFH.
Coastal Barrier Resources Systems (CBRS) (4.6)	Restoration and stabilization of beaches in the designated Coastal Barrier Resources Act (CBRA) Otherwise Protected Areas (OPAs) and System Units.	Alternative 2 would result in a wider beach than Alternative 1 which would provide more protection and stabilization than Alternative 1.	Continued loss and/or degradation of available habitat.
Hazardous, Toxic, and Radioactive Waste (HTRW) (4.7)	No effect.	Same as Alternative 1.	Same as Alternative 1.
Water Quality (4.8)	No effect.	Temporary increases in turbidity in the nearshore environment.	Same as Alternative 1.
Air Quality (4.9)	Minor, temporary degradation of air quality due to heavy equipment and truck emissions.	Same as Alternative 1.	No effect.
Noise (4.10)	Minor, temporary increase in noise level in the project area during construction.	Same as Alternative 1.	No effect.
Aesthetic Resources (4.11)	Long-term improvement in aesthetic due to restoration of the beach and removal of erosional scarps. Presence of heavy equipment may be considered unsightly which would temporarily detract from aesthetics until construction is complete and the equipment is removed.	Same as Alternative 1, however Alternative 2 would result in a wider beach than in Alternative 1.	Decreased aesthetic value due to the narrowing of the beach and potential for increased armoring.

Environmental Factor (Section of EA)	Alternative 1	Alternative 2	No Action Alternative
Recreation Resources (4.12)	Temporary restriction of beach use for safety purposes during placement operations. Long-term positive effects by restoring the beach space for recreation.	Same as Alternative 1, however, the wider beach created in Alternative 2 would result in more space for recreation.	Continued erosion will result in decreased beach space available for recreational activities.
Socio-economic Resources (4.13)	Temporary closure of beach in active construction areas. Potential loss of recreation and/or tourism during construction. Increased traffic and road wear and tear from truck haul operations. Protection of shorefront and upland infrastructure. Increase in property values. Long-term maintenance/improvement of recreation and tourism.	Same as Alternative 1, however, the wider beach created in Alternative 2 would result in more space for recreation and more protection of the shorefront and upland infrastructure than in Alternative 1.	Loss of recreation and tourism due to reduced beachfront. Compromised upland property protection. Decreased beachfront property value. Loss of tax revenue from decreased tourism and recreation.
Cultural Resources (4.14)	No adverse effect on historic properties listed or eligible for listing in the National Register of Historic Places.	No adverse effect. Additional cultural resources surveys, monitoring, avoidance buffers and consultation with the State Historic Preservation Office and federally-recognized tribes will be necessary.	Potential adverse effect from continued erosion and sea-level rise.
Native Americans (4.15)	No effect.	No effect.	No effect.
Irreversible and Irretrievable Commitment of Resources (4.16)	Removal of beach fill material from upland sand source. Energy and fuel used during mining, transport, and placement. Lethal take of non-motile benthic invertebrates/macrofaunal organisms in the placement footprint.	Same as Alternative 1, however, Alternative 2 would result in a longer duration and larger footprint of effects due to Alternative 2's increased scope.	No effect.

Environmental Factor (Section of EA)	Alternative 1	Alternative 2	No Action Alternative
Unavoidable Adverse Environmental Effects (4.17)	Temporary displacement/avoidance by nesting and foraging sea turtles, birds, and other wildlife. Lethal effects to non-motile benthic invertebrates/macrofaunal organisms in the placement footprint. Indirect effects on natural or depletable resources due to use of fuel and machinery wear and tear.	Same as Alternative 1.	Continued erosion will result in the loss and/or degradation of available beach and dune habitat. No effect on natural or depletable resources.
Indirect Effects (4.18)	Beach replenishment frequently leads to more development in greater density within shorefront communities, necessitating future replenishment or more drastic stabilization measures. A state park and CBRA unit (North Beach P14A) restrict and significantly minimize development in Segment III. Adverse effects to sea turtles due to greater development increasing the use of artificial lighting and supporting larger populations of mammalian predators.	Same as Alternative 1.	Armoring measures would likely be undertaken by property owners in the absence of nourishment. Armoring would further reduce the available habitat and result in negative impacts to the biological communities.
Cumulative Effects (4.19)	Protection of upland and shorefront infrastructure. Improved/maintained recreation, tourism, property values and tax revenue. Increased beach and dune habitat for vegetation as well as nesting and foraging sea turtles, migratory shorebirds, and other wildlife.	Same as Alternative 1.	Continued erosion would result in negative effects to the biological communities, beach and dune habitats, as well as the recreation, aesthetic and economic resources.

2.5 ALTERNATIVES ELIMINATED FROM DETAILED EVALUATION

The 2004 FEIS included an extensive list of alternatives considered for erosion control associated with the overall Federal project. Those alternatives, including those eliminated from detailed evaluation are incorporated by reference and summarized below in **Table 3**.

Table 3. Alternatives eliminated from detailed review.

Project Alternative	EIS Section	Treatment in EIS
No Action alternative (Status-Quo)	2.1.1	Included in detailed evaluation
Rezoning of beach area	2.1.2	Eliminated
Condemnation of land and structures	2.1.3	Eliminated
Revetments	2.1.4	Eliminated
Beach fill with periodic nourishment (including alternate sand sources)	2.1.5	Included in detailed evaluation
Beach fill with periodic nourishment, with stabilization by offshore breakwater or submerged artificial reef	2.1.6	Eliminated
Beach nourishment with maintenance material from updrift inlet or sand by-passing methods	2.1.7	Included in detailed evaluation
Beach fill and periodic renourishment with stabilization by groins	2.1.8	Included in detailed evaluation
Beach fill design modifications of beach fill amounts	2.1.9	Included in detailed evaluations (Jan 2001 beach fill design only)
Seawalls	2.1.10	Eliminated
Beach fill with periodic renourishment and hurricane surge protection sand dune	2.1.11	Eliminated
Beach nourishment with creation of nearshore berm from maintenance material from adjacent inlet	2.1.12	Eliminated
Stabilization of beaches and dune by vegetation	2.1.13	Eliminated
Modify navigation project	2.1.14	Eliminated
Sand tightening of jetties	2.1.15	Eliminated

3 EXISTING ENVIRONMENT

The Existing Environment section describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that will affect or that will be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "No Action Alternative," forms the baseline conditions for determining the environmental effects of the reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

The coastline of Segment III in Broward County is located entirely on a barrier island and is bounded by Port Everglades Inlet to the north and the Broward-Dade County line to the south. Port Everglades Inlet provides entrance to Port Everglades, one of the three largest ports in the State of Florida. Sediment transport along the Atlantic coastline is generally from north to south with some localized reversals due to tidal inlets, bathymetric irregularities, and/or oceanographic features. Inlets interrupt the normal transport of sediments along the coastline. The need to maintain inlet channels for commercial and recreational purposes while providing and protecting beaches often results in conflicting interests and competing needs.

Dunes are vegetated mounds of unconsolidated sediments that lie landward of the active beach. Dune formation occurs when winds carrying beach sediments encounter resistance from vegetation, thereby causing the wind to deposit this material. Dunes are comprised of finer sands, while those in the berm and beachface are coarser (Rogers and Nash, 2003). Dunes are dynamic geologic features that continually accrete and erode from factors such as seasonal fluctuations in wave height and storm activity (Rogers and Nash, 2003). The beach and dune community in the south Florida region is limited since most of the coastline is receding due to urban development and beach erosion (Johnson *et al.*, 1992), as well as sea level rise (Leatherman *et al*., 2000).

The action area for this project is defined as all areas to be affected directly or indirectly by the proposed action. The action area for this project is from FDEP Monuments R-86 to R-94 and R-98 to R-128. Section 3.1 of the 2004 FEIS includes more discussion on the general environmental setting.

3.2 VEGETATION

Dune vegetation is essential to maintaining dune structure, and generally consists of hearty plants tolerant of extreme conditions such as sea oats, beach elder, trailing grasses and forbes (Duever 1983; Johnson et al. 1992). In south Florida the typical beach vegetation community consists of sea rocket (*Cakile edentula*), beach morning glory (*Ipomoea pes-caprae*), beach elder (*Iva imbricate*), and sea purslane (*Sesuvium portulacastrum*) (Koch 1992). A review of studies covering Florida dune vegetation concluded that 31 species of plants are commonly found in the beach and dune environment (Koch 1992). The fore dune typically begins with sea oats (*Uniola paniculata*) and ends with sea grape (*Cocoloba uvifera*) at the dune crest (Koch 1992). A 2011 survey of plants throughout the entire Segment II footprint's dune habitat located four species of invasive or exotic plants: beach naupaka (*Scaevola taccada*), crowsfoot grass (*Dactyloctenium aegyptium*), *Casuarina* and Oleander (*Nerium oleander*). It is reasonable to expect these same species to be present in Segment III. Section 3.2 of the 2004 FEIS includes more discussion on the project area's vegetation.

3.3 THREATENED AND ENDANGERED SPECIES

The list of endangered and threatened species developed for this EA (*see* **Table 4**) are a compilation from the National Marine Fisheries Service (NMFS) 1997 South Atlantic Regional Biological Opinion (SARBO) (as amended), the U.S. Fish and Wildlife Services (USFWS) 2015 Statewide Programmatic Biological Opinion (SPBO) for Shore Protection Activities along the Coast of Florida, the USFWS 2013 Programmatic Piping Plover Biological Opinion (P3BO), as well as project specific biological assessments and biological opinions (BOs) for projects which have taken place in the vicinity of the proposed project.

Table 4. Threatened and endangered species in the proposed project vicinity.

Common Name	Scientific Name	Listing Status	Agency
Green sea turtle *North Atlantic Distinct Population Segment (DPS)*	*Chelonia mydas*	Threatened	USFWS/NMFS
Hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	USFWS/NMFS
Leatherback sea turtle	*Dermochelys coriacea*	Endangered	USFWS/NMFS
Loggerhead sea turtle *Northwest Atlantic DPS*	*Caretta caretta*	Threatened/Critical Habitat	USFWS/NMFS
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	USFWS/NMFS
American crocodile	*Crocodylus acutus*	Threatened	USFWS
Florida manatee	*Trichechus manatus latirostris*	Threatened	USFWS
Smalltooth sawfish	*Pristis pectinata*	Endangered	NMFS
Nassau grouper	*Epinephelus striatus*	Threatened	NMFS
Giant manta ray	*Manta birostris*	Threatened	NMFS
Piping plover	*Charadrius melodus*	Threatened	USFWS
Rufa red knot	*Calidris canutus rufa*	Threatened	USFWS
Beach jacquemontia	*Jacquemontia reclinata*	Endangered	USFWS
Pillar coral	*Dendrogyra cylindrus*	Threatened	NMFS
Rough cactus coral	*Mycetophyllia ferox*	Threatened	NMFS
Lobed star coral	*Orbicella annularis*	Threatened	NMFS
Mountainous star coral	*Orbicella faveolata*	Threatened	NMFS
Boulder star coral	*Orbicella franksi*	Threatened	NMFS
Elkhorn coral	*Acropora palmata*	Threatened/Critical Habitat	NMFS
Staghorn coral	*Acropora cervicornis*	Threatened/Critical Habitat	NMFS

3.3.1 SEA TURTLES

Broward County is within the nesting range of four species of sea turtles; the loggerhead (*Caretta caretta*), the North Atlantic Distinct Population Segment (DPS) of green sea turtle (*Chelonia mydas*) (80 FR 15272), hawksbill (*Eretmochelys imbricata*) and leatherback (*Dermochelys coriacea*). The leatherback sea turtle and hawksbill sea turtle are listed as endangered under the Endangered Species Act (ESA). The loggerhead sea turtle and the North Atlantic DPS of the green sea turtle are listed as threatened. Additionally, the waters offshore of Broward County are used for foraging and shelter for the four species listed above as well as the endangered Kemp's ridley sea turtle (*Lepidochelys kempii*).

Three species of sea turtles, the loggerheads, greens, and leatherbacks, are known to regularly nest on Broward County beaches. Peak sea turtle nesting and hatching period is from May 1 to November 1 in Broward County, with nesting typically ending around mid-November. Broward County has maintained a conservation program for threatened and endangered sea turtle species since 1978. Conservation activities include the permitted relocation of nests from hazardous locations, accurate surveys of nesting patterns and nesting success, response to strandings/turtle emergencies, and public outreach. Daily beach surveys are conducted starting half an hour before sunrise from March 1 through October 31. The surveys document all new crawls from the previous night along 21.5 miles of Broward County's beach (excluding the Park shoreline). The conservation program is maintained in non-nourishment years to provide a continuous database of sea turtle nesting and monitoring after beach nourishment projects. The USFWS designated critical habitat for the loggerhead sea turtle in 2014 (79 FR 39855-39912), including areas within the boundaries of Broward County; however, it is north of the project area (*see* **Figure 8**). To reduce potential impacts to nesting and hatchling sea turtles, placement of sand on the beach is not allowed during the peak sea turtle nesting and hatching period, which is between May 1 to November 1 in Broward County. Section 3.3.1 of the 2004 FEIS includes more discussion on sea turtles in and around Broward County.

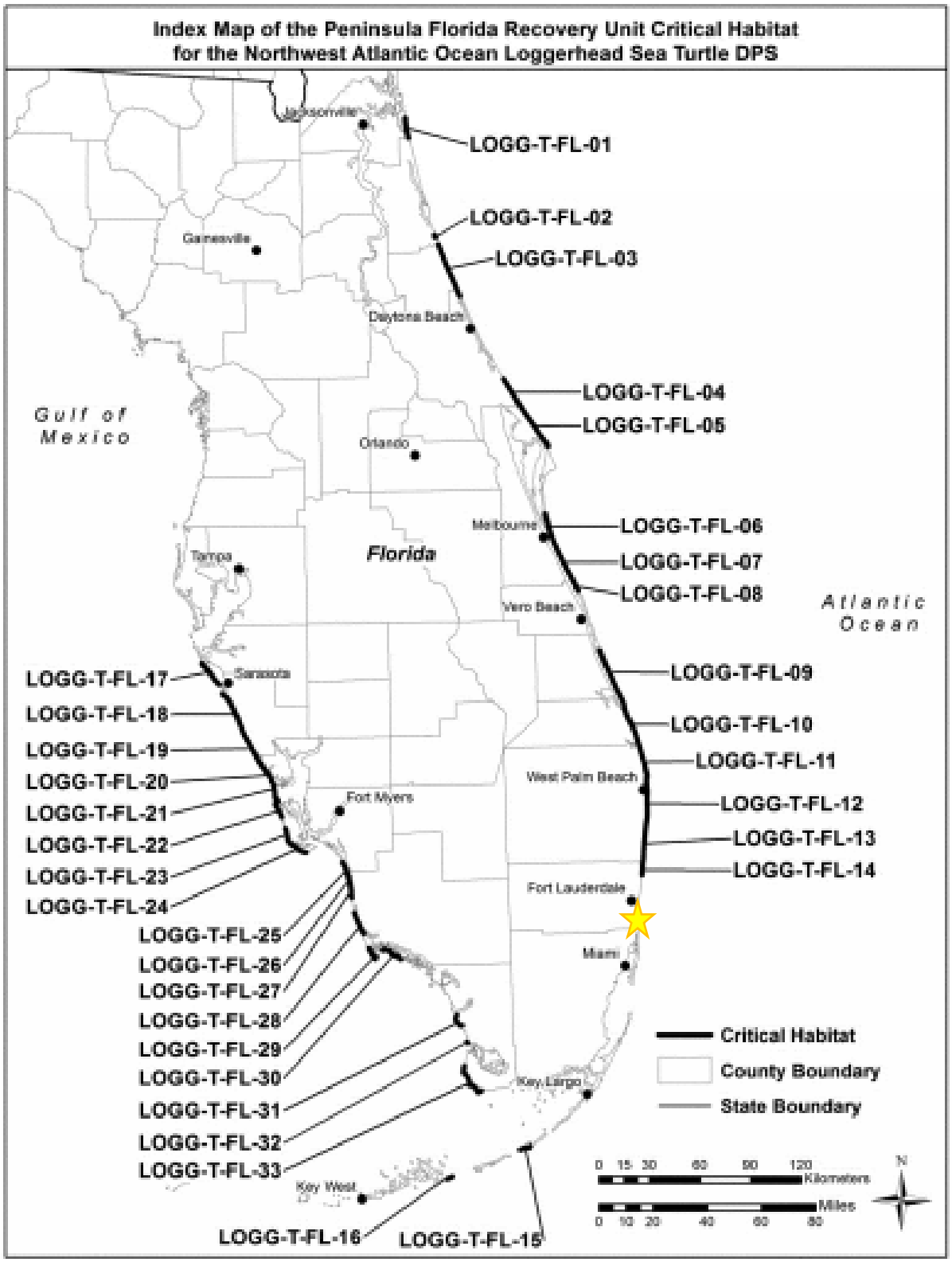

Figure 8. Map of USFWS Designated Critical Habitat for loggerhead sea turtles.
(SOURCE: USFWS 2014)

3.3.2 AMERICAN CROCODILE

The American crocodile (*Crocodylus acustus*) is endemic to the U.S. and inhabits mostly in low-energy bays, creeks, and inland swamps in extreme South Florida, the Caribbean, Mexico, Central America and northern South America. In Florida, the species was listed as endangered by the USFWS in 1975 (40 FR 44149-44151) due to habitat loss and fragmentation, changes in the distribution, timing, and quantity of water flows, and hunting for hide and meat. Hurricanes, cold weather, and traffic also threaten the mortality of American crocodiles. In March 2007, the USFWS reclassified the American crocodile from endangered to threatened. Feeding typically occurs shortly before sunset to just after sunrise and consists of opportunistic foraging for any animals they can catch and easily overpower. Nesting habitat includes sandy shorelines, creek banks adjacent to deep water, or manmade structures, such as canal berms. Males establish and defend breeding territory from late February through March. Females select a nest site and typical clutch size ranges from as few as eight to as many as 56 eggs. Hatchlings are about 10 inches and yellowish-tan in color with cross markings that fade as they grow. Adults are typically greenish-gray with black mottling and can be over 14 feet long. Although DCH was identified in 1979 in the extreme southern portion of Florida, no DCH is present in the project area (*see* **Figure 9**). American crocodiles have been seen in the Park as well as in the surf zone at Dania Beach.

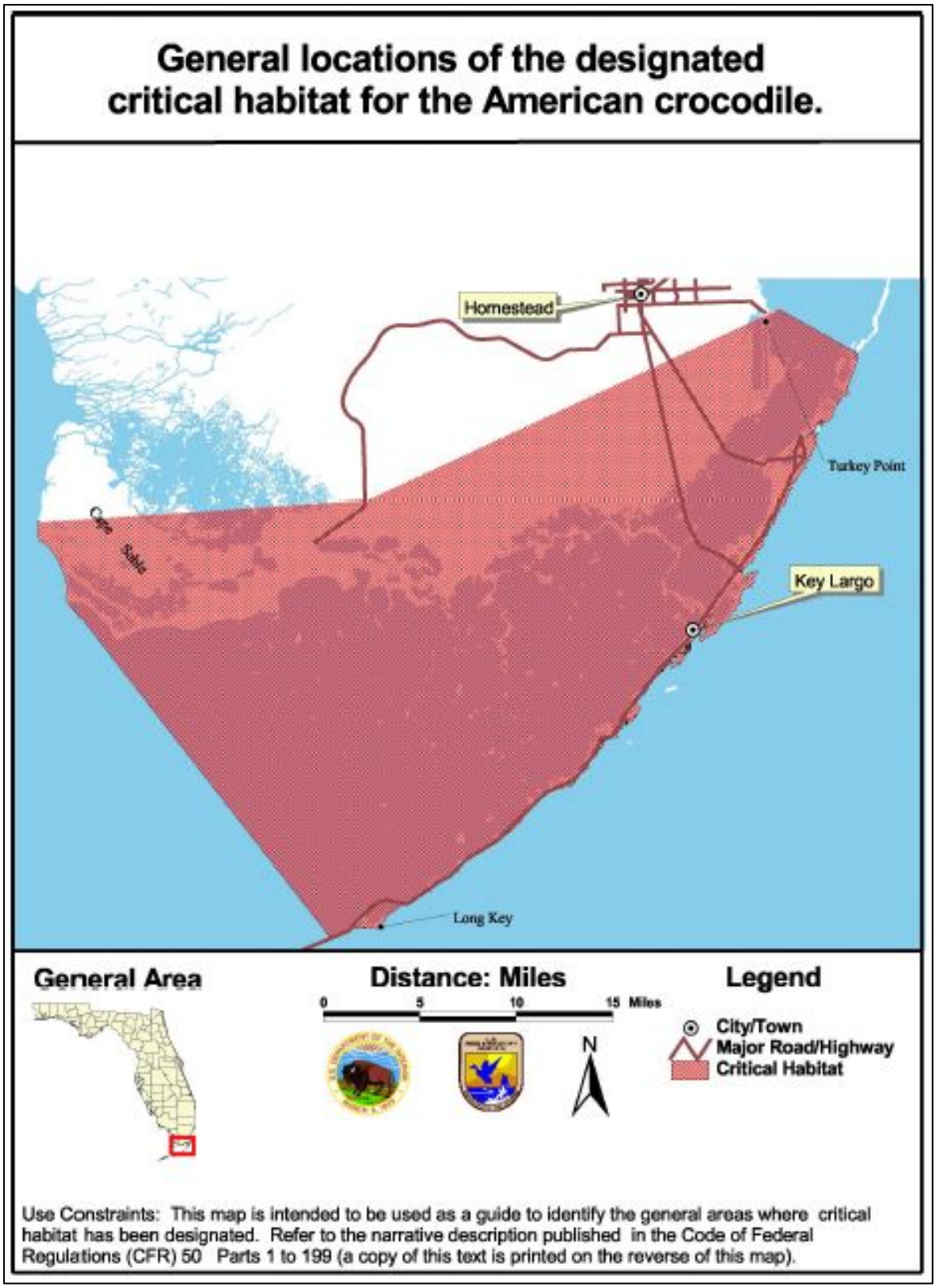

Figure 9. USFWS American crocodile DCH.
(Source: https://ecos.fws.gov/ecp0/profile/speciesProfile?spcode=C02J#crithab)

3.3.3 FLORIDA MANATEE

The Florida manatee (*Trichechus manatus latirostris*) is a subspecies of the West Indian manatee (*Trichechus manatus*) and can be found throughout the southeastern U.S., including the project area. The manatee is a large, plant eating aquatic mammal that moves between freshwater and saltwater environments. They can be found in shallow coastal waters, rivers, and springs. Adult manatees are approximately 10 feet long, weighing between 800 – 1200 pounds, and consume approximately 4-9% of their body weight each day. Although manatees feed underwater, they frequently rest just below the water surface with only the snout above water. The manatee was listed as endangered throughout its range for both the Florida and Antillean subspecies (*Trichechus manatus latirostris* and *Trichechus manatus manatus*) in 1967 (32 FR 4001). In May 2017, the USFWS reclassified the manatee from endangered to threatened. The USFWS designated critical habitat for the manatee in 1976 (41 FR 41914) and revised it in 1977 (42 FR 47840), however it was not designated within the boundaries of Broward County.

Manatees can be found in the inshore waters of the Intracoastal Water Way (IWW) and in the coastal waters of the Atlantic Ocean primarily during migration. While the project area is not within DCH for this species, (*see* **Figure 10** for all of Florida's DCH and *see* **Figure 11** for the project area) it is located within a Florida Fish and Wildlife Conservation Commission (FWC) Manatee Protection Zone (*see* **Figure 12**). Section 3.3.2 of the 2004 FEIS for a general discussion of manatee presence in south Florida.

Figure 10. USFWS Florida manatee critical habitat.
(Source: https://www.fws.gov/northflorida/manatee/2009_CH_Petition/20100112_frn_Federal%20Register_manatee_12-mo_325.pdf)

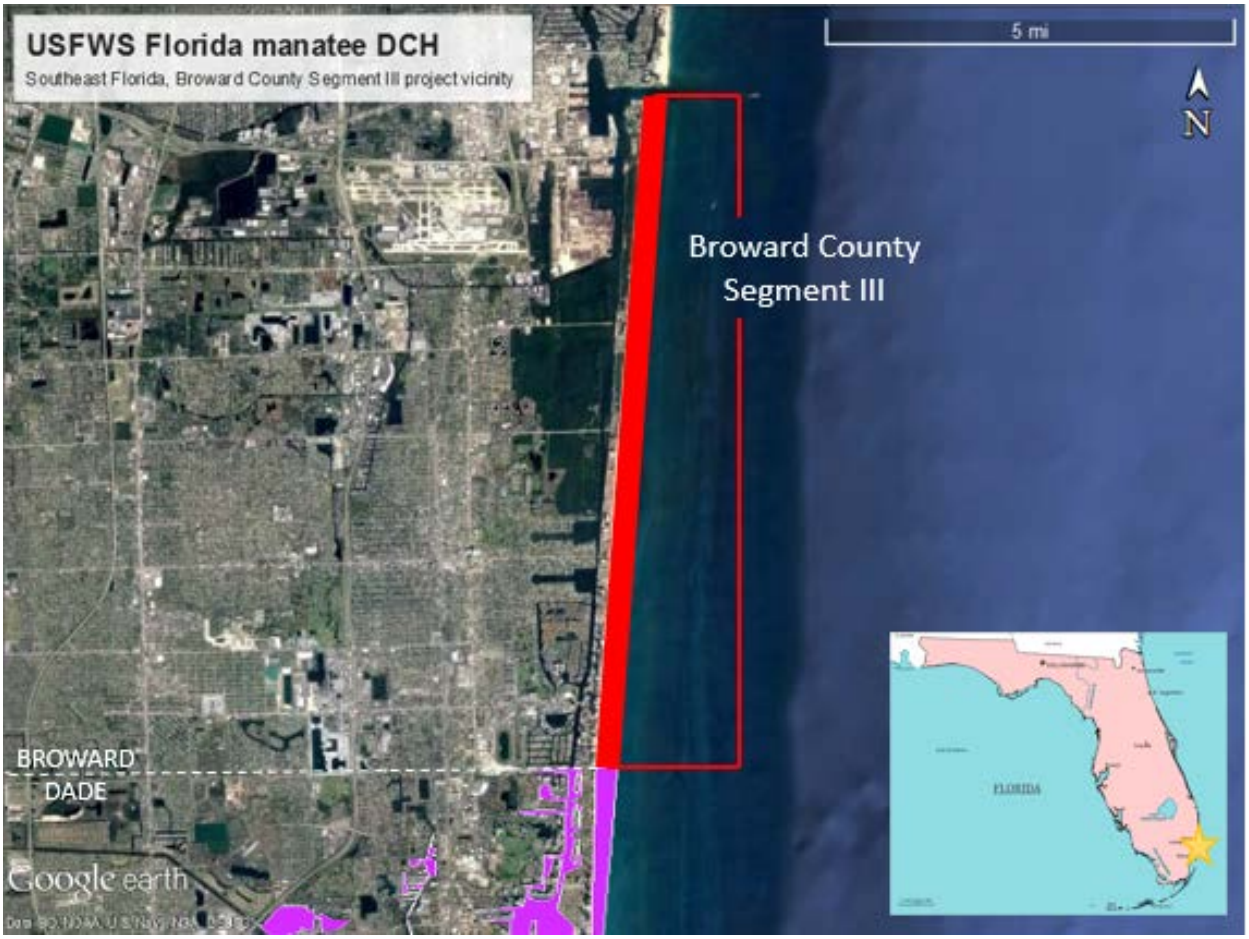

Figure 11. USFWS Florida manatee critical habitat, zoomed to southeast Florida.
(Source: Corps' Regulatory Division Resources at Risk layer)

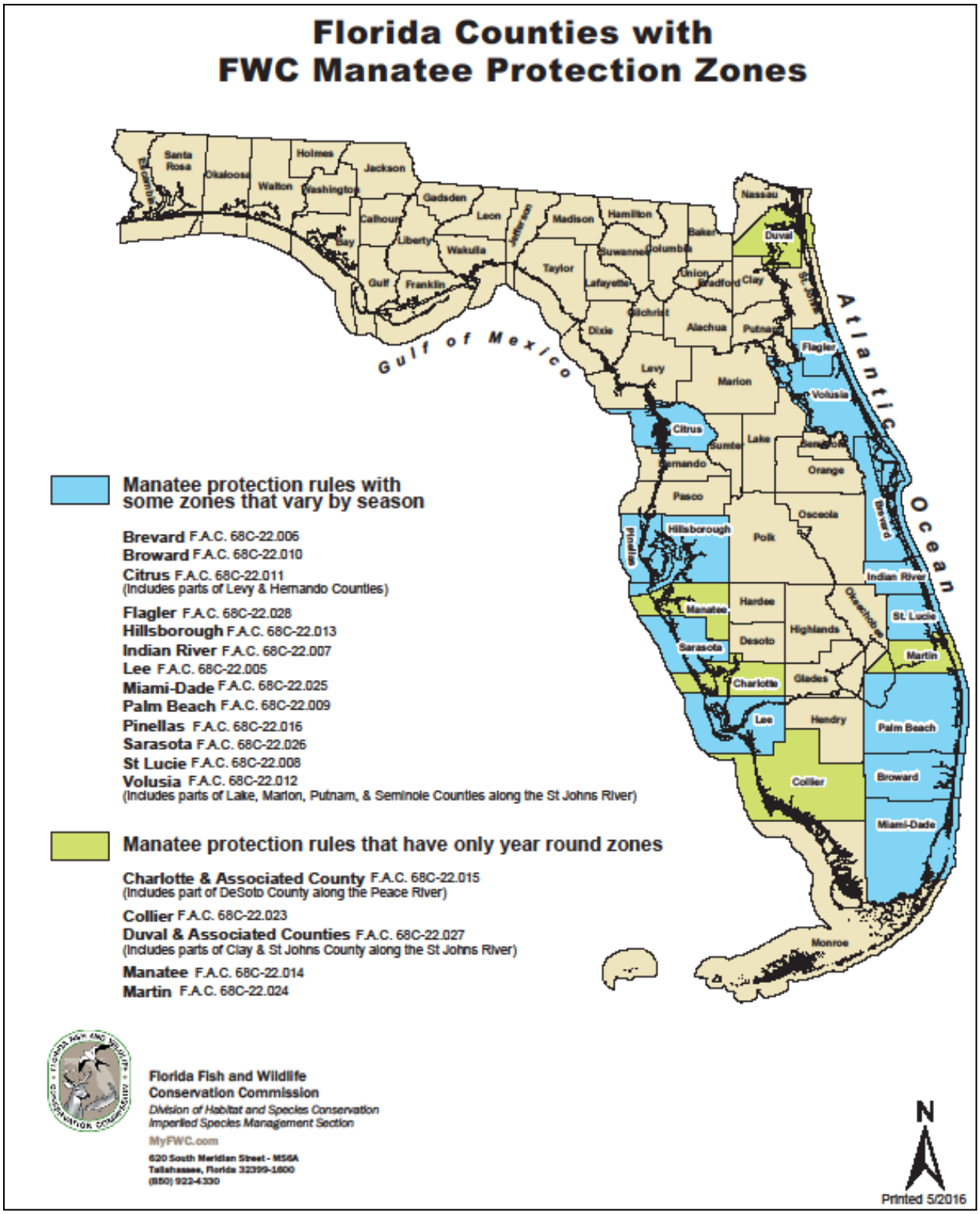

Figure 12. FWC Florida manatee protection zones.
(Source: http://myfwc.com/media/2944209/MPZStatewideMap.pdf)

3.3.4 SMALLTOOTH SAWFISH

The smalltooth sawfish (*Pristis pectinata*) is currently listed as endangered by NMFS. This species has become rare along the southeastern Atlantic and northern Gulf of Mexico coasts of the US during the past 30 years. Its known primary range is now reduced to the coastal waters of Everglades National Park in extreme southern Florida, with rare sightings outside of that area. Fishing and habitat degradation have extirpated the smalltooth sawfish from much of this former range.

The smalltooth sawfish is distributed in tropical and subtropical waters worldwide. It normally inhabits shallow waters (33 feet/10 meters or less), often near river mouths or in estuarine lagoons over sandy or muddy substrates, but may also occur in deeper waters (66 feet/20 meters) of the continental shelf. Shallow water less than 3.3 feet (1 meter) deep is an important nursery area for young smalltooth sawfish and maintenance and protection of these habitat is an important component of the "Recovery Plan for Smalltooth Sawfish (*Pristis pectinata*)" (NMFS 2009). Recent studies indicate that key habitat features (particularly for immature individuals) nominally consist of shallow water, proximity to mangroves, and estuarine conditions. Smalltooth sawfish grow slowly and mature at about 10 years of age. Females bear live young, and the litters reportedly range from 15 to 20 pups requiring a year of gestation. Their diet consists of macroinvertebrates and fishes such as herrings and mullets. The saw is reportedly used to rake surficial sediments in search of crustaceans and benthic fishes or to slash through schools of herrings and mullets (NMFS 2009).

Although NMFS designated critical habitat for the species in 2009, there is no DCH in the project area (*see* **Figure 13**).

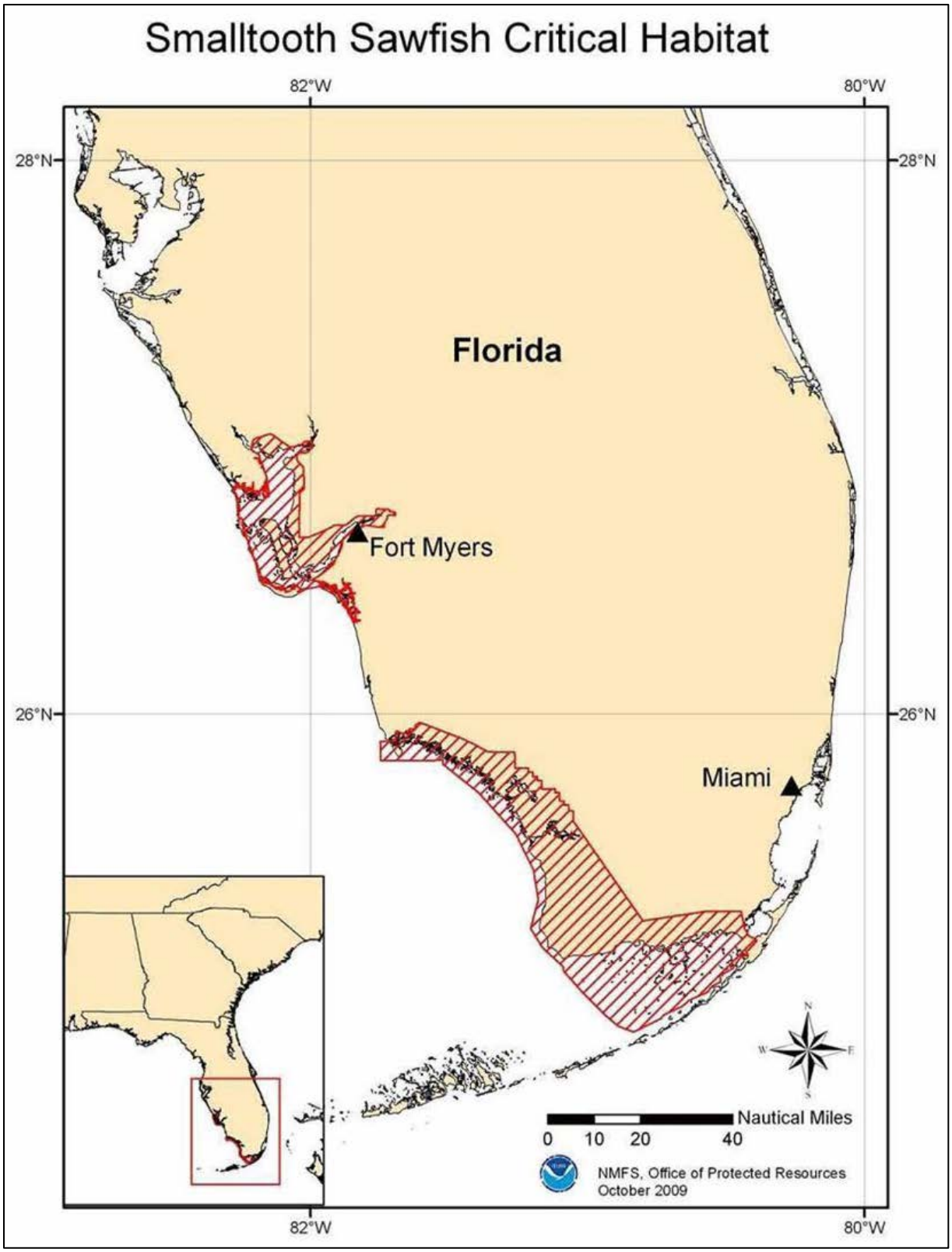

Figure 13. NMFS DCH for the smalltooth sawfish.
(Source: http://www.nmfs.noaa.gov/pr/species/fish/smalltooth-sawfish.html)

3.3.5 NASSAU GROUPER

Nassau grouper was listed as threatened in 2016 (81 FR 42268). It is a top predator in reef systems and is slow growing and long lived. Although considered a reef fish, it transitions through a series of ontogenetic shifts of both habitat and diet. Juveniles are found in nearshore, shallow waters whereas adults are most abundant on high relief coral reefs or rocky substrate in clear water. Both adults and juveniles will use natural or artificial reefs. Nassau grouper reproduce during annual aggregations in which large numbers will collectively spawn; however no sites have been reported in Florida waters (NMFS 2013b). Critical habitat has not been designated for this species.

3.3.6 GIANT MANTA RAY

The giant manta ray was listed as threatened in 2018 (83 FR 2916). Although there is a lack of information on the global distribution and population size, regional populations can be found near estuarine waters by oceanic inlets in water temperatures as low as 66°F. The manta ray is migratory and a seasonal visitor along coastlines. The timing of these visits is relative to many factors such as zooplankton movement, current circulation and tidal patters, seasonal upwelling, water temperatures, and mating behavior. Diet consists of planktonic organisms, shrimp, and small to moderately sized fish. Generally tending to be solitary, manta rays aggregate to feed and mate. Ecuador is thought to be the largest population and aggregation site of the giant manta ray (NMFS 2018). Critical habitat has not been designated for this species.

3.3.7 PIPING PLOVER

The piping plover (*Charadrius melodus*) Atlantic Coast and Northern Great Plains populations were listed as threatened in 1985 (50 FR 50726). Piping plovers are generally found on sandy beaches on the Atlantic Coast and Great Lakes as well as sandbars along major rivers on the northern Great Plains. While most shorebirds have a wide distribution, the piping plover barely extends into Mexico during the winter (Audubon 2018). This species does not nest in Florida but does overwinter here (USFWS 2013a). Piping plovers are foragers and feed on prey such as insects, marine worms, and crustaceans. The populations have declined primarily due to human disturbance on nesting areas, especially in competition for beach use. Nests are shallow scrapes in open ground with no direct shelter or shade. Although critical habitat was designated for the species in 2001 (66 FR 36038), there is no DCH in the project area. The project area includes habitat that could be suitable for use by piping plover but it is not considered optimal habitat based on the USFWS P3BO dated May 22, 2013. According to eBird (an online database launched by the Cornell Lab of Ornithology and National Audubon Society) there have been a limited number of piping plover sightings in Broward County. In April 2018, one bird was observed at the Park (eBird 2018).

3.3.8 RUFA RED KNOT

The rufa subspecies of the red knot (*Calidris canutus rufa*), is listed as threatened, and is a small shorebird that can occur along the Atlantic and Gulf coasts during its migration. It is also known to overwinter in low numbers along both the Atlantic and Gulf coasts. Florida is home to the largest concentration of wintering rufa in the U.S. (A.C. Schwarzer et al. 2012). In migration and winter, it prefers coastal mudflats, tidal zones, and sometimes open sandy beaches where it feeds on small invertebrates such as small mollusks, marine worms, and crustaceans, particularly horseshoe crabs (Kaufman 1996). The rufa red knot population has declined primarily due to reduced food availability from increased harvests of horseshoe crabs (USFWS 2015). Their numbers appear to have stabilized in the past few years, but they remain at low levels relative to earlier decades (USFWS 2015). Critical habitat has not been designated for this species.

Although the project area includes habitat that could be suitable for use by rufa red knot, it is not considered optimal habitat. According to eBird, one bird was observed in Broward County, within West Lake Park, Hollywood in January 1994 (eBird 2018).

3.3.9 BEACH JACQUEMONTIA

Jacquemontia reclinata is commonly known as beach jacquemontia or beach clustervine. This species is a perennial vine with a woody base and non-woody, twining stems up to six feet long. Leaves are fleshy, rounded or egg-shaped and approximately 1-inch long with blunted or indented tips. Flowers are white or pinkish, 1-inch across, and deeply five-lobed with a short tube. *Jacquemontia reclinata* is endemic to the coastal barrier islands in southeast Florida from Palm Beach to Miami-Dade Counties (Johnson et al. 1992; Florida Natural Areas Inventory (FNAI) 2000).

Jacquemontia reclinata was listed as federally endangered in 1993 (58 FR 62046). The majority of habitat, coastal beach strand, has been destroyed or lost due to residential and commercial construction, development of recreational areas, and beach erosion. This species is further threatened by invasion of exotic plant species including Australian pine, carrotwood, Brazilian pepper and turf grass. All but one of the wild populations in Florida exist on public lands in parks or conservation areas (USFWS 2007). Surveys indicate that studied populations were declining in total number of individuals; total area occupied and stem density (Maschinski *et al.* 2005; 2006). Protection and management of this species involves removal of exotics, protecting coastal habitats from development by conservation purchases or easements, and establishing new populations of this species in protected areas (Chafin *et al.* [date unknown]). Reintroductions of *J. reclinata* have increased the number of plants in the wild, although survival after transplant is variable (2-98%) (Maschinski and Wright 2006) due to mortality caused by human and natural factors. Major threats to survival of this species include highly fragmented habitat due to coastal development, and associated reproductive isolation that hinders genetic variability and reproduction (USFWS 2007).

3.3.10 CORAL SPECIES

In 2009, NOAA was petitioned by the Center for Biological Diversity to list 83 species of reef-building corals under the ESA. Substantial information was provided to warrant possible listing for 82 of the 83 species, and a Biological Review Team was assembled to develop a peer-reviewed Status Review Report providing the most up-to-date scientific information for each species (Brainard *et al*., 2011). On November 30, 2012, NOAA proposed listing 66 coral species, including seven in the Caribbean. Life history information for each of the seven Caribbean species proposed for listing is provided below:

<u>Pillar Coral (*Dendrogyra cylindrus*)</u>

Pillar coral was listed as threatened in 2014 (79 FR 67356). It is tan colored with tentacles that are often exposed during daylight giving a fur light appearance over a skeleton that looks similar to brain coral. Sexual reproduction occurs via broadcast spawning of gametes into the water column in mid-August. This species is restricted to the western Atlantic and can be found throughout the Caribbean, although it is only occasionally observed in Florida (Humann 2002). Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Contributing to extinction risk, it is the only species within its genus making it appear this is a naturally rare species in modern times (Brainard et al. 2011). No recent surveys associated with this project have yet been completed. Pillar coral has been found

offshore of Broward County, although typically not within nearshore habitat. Critical habitat has not been designated for this species.

Rough Cactus Coral (*Mycetophyllia ferox*)

Rough cactus coral was listed as threatened in 2014 (79 FR 67356). This species is restricted to the West Atlantic and occurs throughout most of the Caribbean (Veron 2000; Humann 2002). *Mycetophyllia ferox* inhabit shallow or mid-range reefs with strong water flow, and reported depths range from 5 – 30 meters (Carpenter et al. 2008). Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Although this coral may be located within the region, it has not been documented in the project footprint to date. Critical habitat has not been designated for this species.

Lobed Star Coral (*Orbicella annularis*), Mountainous Star Coral (*Orbicella faveolata*), and Boulder Star Coral (*Orbicella franksi*)

Lobed star coral, mountainous star coral, and boulder star coral were listed as threatened in 2014 (79 FR 67356). Once considered a single species, *Orbicella annularis*, it is generally accepted that these are three separate species based on morphology, depth range and ecology (Weil and Knowlton, 1994) and subsequently by reproductive and genetic studies. (*O. faveolata* and *O. franksi* were previously included in the sister complex of *O. annularis.*) Most studies prior to 1994 do not distinguish between the three species clearly. The corals occur in the Caribbean, Gulf of Mexico, Florida, and the Bahamas. *O. annularis* is a common species in fore reef environments, especially in semi-protected reefs, lagoons, and upper reef slopes at depths from 0.5 m to 20 m (Szmant et al. 1997). *O. faveolata* inhabits most reef environments from 0.5 to 40 m (Carpenter, et al. 2008), and is often one of the most abundant corals between 10 and 20 m (Brainard et al. 2011). *O. franksi* occupies most reef environments and has been reported from 5 m to 50 m (Szmant et al. 1997). Similar to other corals, populations have collapsed throughout their range from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Although these corals may be located within the region, they have not been documented within the project footprint to date. Critical habitat has not been designated for these species.

Elkhorn Coral (*Acropora palmata*)

Elkhorn coral is a large, branching coral with thick and sturdy antler-like branches. The dominant mode of reproduction is asexual, with new colonies forming when fragments break off a colony and reattach to the substrate. Sexual reproduction occurs via broadcast spawning of gametes into the water column once each year in August or September. Elkhorn coral is found throughout south Florida, the Florida Keys, the Bahamas, and the Caribbean islands. The approximate northern limit is Broward County, Florida. Once one of two of the most abundant coral species in the Caribbean and Florida Keys, *A. palmata* populations have collapsed throughout their range since the 1980s from disease outbreaks with losses compounded locally by hurricanes, increased predation, bleaching, elevated temperatures, and other factors. Critical habitat was designated in 2008 (73 FR 72210) and is specifically defined as:

> *"All waters in the depths of 98 feet (30 meters) and shallower to the 6 feet (1.8 meters) contour from Boynton Inlet, Palm Beach County, to Government Cut, Miami-Dade County; and the mean low water line from Government Cut south to 82° west longitude in Monroe Counties." Within these specific areas, the essential feature consists of natural*

consolidated hard substrate or dead coral skeleton that are free from fleshy or turf macroalgae cover and sediment cover.

Elkhorn coral has been documented in the nearshore waters of Broward County. Portions of the project's full design construction template (beyond the 6 foot contour) is within *Acropora* spp. DCH. Project area specific surveys would need to be conducted prior to placement of sand below MHW to determine the amount of habitat that contains the primary constituent elements for *Acropora* spp. DCH and could be affected by turbidity and/or sedimentation.

Staghorn Coral (Acropora cervicornis)

Staghorn coral is a branching coral with cylindrical branches ranging from a few centimeters to over 6.5 feet (2 meters) in length. The dominant mode of reproduction for staghorn coral is asexual fragmentation, with new colonies forming when fragments break off a colony and attach to the substrate. Sexual reproduction occurs via broadcast spawning of gametes into the water column once each year in August or September. Staghorn coral occur in back reef and fore reef environments from 0-98 feet (0-30 meters) deep. In Broward County, the species is commonly found in the nearshore and first reef habitats. The upper limit is defined by wave forces and the lower limit is controlled by suspended sediments and light availability. Once considered one of two of the most abundant coral species in the Caribbean and Florida Keys, Staghorn coral is found throughout south Florida, the Florida Keys, the Bahamas, and the Caribbean islands. The approximate northern limit for staghorn coral is in Palm Beach County, Florida. This coral occurs in the Mexican waters of the western Gulf of Mexico, but is absent from U.S. waters in the Gulf of Mexico. It also occurs in Bermuda and the west coast of South America. The greatest source of region-wide mortality for staghorn coral has been disease outbreaks, mainly of white band disease. Other, more localized losses have been caused by hurricanes, increased predation, bleaching, algae overgrowth, human impacts, and other factors. Critical habitat was designated for this species in 2008 (73 FR 72210) and is specifically defined as:

"All waters in the depths of 98 feet (30 meters) and shallower to the 6 feet (1.8 meters) contour from Boynton Inlet, Palm Beach County, to Government Cut, Miami-Dade County; and the mean low water line from Government Cut south to 82° west longitude in Monroe Counties. Within these specific areas, the essential feature consists of natural consolidated hard substrate or dead coral skeleton that are free from fleshy or turf macroalgae cover and sediment cover."

Staghorn coral has been documented in the nearshore waters of Broward County. Portions of the project's full design construction template (beyond the 6 foot contour) is within *Acropora* spp. DCH. Project area specific surveys would need to be conducted prior to placement of sand below MHW to determine the amount of habitat that contains the primary constituent elements for *Acropora* spp. DCH and could be affected by turbidity and/or sedimentation.

3.4 FISH AND WILDLIFE RESOURCES

In addition to the federally listed species discussed above, there are a number of seabirds and shorebirds may occur along the beach and/or dune environment as well as off shore of the project area. Few animals utilize the beach and dunes in the project area due to intense coastal development. The exposed environment of southeast Florida beaches leads to low diversity of organisms that can survive in the high-energy environment. Refer to section 3.5 of the 2004 FEIS

for a discussion of the faunal communities (i.e. shorebirds and infaunal organisms) associated with beach and dune environments in Southeast Florida.

3.5 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (P. L. 104-297), requires Federal agencies to consult with NMFS on activities that may adversely affect essential fish habitat (EFH). South Atlantic Fish Management Council (SAFMC) defines EFH as "those waters and substrate necessary to fish for spawning, breeding, or growth to maturity" (South Atlantic Fish Management Council (SAFMC) 1998).

The South Atlantic Fish Management Council (SAFMC) designated seagrasses, corals, coral reefs, hardbottom, and unconsolidated sediments as EFH. Hardbottom habitats are EFH for coral, red grouper (*Epinephelus morio*), gag grouper (*Mycteroperca microlepis*), gray snapper (*Lutjanus griseus*), mutton snapper (*L. analis*), white grunt (*Haemulon plumieri*), and spiny lobster (*Panulirus argus*). Unconsolidated habitats are EFH for cobia (*Rachycentron canadum*), black seabass (*Centropristis striata*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*S. maculates*), spiny lobster, and pink shrimp (*Farfantepenaeus duorarum*). All demersal fish species under SAFMC management that associate with coral habitats are contained within the fishery management plan for snapper-grouper species and include some of the more commercially and recreationally valuable fish of the region. All of these species show an association with coral or hardbottom habitat during their life history. In groupers, the demersal life history of almost all *Epinephelus* species, several *Mycteroperca* species, and all *Centropristis* species, takes place in association with coral habitat (SAFMC 2009). Coral, coral reef and hardbottom habitats benefit fishery resources by providing food or shelter (SAFMC 1983). SAFMC also designated corals, coral reefs, hardbottom and seagrass as a Habitat Area of Particular Concern (HAPC), which is a subset of EFH that is either rare, particularly susceptible to human-induced degradation, especially important ecologically, or located in an environmentally stressed area. In light of their designation as EFH-HAPC's and Executive Order (E.O.) 13089 (Coral Reef Protection), NMFS applies greater scrutiny to projects affecting corals, coral reefs, hardbottom, and seagrass to ensure practicable measures to avoid and minimize adverse effects to these habitats are fully explored. Section 3.6 of the 2004 FEIS includes more discussion on the project area's EFH.

3.5.1 CORALS, CORAL REEFS, AND HARDBOTTOM HABITATS

HAPCs for corals, coral reefs and hardbottom habitats of central east Florida include 1) the worm reefs in nearshore waters; 2) nearshore hardbottom in water depths 0 to 4 meters; 3) offshore hardbottom habitats in water depths 5 to 30 meters and 4) Oculina banks from Fort Pierce to Cape Canaveral in water depths > 30 meters. Listed coral species are discussed in section 3.3.7 of this EA and are incorporated here by reference.

3.5.2 SEAGRASSES

Seagrasses are discussed in detail in section 3.2.2 of the 2004 FEIS and are incorporated here by reference. Due to the high-energy and dynamic nature of the beach system, seagrasses are not located within the project area.

3.6 COASTAL BARRIER RESOURCES

The Coastal Barrier Resource System (CBRS) includes two types of units, System Units and Otherwise Protected Areas (OPAs). System Units are predominately comprised of privately owned areas, though some are areas that are held for conservation and/or recreation. OPAs are

predominantly comprised of conservation and/or recreation areas, though they may also contain private areas that are not held for conservation and/or recreation. OPAs are denoted with a "P" at the end of the unit number. The only Federal spending prohibition within OPAs is the prohibition related to Federal flood insurance. Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units whereas the only Federal spending prohibition within OPAs are related to Federal flood insurance.

There is one unit designed as an "otherwise protected area" (Lloyd Beach FL-20P) and two areas designated as "system units" (both labelled North Beach P14A) (*see* **Figure 14**).

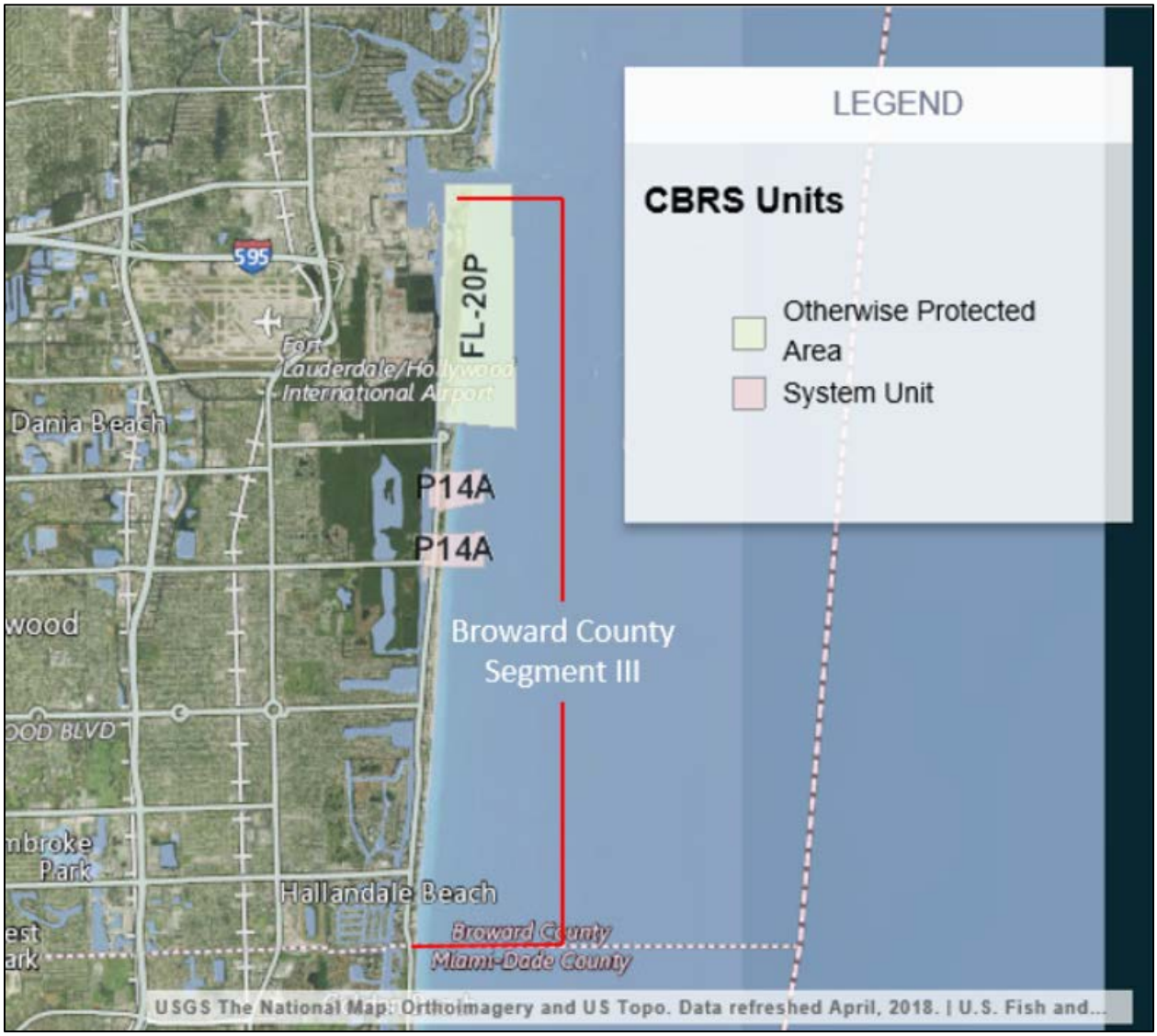

Figure 14. Coastal Barrier Resources Systems within Broward County Segment III. (SOURCE: USFWS, CBRS mapper.)

3.7 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE (HTRW)

Section 3.9 of the FEIS has a detailed discussion of Hazardous, Toxic and Radioactive Waste (HTRW) associated with Segment III of the Broward County SPP. The probability of

contamination by hazardous wastes in the project area has been judged to be negligible. There are currently no HTRW producers adjacent to the project site that discharge effluents near the Broward County shoreline; however, due to the project being located in a highly urbanized area, FDEP lists multiple contamination sites in the project's vicinity (*see* **Figure 15**).

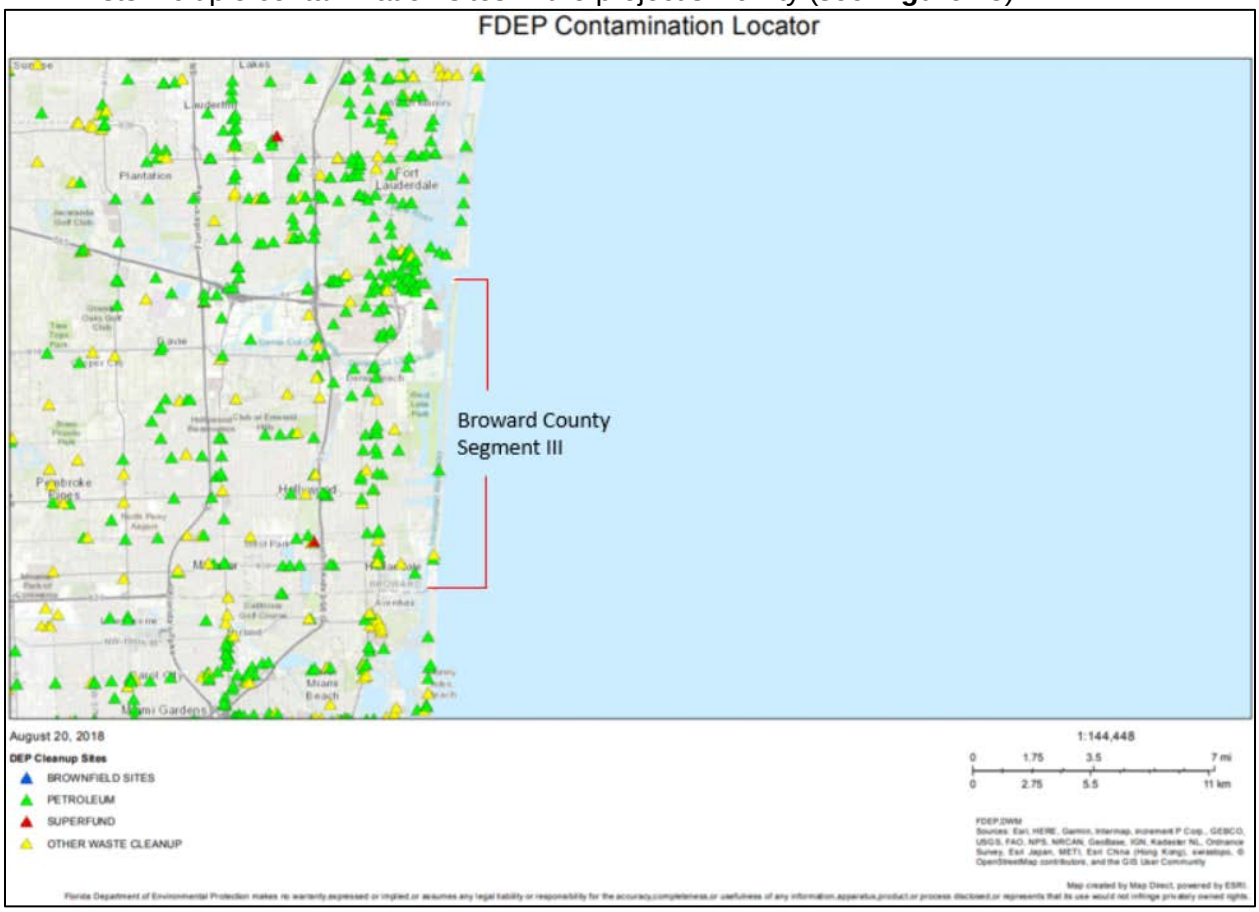

Figure 15. FDEP listed contamination sites located in the vicinity of Broward County Segment III.
(SOURCE: https://ca.dep.state.fl.us/mapdirect/?focus=contamlocator)

3.8 WATER QUALITY

The predominant issue that affects water quality in South Florida is turbidity, which is considered an appropriate measure of water quality. Turbidity is measured in Nephelometric Turbidity Units (NTU), which is a measure of light scattering by particulates within the water. This measurement does not address the characteristics of suspended material that creates turbid conditions. The Florida State Water Quality Standard for turbidity is less than 29 NTU above background levels outside the turbidity-mixing zone, which is defined in the water quality monitoring plan.

Turbidity values are generally lowest in the summer months and highest in the winter months, corresponding with winter storm events and the rainy season, and tend to be higher closer to shore (Gilliam 2008; Dompe and Haynes 1993; Coastal Planning & Engineering 1989). Moreover, higher turbidity levels can generally be expected around inlet areas, especially in estuarine areas, where nutrient and entrained sediment levels are higher. Although some colloidal material will remain suspended in the water column upon disturbance, high turbidity episodes usually return

to background conditions within several days to several weeks, depending on the duration of the perturbation (storm event of other) and on the amount of suspended fines.

Waters around the project area have been designated by the State of Florida as Class III waters, suitable for recreation as well as propagation and maintenance of a healthy and well-balanced population of fish and wildlife. Commercial/recreational boating, recreational fishing, kayaking, and other recreational uses are common in this area.

In addition to turbidity, the rapid population growth and urbanization of southeast Florida is a suspected contributor to the degradation of water quality along the coast, mainly through the discharge of nutrient-laden sewage and stormwater runoff into canals (FDEP 2003). Drainage of Broward County is facilitated by more than 266 miles of natural and dredged canals that traverse the county's urban corridor (Broward County Planning Council 1989). Overall, the hydrology of Broward County is highly manipulated by these water control structures, which have altered the natural hydroperiods and flows of the South Florida watershed. The primary drainage system is managed by the South Florida Water Management District (SFWMD) and consists of nine major canals and their corresponding drainage basins. These nine major canals, along with secondary and tertiary canals, eventually drain to the estuarine areas, such as the IWW. From the IWW, inlets provide discharge access to the Atlantic Ocean. Runoff can carry bacteria, viruses, oil and grease, toxic metals, and pesticides (FDEP 2003). In addition to contributions from canals, nutrients and coliform bacteria can be introduced via septic tanks and disposal well discharges on Florida's east coast (U.S. Geological Survey (USGS) 1992). As part of the State's Healthy Beaches Program, biweekly water samples are collected at fifteen public beaches in Broward County for *Enterococci* bacteria. In order to reduce the potential spread of disease, infections, or rashes, health advisories or warnings are issued by the Florida Department of Health (FDH) when concentrations are elevated (FDH 2012).

3.9 AIR QUALITY

Ambient air quality along the southeast Florida coast is generally good due to prevalent ocean breezes from the northeast to the southeast. The area is in the Southeast Florida Intrastate Air Quality Control Region, as established by 40 CFR § 81.49. U.S. Environmental Protection Agency (USEPA) designates air quality compliance on a county level (40 CFR § 81.310). Broward County is considered to be in attainment with National Ambient Air Quality Standards (NAAQS) for ozone, nitrogen dioxide, carbon monoxide, total suspended particulates, and sulfur dioxide. USEPA has not made a designation for lead in southeastern Florida. Refer to section 3.10 of the FEIS (Corps 2004) for a discussion on air quality within the proposed project area.

3.10 NOISE

Noise is defined as unwanted sound and, in the context of protecting public health and welfare, implies potential effects on the human and natural environment. Noise is a significant concern associated with construction and transportation activities and projects. Ambient noise levels within a given region may fluctuate over time because of variations in intensity and abundance of noise sources. Ambient sources of noise within the project area are recreational activities (boating and fishing), commercial vessels transiting up and down the coast, and natural sounds from the physical and biological environment. Broward County has many seasonal residents and tourists, and many more residents are present in the winter months, which results in more recreation during the winter tourist season, resulting in higher noise levels. In addition, there are many sources of noise associated with the highly developed, urban setting of Segment III and the surrounding area. In-water noise is produced by engine or generator operation as commercial

vessels enter and exit Port Everglades and anchor offshore. Recreational vessels also frequently traverse the area and enter and exit both Port Everglades. Above the water, the greatest contributor to noise is air traffic associated with the Fort Lauderdale/Hollywood International Airport.

3.11 AESTHETIC RESOURCES

The project area is an urban environment and as previously discussed, heavily used for recreational and commercial purposes and needs. The shoreline along Broward County has been highly developed by residential and commercial interests, and much of the shoreline is hardened. Derelict or nonfunctional outfall pipes and shoreline stabilization structures are intermittently spaced along the Broward County shoreline. The man-made Port Everglades inlet was developed in 1927-1928. Much of the dune vegetation was cleared or reduced for the development of Port Everglades and adjacent urban areas. The project area consists of light beige sandy beaches that contrast strikingly with the deep hues of the panoramic Atlantic Ocean. Dunes, dune vegetation and tropical landscaping separate the beach from condominium and hotels along the shore. Landscaping vegetation consists of trees such as coconut, sabal, and date palms, as well as a shrub canopy including seagrape and cocoa plum, which transitions into sea oats, dune sunflower, and morning glory vines. These and many other tropical beach plantings provide an aesthetic transition between the dunes and the beach.

3.12 RECREATION RESOURCES

Broward County boasts 24 miles of oceanfront shoreline that provides access to millions of residents and visitors each year. Broward County is heavily populated and located on Florida's Atlantic Coast, which receives a tremendous volume of tourists, particularly during the winter months. Those beaches that can be accessed by the general public are heavily used year round. Adjacent to these beaches are many condominiums and hotels used by long-term and short-term visitors and residents of the area. Other water-related activities within the project area include on-shore and offshore fishing, snorkeling, scuba diving, windsurfing and recreational boating. Commercial enterprises along the beach rent beach chairs, cushions, umbrellas, and jet skis. Food vendors are also found along the beach areas. Beaches within Segment III include Dania Beach, the Park, Hollywood, and Hallendale. The Park is the only official state recreational resource documented in the coastal area of Segment III. In addition, the county also manages five campgrounds and four water parks (Broward County 2012a). Refer to section 3.13 of the 2004 FEIS for a discussion of recreational use of Broward County beaches.

3.13 ECONOMIC RESOURCES

The median household income in Broward County was $52,954 in 2016, which was slightly lower than the national average of $55,322 (U.S. Census 2016). Tourism contributes significantly to the Broward County economy, with the largest industries being healthcare and social assistance, retail trade, and accommodations and food service (Data USA 2016). Amenities such as restaurants, fishing, nightclubs, golf courses, casinos, malls, etc. provide a large benefit through tourism, taxes, and jobs. In addition, highway A1A serves as the main evacuation route for residents and visitors from the area during storm preparation efforts. Benefits of the beach renourishment project and recreational socio-economic benefits are discussed in section 3.13 of the 2004 FEIS.

3.14 CULTURAL RESOURCES

Archaeological evidence indicates the earliest known prehistoric native peoples entered into Florida during the Paleoindian Period at least 12,000 years ago, inhabiting a landscape and

environment considerably different from the present (Milanich 1994). At that time, the Florida peninsula was almost double the size of its current area, sea levels were 200 to 350 feet lower, fresh sources of water were limited, and Lake Okeechobee and the Everglades did not exist (Meltzer 1989; Milanich 1994). The interior of Florida was likely covered by extensive and moderately dry expanses of grasslands. Intensive Paleoindian habitation was most likely restricted to Florida's coastline; however, remnants and other evidence of these coastal habitation sites are currently located offshore, progressively inundated by rising sea levels in the past.

Paleoindian populations are characterized as consisting of highly mobile bands of large-game hunters. Projectile points during this period are lanceolates ranging from skillfully fluted (e.g. Clovis) to unfluted varieties (e.g. Suwanee-Simpson). These points, hafted to long stout spears, and propelled by the atlatl, suggest the existence of a subsistence strategy based primarily on hunting large mammals (Wilmsen 1970). In Southeast Florida, Paleoindians hunted mammoths, bison, and other types of megafauna in arid or semi-arid climatic conditions at first, adapting to a transitioning climate toward the end of the period coinciding with the new emerging wetlands, and subsistence strategies relying on marine life, gathering, and small game hunting. Few Paleoindian archaeological sites are recorded in Florida, and none are identified within the area of potential effect for the project.

During the Archaic Period, lasting from 8500 – 500 BC, the environment and physiology of Florida transformed, undergoing a gradual warming trend, rising sea levels, a reduction in the area of the peninsula, and an increase in the proliferation of oak forests and hammocks within the interior of the state (Milanich 1994). Population increases and cultural changes begin to appear in the archaeological record. The Archaic period is divided into three subperiods –Early (8500 – 5000 BC), Middle (5000 – 3000 BC), and Late (3000 – 500 BC).

The Early Archaic archaeological sites in the project area are not well represented. Similar to the Paleoindian Period, an arid climate, limited freshwater sources, and scarce availability of raw lithic materials for tool-making, likely deterred Early Archaic settlement. During the Middle Archaic, coastal resources were exploited as the modern estuaries began to form resulting in a variety of new settlement and subsistence strategies adapted to local environments. With the beginning of the Late Archaic, exploitation of inland areas began, and tree islands are inhabited. Pre-ceramic tree-island middens in the Everglades are radiocarbon dated to around 2500 BC (Schwadron 2006). Importantly, the native peoples of Florida began to make the first pottery during this period.

In south Florida, two distinct Late Archaic cultures developed: the Orange culture and the Glades Archaic culture. Orange cultures sites are typically oyster and coquina shell middens along the coastline of Florida, and freshwater-pond snail middens along the inland rivers and streams. Glades Archaic culture sites are represented as non-ceramic bone middens occurring on interior tree islands in the marshes of south Florida. Faunal remains from Glades Archaic sites are mainly freshwater species, such as fish, turtle, and apple snail. While most widely known from northeast Florida, Orange culture sites have been identified along the southeast coast.

During the Glades Period (500 BC – AD 1513), cultures are adapting their lifeways regionally, allowing well-defined archaeological geographic cultural subdivisions to be established. The cultural chronology of the Glades Period is founded in the seminal research of John Goggin (1947), who originally defined the Glades I, Glades II, and Glades III subperiods based on analysis of decorated pottery motifs. The early Glades I Period (500 BC – AD 200) is characterized by the presence of undecorated sand-tempered pottery. The undecorated pottery type continues to

dominate the late Glades 1 Period; however, the decorated Fort Drum series, including punctuated and incised varieties, begin to appear in the archaeological record. During the Glades III Period, newly introduced sand-tempered pottery types (e.g. Key Largo, Miami Incised, and Sanibel Incised) are identified in the archaeological record, allowing further subdivision of the period into the subperiods; Glades IIa, Glades IIb, and Glades IIc. By the Glades III Period (AD 1200 – 1513), decorated pots are almost entirely absent in the archaeological record (Griffen 1989); however, trade in exotic wares are evidenced by the presence of St. John's Checked-Stamped and Safety Harbor sherds recovered from prehistoric middens.

At the time of initial European contact, the area of present-day Broward County was inhabited by the Tequesta Indians, which can be traced back in time at least to 500 BC (Milanich 1994). The archaeological information from the pre-Columbian period provides no evidence that the Tequesta were organized in as complex a fashion as the Calusa, who dominated the lands on the southwestern coast of Florida. Sixteenth-century Spanish documents indicate the Tequesta chief ruled over a small population with allegiance to the Calusa chief. With European expansion to the north came the arrival of displaced native populations from the northern areas into South Florida. By the mid-eighteenth century, a Jesuit mission was established for a brief time at the mouth of the Miami River where the Tequesta's main village had once been. Documents relative to that mission no longer refer to the Tequesta, but they do mention two other groups, the Santaluces and the Boca Ratones. The Spanish probably named the Boca Ratones Indians after the small coastal inlet in which they lived, which today still is called Boca Raton and located just north of the project area (Milanich 1995; Wilson et al. 2018).

The first European to land on and explore Florida was Ponce de Leon. In 1763, the English gained temporary possession of the region from the Spanish. During the American Revolution, the Spanish retook Florida from the British in 1781. During the Second Spanish period, the population of Florida continued to grow. As the eighteenth century ended and the nineteenth century began, the Seminole Indians were increasingly forced into the interior of Florida. In the early nineteenth century, Spain's control over Florida was weak, and after the First Seminole War, Spain sold Florida to the U.S. (McIver 1983). In 1821, Florida became an American territory and remained a territory until 1845, when it was granted statehood. Dade County encompassing present-day Miami-Dade, Broward, and Palm Beach counties, was established in 1936.

The 1920s were a boom time across Florida, including Broward County. New developments sprang up across the county (Allen and Capone 2000). In the 1920s, the Port of Palm Beach opened and it was very successful. In 1926, hurricanes and a banking crisis ended the boom times for Florida. Despite the difficulties of the times, Port Everglades successfully opened in 1928 (McIver 1983). World War II brought civilian jobs and military base construction to Broward and Palm Beach counties. The Postwar period brought yet another surge in development to Broward County, with the creation of new subdivisions and towns. Improved flood control opened up more land in the county for real estate development. This pattern of development continued through the 1960s. Today, the east coast of Florida is one of America's premier retirement locations and the beaches are a tourism attraction.

Refer to section 3.15 of the 2004 FEIS for more discussion on cultural resources in the project area.

3.15 NATIVE AMERICANS

The Broward County Segment III beaches are not located within or adjacent to known Native-American-owned lands, reservations lands, or Traditional Cultural Properties.

4 ENVIRONMENTAL EFFECTS

This section is the analytic basis for the comparisons of the alternatives. (*See* **Table 2** in Section 2 (Alternatives) for summary of effects.) The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects. The Preferred Alternative is the FCCE truck haul renourishment above MHW added into the project lifecycle (Alternative 1).

4.1 GENERAL ENVIRONMENTAL EFFECTS

Under the No Action Alternative, erosion of Broward County beaches in Segment III would likely continue resulting in a progressive loss and possible elimination of the remaining beach and dune system. Damages to upland and shorefront structures and roads would likely occur. Recreation and tourism opportunities and economic benefits would decrease and possibly be eliminated. Beach nourishment will provide protection to upland and shorefront infrastructure. Positive effects include protection of upland structures and infrastructure, as well as potential benefits to local economies due to increased use for recreation. Beach nourishment will also have positive and negative effects on multiple components of the beach ecosystem, including (but not limited to) flora and fauna, water quality, and marine resources. Alternative 2 would result in a wider beach which would provide more protection of the upland and shorefront infrastructure as well as the beach ecosystem than Alternative 1. Although some temporary negative effects will occur, long term negative effects are not anticipated. Ecological recovery of the system is influenced by the project timing, project size and location, techniques employed, sand quality and quantity, and conditions prior to nourishment (Speybroeck et al. 2006). The project's potential benefits and temporary adverse effects are discussed in more detail throughout this chapter.

4.2 VEGETATION

Much of the dune community along the Segment III shoreline has been lost due to a combination of development and erosion. Placement of sand on the beach as described in Alternative 1 and 2 would raise the beach and may contribute to development of a stable dune habitat for many plant and animal species through natural dune building processes. Stands of vegetation >25 square feet in area will be avoided. Less than 25 square feet in area will be replanted. During construction, impacts to extant dune vegetation will be minimal, as operations will avoid placing sand directly onto the vegetation and construction vehicles will utilize already-existing access corridors. In comparison, the No Action Alternative would allow for continued erosion of Broward County's beaches. Without beach renourishment, there would likely be a progressive loss and possible elimination of the remaining beach and dune which would further reduce habitat available for vegetation recruitment and growth. Additionally, armoring measures that would likely be undertaken by property owners in the absence of nourishment would further reduce the available habitat.

4.3 THREATENED AND ENDANGERED SPECIES

Under the No Action Alternative, renourishment of Segment III would not occur. The No Action Alternative would have no effect on the American crocodile, Florida manatee, smalltooth sawfish, Nassau grouper, and giant manta ray. Continued erosion could result in exposure of nearshore rock outcroppings which may serve as habitat for coral colonization. The increased turbidity associated with the continued erosion may also reduce recruitment due to the interference with coral spawning or coral health. Fragmentation would still be potential. Additionally, the continued erosion of the beach could threaten the existence of the remaining dune vegetation and adjacent scrub habitat in Broward County. This decrease in available habitat will negatively affect beach

jacquemontia as well as result in a loss of potential foraging habitat that will negatively affect the piping plover and rufa red knot. The continued shoreline recession will also reduce the amount of dry beach available for sea turtle nesting and may result in poor site selection by nesting females. As the beaches recede, nests become more susceptible to tidal inundation leading to an increase in hatchling mortality (Brock and Erhard 2008; Witherington et al. 2008). Other studies have documented an increase in the number of false crawls with increased erosion (Mosier and Witherington 2002). In the absence of nourishment, coastal property owners may turn to armoring measures, such as sea walls, groins and revetments, which severely decreases suitable nesting habitat and leads to an increase in false crawls and hatchling mortality due to wash out (Mosier and Witherington 2002; Brock and Erhart 2008; Witherington et al. 2008).

Potential effects of the placement of sand on the beach (Alternative 1 and 2) have been reviewed in the 1997 SARBO (as amended), 2015 SPBO, and 2013 P3BO. These BOs include terms and conditions (T&Cs) to minimize adverse effects to listed species and provide incidental take authorizations where adverse effects cannot be avoided. Due to the placement of sand above MHW, implementation of Alternative 1 would include the applicable T&Cs of the SPBO and P3BO issued by USFWS in the project plans and specifications to be followed during construction. Due to the placement of sand below MHW, implementation of Alternative 2 would also include the applicable T&Cs of the SARBO issued by NMFS in the project plans and specifications to be followed during construction.

Additional analysis, by species group or species, is provided below along with the Corps' effects determination:

<u>Sea Turtles</u>
Beach renourishment (Alternative 1 and 2) could potentially directly and indirectly affect sea turtles in several ways, including:

- Placement activities on nesting beaches may affect sea turtles;
- Escarpment formations and resulting impediments to nesting females as well as potential losses to the beach equilibration process;
- Sediment density (compaction), shear resistance (hardness), sediment moisture content, beach slope, sediment color, sediment grain size, sediment grain shape, and sediment grain mineral content can be altered potentially affecting the nesting and incubating environment;
- Hard sediment can prevent a female turtle from digging a nest or result in a poorly constructed nest cavity;
- Changes in sediment properties and color could alter the temperature of the beach and incubating nests, thus influencing sex ratios.

USFWS biological opinions for similar projects acknowledge that placement of sand on a critically eroded beach can enhance sea turtle nesting habitat if the sand placed is highly compatible (*i.e.*, grain size, shape, color, etc.) with naturally occurring beach sediments at the recipient site, and compaction and escarpment remediation measures are properly adopted (USFWS 2015).

The Corps plans to minimize potential effects to nesting sea turtles in the project area by implementing steps that are now common practice including, but not limited to:

- contingency plans;
- risk assessments;
- sediment quality monitoring;

- compaction tests;
- tilling; and
- leveling escarpments in the fill;
- time of year restriction: no beach placement from May 1 through November 1.

Construction of Alternative 1 or 2 would occur during the non-peak nesting winter months to avoid effects to sea turtle nests and/or hatchlings. Construction will occur between November 1 and April 30, which allows for a total of 180 calendar days to complete the project. While nourishment can be beneficial in restoring nesting habitat, it also has the potential to adversely impact nesting and hatchling sea turtles in a number of ways and is considered a primary threat that may impact proposed critical habitat for nesting loggerhead sea turtles (78 FR 18000-7999 18082). There have been mixed results reported in studies measuring sea turtle hatchling success for nourished versus non-nourished beaches. Section 4.3.1.1 of the 2004 GRR/FEIS provides a review of some studies and analysis of other positive and negative impacts to sea turtles (Corps 2004).

Additional effects associated with placement of material below the MHW line (Alternative 2), include burial of nearshore hardbottom as the beach profile reaches the estimated toe of fill (ETOF). This burial may adversely impact nearshore sea turtle habitat as the nearshore hardbottom is especially important habitat for the green sea turtle foraging and juvenile development habitat. Algal species that are known food sources for green turtles have been documented in the nearshore environment, including *Gelidium, Dictyota, Dasya, Gracilaria, Hypnea* and *Bryothamnion* (Wershoven and Wershoven, 1988; 1992; Makowski et al., 2006). Possible secondary impacts to macroalgae communities that serve as important foraging habitat include decreased photosynthetic rates due to turbidity and possible burial due to sedimentation. A more in-depth discussion of green sea turtle utilization of the nearshore hardbottom habitat in Broward County, as well as potential impacts from project construction can be found in section 4.3.1.1(c) of the 2004 FEIS.

Because a truck haul project would not require use of dredges or other vessels, it is unlikely that offshore sea turtle habitat would be impacted. A truck haul approach minimizes the use of in-water vessels and the potential for entanglement, entrainment or strikes. The Corps determined that implementation of either Alternative 1 or 2 would have no effect on Kemp's ridley sea turtles due to the unlikelihood of encountering this species in the project area. The Corps has determined that placement of sand above MHW (Alternative 1 and Alternative 2) is consistent with the SPBO and the proposed activities are likely to adversely affect nesting sea turtles but not likely to jeopardize the continued existence of the species. Due to the placement of sand above MHW, implementation of Alternative 1 and 2 would include the applicable T&Cs of the SPBO issued by USFWS in the project plans and specifications to be followed during construction. Implementation of Alternative 2, which includes placement of sand below MHW, would also include the applicable T&Cs of the 1997 SARBO (as amended) issued by NMFS in the project plans and specifications to be followed during construction. The Corps has determined that Alternative 2 is consistent with the NMFS' SARBO and may affect, but is not likely to adversely affect, sea turtles under NMFS jurisdiction.

<u>American Crocodile</u>
The Corps has determined that both Alternatives 1 and 2 may affect, but are not likely to adversely affect, American crocodiles. This species has been sighted in the Park and in the surf zone at Dania Beach. Although a truck haul approach minimizes the use of in-water vessels and the potential for entanglement, entrainment, or strikes in the water, American crocodiles could also

be found on the beach. Due to the species being highly mobile and able to easily avoid the area, direct, physical injury effects to this species are not anticipated from construction operations, machinery, or materials.

Florida Manatee

The Corps has determined that beach renourishment above MHW (Alternative 1) would have no effect on manatees; however, beach renourishment below MHW (Alternative 2) may affect, but is not likely to adversely affect manatees. In accordance with Section 7 of the ESA, consultation with the USFWS would be conducted under the SPBO for implementation of Alternative 2. Manatees are most likely to be impacted by support boats involved with turbidity monitoring while moving from dock areas through channels to the project location (Corps 1996). No significant adverse impacts to manatees are anticipated with implementation of the 2011 USFWS Standard Manatee Conditions for In-Water Work as required by the SPBO to ensure the protection of manatees during construction.

Smalltooth Sawfish

The Corps has determined that beach renourishment above MHW (Alternative 1) will have no effect on smalltooth sawfish. Beach renourishment below MHW (Alternative 2) may affect, but is not likely to adversely affect smalltooth sawfish. Based on the low probability that this species will enter the project area and the use of a truck haul approach instead of a dredge-and-fill approach, the Corps determined that the unlikelihood of encountering this species deems the possibility of affecting them as discountable.

Nassau Grouper and Giant Manta Ray

The Corps has determined that beach renourishment above MHW (Alternative 1) will have no effect on Nassau groupers and/or giant manta rays. Beach renourishment below MHW (Alternative 2) may affect, but is not likely to adversely affect Nassau groupers and/or giant manta rays. Due to the species being highly mobile and able to easily avoid the area as well as the use of a truck haul approach instead of a dredge-and-fill approach, direct, physical injury effects to this species are not anticipated from construction operations, machinery, or materials.

Piping Plover and Rufa Red Knot

Placement of sand on the beach for Alternative 1 or 2 includes habitat that could be used by the piping plover and/or rufa red knot, but it is not considered optimal habitat for either species. Direct effects to the birds from project construction are expected to be minimal as birds are motile and can avoid construction activities. Placement of sand on the beach may temporarily displace foraging and resting birds. This interruption is limited to the immediate area and duration of construction. Habitat exists outside of the beach placement areas with similar characteristics that may be used by displaced species while renourishment activities are underway. The prey base, which includes the benthic organisms, may be temporarily reduced in the proposed beach placement areas. This effect would be short-term as recovery of beach infauna is expected to occur quickly. Therefore, implementation of Alternative 1 or 2 may affect, but is not likely to adversely affect, the piping plover or rufa red knot. If either species are found in the renourishment footprint, the protective conditions developed for migratory birds will be utilized as well as conditions of the P3BO. Compliance with the reasonable and prudent measures and T&Cs listed in the P3BO will provide sufficient protection for piping plover and rufa red knot.

Beach Jacquemontia

Implementation of Alternative 1 or 2 may impart both negative and positive impacts on the endangered dune plant *Jacquemontia reclinata*. In the short term, presence of construction equipment may mechanically damage any existing plants, while sand placement, if done improperly, may bury extant plants. Construction of the beach may provide potential habitat for this species. Due to the low number of observations for this species in Broward County, the Corps has determined the project will have no effect on this species.

Coral Species

There are no hardbottoms in the direct footprint of the FCCE; however, based on previous surveys of the full construction template placement area there may be hardbottom present below MHW in the placement area. A full nearshore hardbottom survey would need to be conducted prior to construction of the full template. Based on previous surveys of Segment III and Segment II, listed coral species are not expected to be found adjacent to the project area; however, confirmation will be required by a survey prior to construction of the full template. Placement of sand above MHW (Alternative 1) will have no effect on listed corals. For the placement of sand below MHW (Alternative 2), turbidity measurements may not accurately reflect the amount of sedimentation and siltation that occurs on adjacent reef communities. There is no direct correlation between turbidity and sedimentation rates, or between turbidity and total suspended solids that can be uniformly applied across differing projects (Davies-Colley and Smith 2001; Clarke and Wilber 2008). The effects of sedimentation are a dose-response relationship, and the results of that relationship specific to dredging projects in SE Florida, has been previously reported. The effects of sedimentation, with proper *in situ* monitoring, showed no long-term adverse effect on coral species in general; however, issues of concern and the sufficiency of measures to avoid, minimize, and mitigate for impacts to corals and hardbottom resources will be more closely examined prior to full construction of the FCCE template. Standard construction measures and Best Management Practices (BMPs) will be implemented to avoid undue turbidity and sedimentation from reaching corals.

4.4 FISH AND WILDLIFE RESOURCES

The No Action Alternative will result in increased erosion. No adverse environmental impacts to nearshore and offshore hardbottom habitats and fish communities are anticipated due to the No Action Alternative. An increased exposure of nearshore hardbottom due to continued beach erosion is probable which, in turn, could provide increased habitat for surf zone fishes. Continued erosion of the beach could threaten the existence of the remaining dune vegetation and adjacent scrub habitat in Broward County, potential decreasing available habitat for birds and dune species. Additionally, armoring measures that would likely be undertaken by property owners in the absence of nourishment would further reduce the available habitat and result in negative impacts to the biological communities.

Implementation of Alternative 1 or 2 will have the same effects on beach and dune habitat. Direct effects to birds and other wildlife from project construction are expected to be minimal as these animals are motile and can avoid construction activities, however, temporary displacement and noise related to use of heavy construction equipment could disturb nesting and foraging birds and other wildlife (Speybroek et al. 2006). Some wildlife and birds may experience temporary adverse effects from a reduction in available food sources. These effects will be short-term and limited to the immediate area of placement and time of construction. There will be sufficient areas north and south of the construction zone that can be used by displaced birds and wildlife during construction. Long-term benefits can be expected from the additional beach area that will result in more available nesting and foraging areas for migratory birds.

The Corps, in conjunction with the USFWS and FWC, has developed statewide guidelines to avoid and monitor potential effects to shorebirds. If placement of sand occurs during migratory bird nesting season, short-term, localized effects may occur. The timeframe for the construction activities will be in accordance with P3BO and SPBO T&Cs. The Corps developed a suite of contractual specifications for contractors to implement during construction where migratory birds may be present. The Contractor, will be assisted in this by a qualified bird observer as required by the SPBO, will keep all construction activities under surveillance, management, and control to prevent effects to migratory birds and their nests. The Contractor may be held responsible for harming or harassing the birds, their eggs or their nests as a result of their activities.

Nelson (1989) reviewed the literature on the effects of beach nourishment projects on sand beach fauna and concluded that minimal biological effects resulted from beach nourishment. Nelson reviewed several studies on the most common beach invertebrates of the southeastern U.S., including the mole crab (*Emerita talpoida)*, the surf clam, (*Donax sp.)* and the ghost crab (*Ocypode quadrata)*. None of the studies cited by Nelson (1989) showed significant or lasting impacts to any of the above species resulting from beach nourishment. Hackney et al. (1996) provide a more recent review of the effects of beach restoration projects on beach infauna in the southeastern U.S. They also reviewed studies on the above species and agree with the conclusions set forth by Nelson (1989), with the suggestion that construction should take place in winter months to minimize potential effects, and that the sand used should be a close match to native beach sand. In review of past studies, there was a considerable short-term reduction in the abundances of mole crabs, surf clams, and ghost crabs attributable to direct burial. Recruitment and immigration were generally sufficient to re-establish populations within one year of construction. No long-term adverse effects are anticipated to the intertidal macroinfaunal community due to placement activities (Deis et al. 1992, Nelson 1985, Gorzelany & Nelson 1987). Section 4.5.1 of the 2004 GRR/FEIS analyzes potential impacts to infaunal and shorebird species (Corps 2004).

In addition to beach and dune effects, implementation of Alternative 2 could also affect nearshore hardbottoms and unvegetated habitat through turbidity and sedimentation from the placement of sand below MHW. These affects would be offset with in-kind compensatory mitigation, which will likely consist of construction of a nearshore artificial reef composed of prefabricated habitat replication units or limestone boulders scoped and sized according to the characteristics of the hardbottom habitat expected to be impacted.

4.5 ESSENTIAL FISH HABITAT

Under the No Action Alternative, erosion of the shoreline would continue. As stated in section 4.4.5 of the 2004 FEIS, "…it is probable that maintenance of status-quo conditions would result in increased exposure of nearshore rock outcrops as the shoreline continues to erode at its present rate."(Corps 2004). The exposed rock outcrops could potentially serve as additional EFH. Alternative 1 is not expected to result in effects to EFH due to the placement of sand above MHW.

Temporary effects associated with turbidity from Alternative 2's placement of sand below MHW would occur; however, these effects will be limited to the duration of project construction and will not have long-term effects on water quality. Motile species may leave the project area during construction but it is expected that they will return upon completion of the project. There may be direct and indirect impacts to the nearshore hardbottom resources. Issues of concern and the sufficiency of measures to avoid, minimize, and mitigate for impacts to corals and hardbottom

resources will be more closely examined prior to full construction of the FCCE template. Standard construction measures and BMPs will be implemented to avoid undue turbidity and sedimentation from reaching these sensitive habitats.

4.6 COASTAL BARRIER RESOURCES

Under the No Action Alternative, erosion would continue and the shoreline would continue to narrow in the identified Coastal Barrier Resources Act (CBRA) units (OWA FL20P, Lloyd Beach, and System Unit P14A, North Beach). Implementation of Alternative 1 or 2 would result in a restored and stabilized beach in the CBRA units. Consultation for the Broward County SPP beach renourishment within OWA FL20P and System Unit P14A was completed with USFWS during the FEIS process. In a letter dated April 30, 2003, the USFWS concluded the following:

> *"Since the proposed Broward County Shore Protection Project does not include the construction of structures that would require Federal Flood Insurance, then Federal expenditures for the proposed project are not restricted in the FL-19P, Birch Park, and FL-20P, Lloyd Beach OPAs. The Service has determined that the construction activities within CBRA Unit P-14A, North Beach, are consistent with the intent of the Act and are exempt pursuant to section 6(a)(G) which authorizes 'nonstructural projects for shoreline stabilization that is designed to mimic, enhance, or restore a natural stabilization system.'"*

4.7 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

None of the alternatives will result in a change to the project area's HTRW conditions. The project will not introduce any new sources of contaminants or hazardous waste to the area. All wastes and refuse generated by project construction will be removed and properly disposed. Contractors will implement a spill contingency plan for hazardous, toxic, or petroleum material for the borrow area.

4.8 WATER QUALITY

The No Action Alternative and Alternative 1 are not expected to affect water quality. Construction of Alternative 1 will occur completely on a dry beach, and the placement of sand will be above MHW. The submerged portion of the beach is already in equilibrium and therefore, no effects associated with reaching equilibrium are anticipated.

Alternative 2 includes placement of sand below MHW. Turbidity may increase in the nearshore environment as the newly constructed beach adjusts to conditions and reaches the ETOF. Turbidity will be minimized through the planned use of high quality sand from an upland source, preventative measures, and monitoring efforts; therefore, project construction is not expected to require a variance to the standard mixing zone of 150 meters. After placement, water quality will quickly return to pre-construction conditions. If Alternative 2 is selected in future cycles, implementation will be performed in compliance with State of Florida water quality standards, and the Corps will obtain Section 401 Clean Water Act water quality certification (WQC) prior to construction. Section 4.25.2 of the 2004 GRR/FEIS discusses turbidity recordings and sedimentation monitoring for various nourishment projects (Corps 2004).

4.9 AIR QUALITY

Under the No Action Alternative, air quality conditions would remain the same. Implementation of Alternative 1 or 2 will occur in an urban, highly developed area, which already experiences

various emissions and is in attainment with NAAQS. Both Alternatives will have minor, temporary degradation of air quality due to emissions from heavy equipment during mining, transport, and placement operations.

4.10 NOISE

Under the No Action Alternative, noise levels are expected to remain the same. Implementation of Alternative 1 or 2 will result in temporary, minor increases in noise during construction due to the heavy machinery involved with a truck haul project. Areas where placement will occur currently experience elevated background noise associated with recreation, commercial, and tourism activities. Placement operations near populated or other noise-sensitive locations may result in increased levels of noise. Noise levels will be affected along the roads and bridges traversed by dump trucks, at the beach access points and staging areas where sand transfer will occur, and at the section of beach being filled. Construction equipment will be properly maintained to minimize these effects in compliance with local laws. Sand delivery and placement will be limited to daylight hours due to safety and noise concerns. It is not expected that there will be any permanent or lasting impacts to above water noise levels. Although Alternative 2 includes some in-water work associated with sand placement below the MLW, the noise levels generated by the small boats present for turbidity monitoring purposes are no different than typical noise created by other commercial and recreational vessels in the area. Following construction completion, noise levels are expected to revert to background levels.

4.11 AESTHETIC RESOURCES

The No Action Alternative would result in decreased aesthetic value due to the narrowing of the beach and the potential for increased armoring. Although Alternative 2 would result in a wider beach than Alternative 1, implementation of either alternative will result in improved aesthetic value of the beach due to the taller and/or wider beach without erosional scarps. Members of the public may consider the presence of construction equipment to be “unsightly”, which will temporarily detract from the aesthetics until construction is complete and the equipment is removed.

4.12 RECREATION RESOURCES

Under the No Action Alternative, the continued erosion will reduce the beach space available for recreational activities, which will likely result in negative effects on the long-term recreational use of the area. Implementation of Alternative 1 or 2 will temporarily impede or restrict beach use for safety purposes during placement operations; however, this effect will be temporary, lasting only until construction is complete. Although both alternatives will result in long-term positive effects by restoring beach space for recreational activities, Alternative 2 would result in a wider beach which provides more space than Alternative 1.

4.13 ECONOMIC RESOURCES

Section 15 of the Corps’ 2018 PIR and Section 4.8 of the 2004 GRR/FEIS have detailed discussions of the socio-economic impacts associated with placement of sand on the Broward County Segment III beachfront. Both of those analyses are relevant to this project and are incorporated by reference. Implementation of Alternative 1 or 2 will result in increased traffic and wear and tear on the roads during truck haul activities. Placement of sand on the beach will increase the capacity for recreational activity, and ultimately lead to an increase in tax revenue and tourism commerce. The commercial businesses and residential properties along the shoreline will benefit from the storm protection afforded by the project, which will maintain or increase beachfront property values and incur less risk of property damage. Construction of

Alternative 2 would result in a wider beach due to the placement of sand below MHW. The wider beach would provide more space for recreation and tourism as well as protection to upland structures than Alternative 1.

The No Action Alternative assumes continued erosion along Segment III's shoreline. The reduction of storm protection could result in damages to infrastructure that could lead to millions of dollars of repair costs to be borne by the local sponsor. Additionally, the continued loss of recreational beach area may result in loss of tourism commerce and tax revenue. The potential loss of or damages to roads, specifically highway A1A, could impede efforts to evacuate residents and visitors from the area during storm preparation efforts.

4.14 CULTURAL RESOURCES

Potential cultural resources that may exist near the project area include archaeological resources or historic structures located in or near the project area or sand sources. Based on archival research of the Florida Master Site File (FMSF) no prehistoric archaeological sites are recorded within the beach placement area; however, several historic structures (8BD03841, 8BD03836, 8BD03835, 8BD3804, 8BD03804, 8BD03802, 89BD03815, 8BD03800, 8BD00322, 8BD05203, 8BD03427, 8BD03769, 8BD03337, 8BD03309, 8BD3300, and 8BD03299) are located within 200 feet of the placement activities. In the past, beach material placement for the project was viewed as a protective measure; therefore, no cultural resources survey has been conducted during for previous project renourishments. For the proposed action Alternative 1 – FCCE only renourishment added into the project life cycle, the Corps has determined that the project will have no adverse effect on historic properties on or eligible for inclusion on the NRHP. For the proposed action Alternative 2 – FCCE – placement congruent with the full construction template, nearshore areas that have not been previously subject to cultural resources surveys will require cultural resources surveys prior to project implementation. The No Action Alternative through continued erosion and sea level rise poses an adverse effect on cultural resources.

The primary commercial upland sand sources identified for the Segment III Project include the Ortona Sand Mine and the Witherspoon Sand Mine. Over the years, a number of cultural resource surveys have been conducted for the Ortona Sand Mine (Department of Historical Resources (DHR) Survey Nos. 6689, 4847, 3021, 17005, and 16862). Several prehistoric archaeological sites associated with the Ortona Mound complex have been identified and recorded within the mine property including Ortona Canal East (8GL4a), Quarry Mound (8GL81), Lance's Mound (8GL419), Saw Palmetto Haven Mound (8GL420), and Tallant Mound (8GL00083). FMSF records indicate that the Ortona Canal East (8GL4a) and Quarry Mound (8GL81) have been mitigated. Cultural resources investigations for the adjacent Witherspoon sand mine have been completed (DHR Survey No. 4602). Two archaeological sites (8GL378 T.C. Cabbage Palm Mound and 8GL379 Fox Hammock Midden) were identified as eligible for inclusion in the National Register of Historic Places. These sites will not be impacted by the sand mining activities. Any upland sand mines employed for this project are subject to the requirement of proving compliance with the State of Florida's statutory requirements in Chapter 267 for protection of historical resources in the sand source footprints before the Corps will approve utilizing the source. Consultation under Section 106 of NHPA (54 U.S.C. §306108) with Florida SHPO and appropriate federally-recognized tribes is ongoing.

The Corps has determined that the Preferred Alternative, including the use of the potential upland sand sources, will have no effect on historic properties eligible or potentially eligible for listing in the National Register of Historic Places. Consultation with the Florida State Historic Preservation

Officer and the appropriate federally-recognized tribes was initiated by letter on August 28, 2018 (**Appendix A**). Consultation will be completed prior to project implementation.

4.15 NATIVE AMERICANS

No portion of the proposed action is located within or adjacent to known Native American-owned lands, reservation lands, or Traditional Cultural Properties. Prior consultation on the project has not indicated any historic use of the project area. However, Native American groups have lived throughout the region as evidenced by the presence of prehistoric archaeological sites near the project area, and their descendants continue to live within the State of Florida and throughout the United States. Pursuant to Section 106 of the NHPA (54 U.S.C. §306101 *et seq.*), obligations regarding the Corps' Trust Responsibilities to federally-recognized Native American Tribes, and in consideration of the Burial Resources Agreement between the Corps and the Seminole Tribe of Florida, consultation is ongoing with Native American tribes having ancestral ties to this region, including the Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Seminole Nation of Oklahoma, and Thlopthlocco Tribal Town. **Appendix A (Environmental Correspondence)** includes pertinent correspondence.

4.16 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.16.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. An irreversible commitment for this project (under either Alternative 1 or 2) includes the removal of beach fill material from the upland sand source. The energy and fuel used during mining, transport, and placement would also be an irreversible commitment of resources under either Alternative 1 or 2.

4.16.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction. Impacts from the placement of the sand on the beach which are temporary (e.g. benthic invertebrates, etc.), would be an irretrievable loss of that resource for the period of time it takes to recover under both Alternatives 1 and 2.

4.17 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Under the No Action Alternative, continued erosion of Broward County Segment III may result in adverse effects to nesting sea turtles and shorebirds foraging and nesting habitat due to the loss/degradation of existing beach and dunes.

Construction activities and noise related to use of heavy construction equipment associated with the implementation of Alternative 1 or 2 could disturb nesting and foraging sea turtles, birds, and other wildlife, causing them to be temporarily displaced and/or avoid the area. Infaunal resources that live inside the boundaries of the placement footprint will be lethally impacted by placement but are expected to recolonize shortly after construction has ceased. All of these effects are expected to be short-term and minor in nature.

Natural or Depletable Resources:
The No Action Alternative will have no effect on natural or depletable resources, however, implementation of Alternative 1 or 2 include indirect effects, such as the use of fuel for construction and operations (petroleum depletion), machinery wear and tear (metal ore depletion), and similar effects. These effects are considered to be of minor consequence.

Energy Requirements and Conservation:
The No Action Alternative will require no energy or energy conservation efforts; however, implementation of Alternative 1 or 2 will involve the use of fuel to power heavy equipment, trucks, and other associated machinery in conjunction with the mining, transport, and placement of sand on the beach.

4.18 INDIRECT EFFECTS

A 1995 study for the Corps' Institute for Water Resources found no evidence that beach nourishment projects induce development along the protected shoreline (Cordes and Yezer 1995). Pilkey and Dixon (1996) state that beach replenishment frequently leads to more development in greater density within shorefront communities, necessitating future replenishment or more drastic stabilization measures. Dean (1999) also notes that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a 1982 Miami Beach shore protection project, investment in new and updated facilities substantially increased tourism (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as older buildings were replaced by much larger ones that accommodated more beach users. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures.

In addition, increased shoreline development may adversely affect sea turtle nesting success. Greater development may result in greater adverse effects due to artificial lighting and support larger populations of mammalian predators, such as foxes and raccoons (National Research Council 1990a).

4.19 CUMULATIVE EFFECTS

Cumulative effects are defined in 40 CFR §1508.7 as those effects that result from "...the incremental effect of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or nonfederal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time."

Past, present and reasonably foreseeable actions and plans are summarized below in **Table 5**. Section 1.4 of the EA contains more details on environmental reports completed in/around the project's vicinity. In addition to beach renourishment of Broward County SPP, other Federal civil works projects in the vicinity include dredging of the IWW in Broward County and dredging of Port Everglades. It is expected that the public, State of Florida, and local governments could have permitted activities in or around the project area. Federal activities are evaluated under NEPA directly for each project. Other projects that take place in-water or would affect wetlands are evaluated under a permit issued by the Corps' Regulatory Division.
The FCCE truck haul and placement of sand on Segment III of the Broward County SPP, when considered with past projects in the area and potential future projects, has no significant cumulative impact on the environmental conditions of the project area. A summary of cumulative

effects on environmental factors from past, present, and reasonably foreseeable actions and plans is provided in **Table 6**.

Table 5. Past, present, and reasonably foreseeable actions and plans affecting the project area.

Past Actions/Authorized Plans	Current Actions and Operating Plans	Reasonably Foreseeable Future Actions and Plans
- Broward County SPP (Segments I, II, and III) - IWW dredging - Port Everglades development, harbor improvements, and maintenance dredging - General urbanization	- No known projects	- Broward County Sand Bypass project - Broward County SPP Segment II renourishment -Port Everglades maintenance dredging (2019) -Port Everglades navigation improvements project (2019-2024) - Broward County SPP Segment III full construction template renourishment (2020)

Table 6. Summary of cumulative effects.

Natural Setting (Vegetation, Threatened and Endangered Species, Fish and Wildlife Resources, EFH, CBRS)	
Past Actions	Construction of residential and commercial/public infrastructure has decreased the amount of habitat available for fish, wildlife, and threatened and endangered species use in the area.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Placement of sand may result in temporary impacts to fish, wildlife, and threatened and endangered species during construction due to noise and/or construction activities; however, these impacts are expected to be minor and will cease with the completion of construction. Benthic species located within the project footprint will be lethally impacted due to placement operations. These impacts, although lethal, are expected to be minor and temporary as recolonization from adjacent communities will occur almost immediately. Beach renourishment will result in the creation of improved and new habitat available for wildlife and threatened and endangered species use. Detailed discussion of the effects of the proposed action on the components of the natural setting are described in Section 4 (Environmental Effects), specifically sections 4.2 (Vegetation), 4.3 (Threatened and Endangered Species), 4.4 (Fish and Wildlife Resources), 4.5 (EFH), and 4.6 (CBRS).
Future Actions	Any Federal and/or state/local projects will be required to follow regulations to maintain and protect threatened and endangered species and their habitats within the area.
Cumulative Effect	No cumulative effects to the natural setting of this area are expected.

Physical Setting (HTRW, Water Quality, Air Quality, Noise)	
Past Actions	General urbanization has introduced sources of HTRW and noise as well as contributed to the degradation of water and air quality.
Present Actions	Port and airport operations contribute to water quality, air quality, and noise in the project area.
Preferred Alternative	Due to the placement of sand above MHW, no effects to water quality are anticipated. Construction equipment may release negligible amounts of pollutants, including oils and grease. Best management practices will be used to limit the possibility of adverse effects, and detailed pollution control plans will be developed prior to the start of construction. No new sources of HTRW will be introduced to the project area. Increased noise will occur during beach renourishment activities, however, this will effect will end with completion of construction. Detailed discussion of the effects of the proposed action on the components of the physical setting are described in Section 4 (Environmental Effects), specifically sections 4.7 (HTRW), 4.8 (Water Quality), 4.9 (Air Quality), and 4.10 (Noise).
Future Actions	Projects implemented would meet and maintain regulated water and air quality standards and noise limitations within the area.
Cumulative Effect	Ongoing erosion, seasonal weather, and storm event effects on water quality are unlikely to be eliminated. The Corps is committed to ensuring that projects will not result in violations of water or quality standards.
Socioeconomic Resources (Aesthetic Resources, Recreation Resources, Economic Resources)	
Past Actions	General urbanization of the region has increased the aesthetic, recreation, and economic resources in this area.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Renourishment of the beach will ensure continued use, which provides benefits to the recreation and economy in this area. Detailed discussion of the effects of the proposed action on the components of socioeconomic resources are described in Section 4 (Environmental Effects), specifically sections 4.11 (Aesthetic Resources), 4.12 (Recreation Resources), and 4.13 (Economic Resources).
Future Actions	Continued urbanization and projects to increase benefits to the economy (e.g. tourism), recreation, and aesthetics are likely in this region.
Cumulative Effect	Continuation of benefits to socioeconomic resources may be anticipated when considering the cumulative effects of projects in this area.
Cultural Resources	
Past Actions	Ongoing erosion and storm event effects have added to the degradation of cultural resources located along the shoreline.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	Preferred alternative will have no adverse effect on any known historic properties in the project area.
Future Actions	Future actions are not anticipated to impact any known historic properties in the project area.

Cumulative Effect	Ongoing erosion and storm event effects on historic properties are unlikely to be eliminated; however, cumulative effects from the implementation of the preferred alternative will not impact any known historic properties in the project area.
Native Americans	
Past Actions	Ongoing erosion and storm event effects have added to the degradation of cultural resources located along the shoreline.
Present Actions	No known present actions are occurring in the project vicinity.
Preferred Alternative	There are no known impacts.
Future Actions	Dredge material placement may result in the stabilization of existing shorelines and minimize future erosion in some areas.
Cumulative Effect	Ongoing erosion and storm event effects on cultural resources are unlikely to be eliminated; however, implementation of the preferred alternative will not impact any known sites in the project area. No cumulative impacts are expected.

In addition to the analysis above, Table 22 of the 2004 GRR/FEIS summarizes the impact of such cumulative actions by identifying the past, present, and reasonably foreseeable future condition of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. The table also illustrates the with-project and without-project condition (the difference being the incremental impact of the project). Also illustrated is the future condition with any reasonable alternatives (or range of alternatives). Section 4.25 of the 2004 FEIS includes detailed cumulative effects analysis and those analyses are incorporated by reference into this EA. Issues and effects identified in those documents remain pertinent to this nourishment.

4.20 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Shoreline protection using beach fill with periodic renourishment is an ongoing effort. Beach renourishment projects have a temporary and short-term impact on local offshore and nearshore biological resources. Most motile organisms in the beach habitat areas should be able to relocate during construction. Less-motile or non-motile organisms will be lost; however, the macroinfaunal community will likely begin recovery immediately through the recolonization of the newly created habitat via species present in the undisturbed areas adjacent to the renourished areas (Burlas et al. 2001; Van Dolah et al. 1984; Jutte et al. 2002). Short-term reductions in primary productivity and reproductive and feeding success of invertebrate species living in the fill area are expected. The sustainability of these populations should not be negatively affected considering that adjacent suitable habitat is available and the project will result in the creation of more suitable habitat following construction.

4.21 UNCERTAIN, UNIQUE, OR UNKNOWN RISKS

The proposed Broward County Segment III work does not involve any activities that have not been previously utilized during past renourishment activities performed in Broward County or along the south Florida Atlantic Coast shoreline. Precautionary measures will be included in the contract specifications to ensure that there are no impacts related to pollution, migratory birds, or nesting sea turtles. In the unlikely event that any unacceptable impacts occur, necessary corrective measures will occur as required by the permits and law.

4.22 CONFLICTS AND CONTROVERSY

In past years, resource agencies, scientists, and some environmental organizations have expressed concern regarding the effects of beach restoration and maintenance activities on nearby corals and hardbottom communities. The Corps has considered and will continue to evaluate the degree to which the effects of the alternatives may be controversial and ensure the sufficiency of measures to avoid, minimize, and mitigate for impacts to resources.

4.23 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The Federal objective is to contribute to national economic development consistent with protecting the nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. Federal planning concerns other than economic include environmental protection and enhancement, human safety, social wellbeing, and cultural and historical resources.

Federal and County objectives include (1) the reduction of expected storm damages through beach nourishment and other project alternatives; (2) maintaining beaches as suitable recreational areas; (3) maintaining suitable beach habitat for nesting sea turtles, invertebrate species, and shorebirds; and (4) maintaining commerce associated with beach recreation in Broward County. The Preferred Alternative is consistent with Federal and Local objectives and State of Florida's Coastal Zone Management Program (CZMP).

4.24 PRECEDENT AND PRINCIPLE FOR FUTURE ACTIONS

As stated above, the proposed Segment III work does not involve any renourishment activities that have not been previously utilized in Broward County. These beach nourishment projects include the Segment III work as well as multiple other beaches along the south Florida Atlantic coast shoreline (Palm Beach through Miami-Dade Counties).

5 PUBLIC/AGENCY COORDINATION

5.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. §4321 *ET SEQ*.)

This EA has been prepared pursuant to NEPA and its implementing regulations. The project will be in compliance with the NEPA of 1969, as amended, 42 U.S.C. §4321, *et seq*. Public Law 91-190.

5.2 PUBLIC AND AGENCY COORDINATION

The draft EA, proposed FONSI, and associated appendices for the proposed project will be circulated for public review and comment for a 15 day comment period, and sent to pertinent agencies and interested parties and stakeholders. A Notice of Availability of the draft EA and proposed FONSI will be distributed to the following list of recipients:

Federal Agencies:
NMFS, U.S. Coast Guard, USEPA, USFWS

Tribal Nations:
Miccosukee Tribe of Indians of Florida, Seminole Tribe of Florida, Poarch Band of Indians, Muscogee (Creek) Nation, Kialegee Tribal Town, Alabama-Quassarte Tribal Town, Thlopthlocco Tribal Town, and the Seminole Nation of Oklahoma

State Agencies:
FDEP, Florida Department of Transportation, Florida Inland Navigation District, Florida State Clearinghouse, FWC, SFWMD, SHPO

Local Agencies:
Broward County: District 7 Commissioner, District 6 Commissioner, Mayor, Vice Mayor, Department of Planning and Environmental Protection, Planning Council
City of Dania Beach: City Commissioners, Mayor, Vice Mayor, City Manager, Assistant City Manager, Parks and Recreation Department
City of Hollywood: District 1 City Commissioner, Mayor, Vice Mayor, City Manager, Parks, Recreation, and Cultural Arts Department, Planning Division, Engineering Division
City of Hallandale Beach: City Commissioners, Mayor, Vice Mayor, City Manager, Parks and Recreation Department

Non-Governmental Agencies:
Save the Manatee Club; South Florida Audubon Society; Audubon of Florida; Florida Wildlife Federation; Sierra Club; Fish and Wildlife Foundation of Florida; Florida Biodiversity Project; the Wildlife Society; Nature Conservancy; Surfrider Foundation; Sea Turtle Oversight Protection; South Florida Wilderness Association; Florida Shore and Beach Preservation Association; Cry of the Water, Inc.; Reefkeeper International; National Wildlife Federation; and Miami Waterkeeper.

6 ENVIRONMENTAL COMMITMENTS

The Corps will comply with all T&Cs of the revised 2015 SPBO and 2013 P3BO. The Corps and its contractors also commit to avoiding and minimizing for adverse effects during construction activities by including the following commitments in the contract specifications:

6.1 PROTECTION OF FISH AND WILDLIFE RESOURCES

Contractors will keep construction activities under surveillance, management, and control to minimize interference with and disturbance and damage to fish and wildlife. Species that require specific attention, along with measures for their protection, will be listed in the Contractor's Environmental Protection Plan (EPP) prior to the beginning of construction operation.

6.2 ENDANGERED AND THREATENED SPECIES PROTECTION

The Corps and its contractors commit to avoiding and minimizing for adverse effects to endangered and threatened species. The Corps will include applicable T&Cs of the 2015 SPBO and 2013 P3BO for sand placement in the project specifications. The Contractor will also include protection criteria for endangered and threatened species protections in their EPP.

6.3 WATER QUALITY

The Corps and its contractors will prevent oil, fuel, or other hazardous substances from entering the air or water. This will be accomplished by design and procedural controls. Due to the placement of sand above MHW, a Section 401 WQC is not required. All wastes and refuse generated by project construction will be removed and properly disposed. Contractors will implement a spill contingency plan for hazardous, toxic, or petroleum material.

6.4 CULTURAL RESOURCES

An unexpected cultural resources finds clause will be included in the project specifications. In the event that any archaeological resource is uncovered during construction activities, all activities will be halted immediately within the area. Once reported, Corps staff will initiate coordination with the appropriate Federal, tribal, and state agencies to determine if archaeological investigation is required. Additional work in the area of the discovery will be suspended at the site until compliance with all Federal and state regulations is successfully completed and Corps staff members provide further directive.

6.5 PROTECTION OF MIGRATORY BIRDS

The Corps will incorporate the standard migratory bird protection protocols into the project plans and specifications and will require the contractor to abide by those requirements to include all monitoring timeframes as specified by the appropriate BOs.

7 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

7.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969 (42 U.S.C. §4321 *ET SEQ.*)

This project complies with NEPA as noted by the discussion in Section 5.1 above.

7.2 ENDANGERED SPECIES ACT OF 1973 (16 U.S.C. §1531 *ET SEQ.)*

This project is coordinated with USFWS through the SPBO dated March 13, 2015 and the P3BO dated May 22, 2013. The conservation recommendations included in the P3BO for shorebirds will provide protections to the piping plover and rufa red knot. To reduce potential impacts to nesting and hatchling sea turtles, placement of sand on the beach is not allowed during the peak sea turtle nesting and hatching period, which is between May 1 to November in Broward County. If beach placement occurs during early (March 1 to April 30) or late (November 1 to January 15) sea turtle nesting season, daily sea turtle nest surveys and potential nest relocations are required. Nest laying typically ends around November 11. Broward County Environmental Protection and Growth Management Department could conduct these surveys as they already possess a marine turtle permit from FWC for monitoring and relocation of nests for conservation purposes and have conducted this monitoring on other renourishment projects in Broward County. The 2015 SPBO issued by the USFWS covers nest relocations due to beach nourishment activities, however, Broward County or other turtle monitoring permit holders will need a permit modification for activities during construction prior to conducting relocations. The proposed project activities occur above MHW, therefore, the project will not affect species under NMFS jurisdiction and no consultation with NMFS is required. This project is being coordinated with USFWS and is in compliance with the Act.

7.3 FISH AND WILDLIFE COORDINATION ACT OF 1958 (16 U.S.C. §661 *ET SEQ.*)

In conjunction with the 2004 GRR/FEIS for the Broward County SPP Segments II and III, a Fish and Wildlife Coordination Act Report was completed by USFWS in June 2002. In addition, a memorandum for the record will be submitted to USFWS to document an agreement between the Corps and USFWS to use the NEPA review and ESA consultation processes to complete coordination responsibilities under the Fish and Wildlife Coordination Act. This agreement will avoid duplicate analysis and documentation as authorized under 40 CFR 1500.4(k), 1502.25, 1506.4, and is consistent with the Presidential E.O. 13563 (Improving Regulation and Regulatory Review), released January 18, 2011. This project complies with this Act.

7.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

The Corps determined that the proposed action will not adversely affect historic properties included in or eligible for inclusion in the NRHP. Such properties are not located in the affected area. Consultation with the Florida SHPO and appropriate federally recognized tribes was initiated in accordance with Section 106 of the NHPA, as amended, and as part of the requirements and consultation processes contained within the NHPA implementing regulations of 36 CFR Part 800. Copies of these letters have been placed in **Appendix A (Environmental Correspondence)**. Consultation is ongoing and will be finalized prior to project implementation. The project is in compliance with the goals of this Act.

The proposed activity is also in compliance with the following:

- Archeological Resources Protection Act (P.L. 96-95);
- American Indian Religious Freedom Act (P.L. 95-341);

- E.O. 11593 (Protection and Enhancement of the Cultural Environment);
- E.O. 13007 (Indian Sacred Sites);
- E.O. 13175 (Consultation and Coordination with Indian Tribal Governments);
- Presidential Memo of 1994 on Government to Government Relations with Native American Tribal Governments.

7.5 CLEAN WATER ACT OF 1972, SECTION 401 AND SECTION 404(B) (33 U.S.C. §1341 *ET SEQ*. AND 33 U.S.C. §1344(B) *ET SEQ.*)

The placement of sand above MHW does not require a Clean Water Act Section 401 WQC or a Section 404(b)(1) guidelines evaluation (40 CFR Part 230).

7.6 CLEAN AIR ACT OF 1972 (42 U.S.C. §7401 *ET SEQ.*)

The short-term impacts from construction equipment associated with the project would not significantly affect air quality. No air quality permits would be required for this project. Broward County is designated as an attainment area for federal air quality standards under the Clean Air Act. Because the project is located within an attainment area, USEPA's General Conformity Rule to implement Section 176(c) of the Clean Air Act does not apply and a conformity determination is not required.

7.7 COASTAL ZONE MANAGEMENT ACT OF 1972 (16 U.S.C. §1451 *ET SEQ.*)

The project's FCD was submitted to the FDEP for the State of Florida's review and concurrence. The FCD is included in this report as **Appendix B**. The State of Florida has previously found the entire Broward County SPP consistent with the Florida CZMP under the 2004 GRR/FEIS. The FCCE project for Segment III is within the same footprint as that previous determination. The Corps expects that the State will determine that this project is consistent with the Florida CZMP.

7.8 FARMLAND PROTECTION POLICY ACT OF 1981 (7 U.S.C. §4201 *ET SEQ.*)

The proposed project activities will not affect any prime or unique farmland. This Act is not applicable to this project.

7.9 WILD AND SCENIC RIVER ACT OF 1968 (16 U.S.C. §1271 *ET SEQ.*)

The proposed project activities will not affect any designated wild and scenic river reaches. This Act is not applicable to this project.

7.10 MARINE MAMMAL PROTECTION ACT OF 1972 (16 U.S.C. §1361 *ET SEQ.*)

Although Florida manatees may occur in the project vicinity, the Preferred Alternative's activities occur above MHW, therefore, the project will not affect marine mammals. This Act is not applicable to this project.

7.11 ESTUARY PROTECTION ACT OF 1968 (16 U.S.C. §§1221-26)

The proposed project activities will not affect any designated estuaries. This Act is not applicable to this project.

7.12 FEDERAL WATER PROJECT RECREATION ACT (16 U.S.C. §460|-12 *ET SEQ.*)

The principles of the Federal Water Project Recreation Act (16 U.S.C. §460|-12 *et seq.*) require the Corps to consider any opportunity for the project to add or improve outdoor recreation and/or fish and wildlife enhancement. The proposed project will restore the beach which will improve

recreation and enhance habitat for wildlife. Recreational resources and opportunities are discussed in this report. This project complies with the Act.

7.13 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976, AS AMENDED (16 U.S.C. §1801 *ET SEQ.*)

The proposed project activities occur above MHW, therefore, the project will not affect EFH. This Act is not applicable to this project.

7.14 SUBMERGED LANDS ACT OF 1953 (43 U.S.C. § 1301 *ET SEQ.*)

The proposed project activities occur above MHW. The project has been coordinated with the State of Florida through the submittal of the Corps' FCD. This project complies with this Act.

7.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990 (16 U.S.C. §3501 *ET SEQ.*)

There are two designated coastal barrier resources in the project area that would be affected by this project: OWA FL20P, Lloyd Beach, and System Unit P14A, North Beach. Consultation for the Broward County SPP beach renourishment within OWA FL20P and System Unit P14A was completed with USFWS on April 30, 2003. USFWS concluded that renourishment of these units "*…are consistent with the intent of the Act and are exempt pursuant to section 6(a)(G) which authorizes "nonstructural projects for shoreline stabilization that is designed to mimic, enhance, or restore a natural stabilization system.*" The project has not changed in a manner that would change this determination. This project complies with the Act.

7.16 RIVERS AND HARBORS ACT OF 1899, SECTION 10 (33 U.S.C. §403 *ET SEQ.*)

The proposed project activities occur above MHW, therefore, the project will not obstruct navigable waters of the U.S. This Act is not applicable to this project.

7.17 ANADROMOUS FISH CONSERVATION ACT (16 U.S.C. §§757A-757G)

The proposed project activities occur above MHW, therefore, the project will not affect anadromous fish species. This Act is not applicable to this project.

7.18 MIGRATORY BIRD TREATY ACT (16 U.S.C. §§703-712) AND MIGRATORY BIRD CONSERVATION ACT (16 U.S.C. §§715-715D, 715E, 715F-715R)

The project plans and specifications will include migratory bird protection measures for construction activities. If nesting activities occur within the construction area, appropriate buffers will be placed around nests to ensure their protection. This project is coordinated with USFWS and complies with the Act.

7.19 MARINE PROTECTION, RESEARCH, AND SANCTUARIES ACT (16 U.S.C. §1431 *ET SEQ*. AND 33 U.S.C. §1401 *ET SEQ.*)

Ocean disposal is not a component of this project; therefore, this Act is not applicable to this project.

7.20 UNIFORM RELOCATION ASSISTANCE AND REAL PROPERTY ACQUISITION POLICIES ACT OF 1970 (42 U.S.C. §4601 *ET SEQ.*)

The purpose of Public Law 91-646 is to ensure that owners of real property to be acquired for Federal and Federally assisted projects are treated fairly and consistently and that persons displaced as a direct result of such acquisition will not suffer disproportionate injuries as a result

of projects designed for the benefit of the public as a whole. As this work is authorized under the FCCE, it is notable that only the volume of material determined to be lost due to the disaster (primarily Hurricane Irma) will be placed. The width of the restored beach is controlled by the pre-project MHW and will not be extended seaward by the project. Placement of sand landward of the erosion control line will not be allowed in locations where easements have not been obtained. The project does not involve real property acquisition and/or displacement of property of property owners or tenants. The project complies with the Order.

7.21 E.O. 11988, FLOOD PLAIN MANAGEMENT

To comply with E.O. 11988, the policy of the Corps is formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. The Corps concludes that the proposed project is in the public interest, will not result in harm to people, property, and floodplain values, and will not induce development in the floodplain. The project complies with the Order.

7.22 E.O. 11990, PROTECTION OF WETLANDS

No wetlands will be affected by project activities. The project complies with the Order.

7.23 E.O. 12898, ENVIRONMENTAL JUSTICE

On February 11, 1994, the President of the U.S. issued E.O. 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations. The E.O. mandates that each Federal agency make environmental justice (EJ) part of the agency mission and to address, as appropriate, disproportionately high and adverse human health or environmental effects of the programs and policies on minority and low-income populations. Significance thresholds that may be used to evaluate the effects of a proposed action related to EJ are not specifically outlined. However, the Council of Environmental Quality (CEQ) guidance requires an evaluation of a proposed action's effect on the human environment and the Corps must comply with E.O. 12898. The Corps has determined that a proposed action or its alternatives would result in significant effects related to EJ if the proposed action or an alternative would disproportionately adversely affect an EJ community through its effects on:

- Environmental conditions such as quality of air, water, and other environmental media; degradation of aesthetics, loss of open space, and nuisance concerns such as odor, noise, and dust;
- Human health such as exposure of EJ populations to pathogens;
- Public welfare in terms of social conditions such as reduced access to certain amenities like hospitals, safe drinking water, public transportation, etc.; and
- Public welfare in terms of economic conditions such as changes in employment, income, and the cost of housing, etc.

The Corps conducted an evaluation of EJ impacts using a two-step process: as a first step, the study area was evaluated to determine whether it contains a concentration of minority and/or low-income populations. Following that evaluation, in the second step, the Corps determined whether the proposed action would result in the types of effects listed above in a disproportionately, high adverse manner on these populations.

As defined in E.O. 12898 and the CEQ guidance, a minority population occurs where one or both of the following conditions are met within a given geographic area:

- The American Indian, Alaskan Native, Asian, Pacific Islander, Black, or Hispanic population of the affected area exceeds 50 percent; or
- The minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Using the USEPA EJAssist Tool, the project area was identified (*see* **Figure 16**) and the average percentage for the EJ criteria are compared in **Table 7** for the project area, the State of Florida, and the U.S.

Table 7. USEPA EJAssist environmental justice criteria percentages (Source: EPA EJAssist, August 11, 2018.)

	Project Area %	Florida Average %	USA Average %
Minority Population	27%	44%	38%
Low Income Population	28%	38%	34%

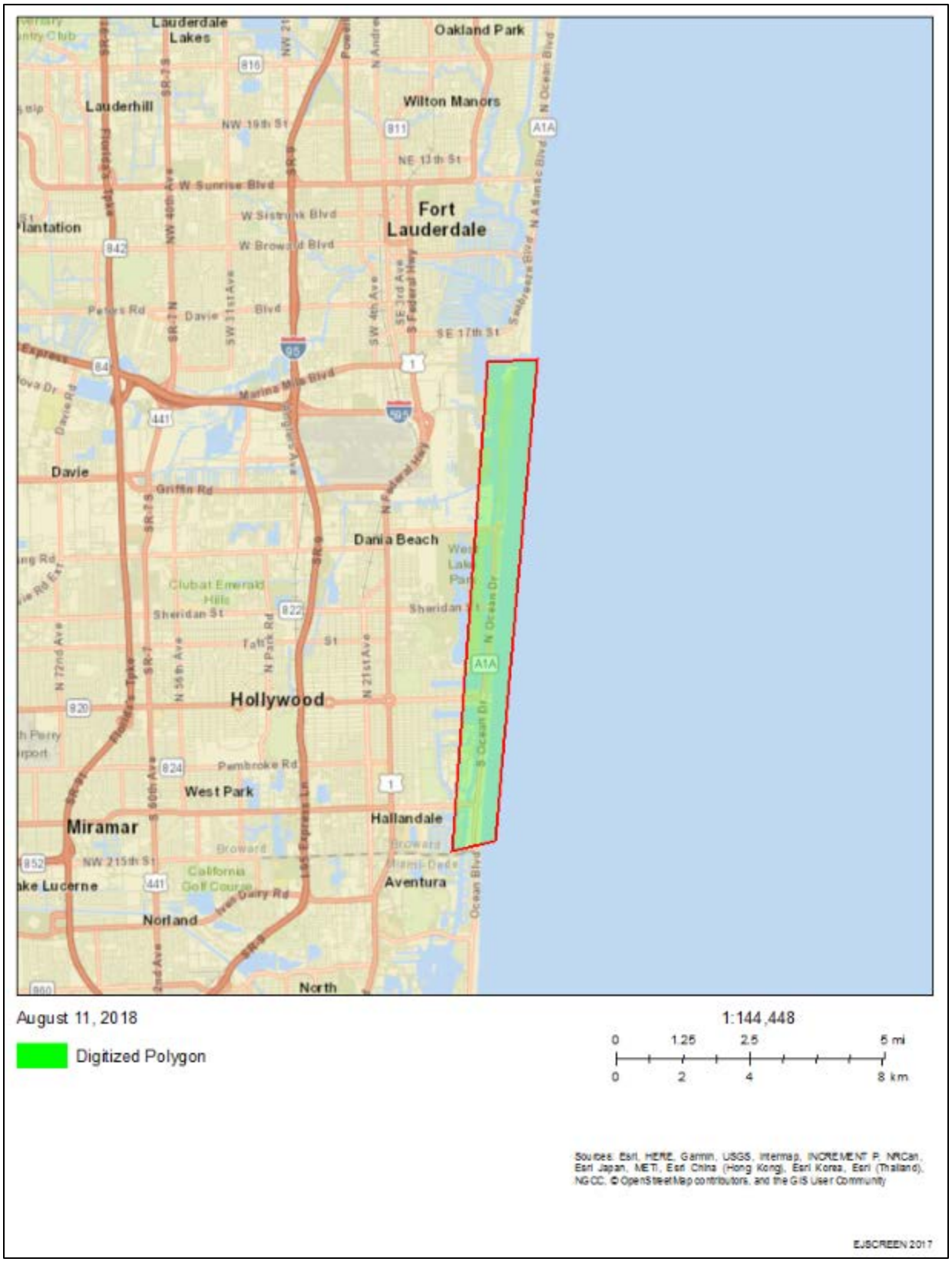

Figure 16. USEPA EJAssist Tool User-defined Project Area.

E.O. 12898 does not provide criteria to determine if an affected area consists of a low-income population. For the purpose of this assessment, the CEQ criterion for defining a minority population has been adapted to identify whether or not the population in an affected area constitutes a low-income population. An affected geographic area is considered to consist of a low-income population (i.e. below the poverty level for purposes of this analysis) where the percentage of low-income persons:

- is at least 50 percent of the total population; or
- is meaningfully greater than the low-income population percentage in the general population or other appropriate unit of geographic analysis.

Based on the information provided by the USEPA EJAssist tool, the project is not located within an area of high minority and/or low-income populations. No disproportionate and adverse effects to minority and/or low income populations are expected to result from the implementation of the project. The project complies with the Order.

7.24 E.O. 13045, PROTECTION OF CHILDREN FROM ENVIRONMENTAL HEALTH RISKS AND SAFETY RISKS

On April 21, 1997, the President of the U.S. issued E.O. 13045, Protection of Children from Environmental Health Risks and Safety Risks. The E.O. mandates that each Federal agency make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children and ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks. As the proposed action does not affect children disproportionately from other members of the population, the proposed action would not increase any environmental health or safety risks to children. The project complies with the Order.

7.25 E.O. 13089, CORAL REEF PROTECTION

Due to the placement of sand above MHW, the proposed project activities will not affect corals, habitats, or other natural resources associated with coral reefs in the project area. This project was specifically designed to avoid potential effects to benthic marine resources in the project area to ensure that the placement of sand will be implementable upon receipt of emergency funds. Renourishment above MHW will stabilize the project until the full renourishment can be completed in 2020. The project complies with the Order.

7.26 E.O. 13112, INVASIVE SPECIES

The proposed project is not likely to affect the status of invasive species as it does not include a significant risk or potential for the transport species from one region to another, introducing them to new habitats where they are able to out-compete native species. The benefits of the proposed project outweigh the risks associated with the very slight potential for introducing non-native species to this region. The project complies with the Order.

7.27 E.O. 13186, RESPONSIBILITIES OF FEDERAL AGENCIES TO PROTECT MIGRATORY BIRDS

This E.O. requires, among other things, a Memorandum of Understanding (MOU) between the Federal Agency and the USFWS concerning migratory birds. Neither the Department of Defense MOU nor the Corps' Draft MOU clearly address migratory birds on lands not owned or controlled by the Corps. For many Corps' civil works projects, the real estate interests are provided by the non-Federal Sponsor. Control and ownership of the Project lands remain with a non-Federal interest. Measures to avoid the destruction of migratory birds and their eggs or hatchlings are

described in sections 4.4 (Fish and Wildlife Resources) and 7.18 (Migratory Bird Treaty Act), and incorporated by reference. The Corps will include standard migratory bird protection requirements in the project plans and specifications and will require the contractor to abide by those requirements. The project complies with the Order.

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9 ACRONYM LIST

BMPs	Best Management Practices
CFR	Code of Federal Regulations
CBRS	Coastal Barrier Resource System
CEQ	Council of Environmental Quality
Corps	U.S. Army Corps of Engineers
CY	Cubic Yards
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DCH	Designated Critical Habitat
DHR	Department of Historical Resources
DPS	Distinct Population Segment
E.O.	Executive Order
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EJ	Environmental justice
EPP	Environmental Protection Plan
ER	Engineering Regulation
ESA	Endangered Species Act
ETOF	Estimated Toe of Fill
F.A.C.	Florida Administrative Code
FCCE	Flood Control and Coastal Emergencies Act
FCD	Federal Consistency Determination
FDEP	Florida Department of Environmental Protection
FDH	Florida Department of Health
FEIS	Final Environmental Impact Statement
FMSF	Florida Master Site File
FONSI	Finding of No Significant Impact
FR	Federal Register
FWC	Florida Fish and Wildlife Conservation Commission
GRR	General Reevaluation Report
HAPC	Habitat of Particular Concern
HTRW	Hazardous, toxic, and radioactive waste
IWW	Intracoastal Waterway
LIDAR	Light detection and ranging
MHW	Mean High Water
MOU	Memorandum of Understanding
NAAQS	National Ambient Air Quality Standards
NAVD88	North American Vertical Datum 1988
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NRHP	National Register of Historic Places
NTU	Nephelometric Turbidity Units
OPA	Otherwise Protected Area
P3BO	Programmatic Piping Plover Biological Opinion
Park	Dr. Von D. Mizell-Eula Johnson State Park
PIR	Project Implementation Report
SAFMC	South Atlantic Fish Management Council
SARBO	South Atlantic Regional Biological Opinion
SHPO	State Historic Preservation Office
SPBO	Statewide Programmatic Biological Opinion
SPP	Shore Protection Project
T&Cs	Terms and Conditions
U.S.	United States
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WQC	Water quality certification

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