FINDING OF NO SIGNIFICANT IMPACT

Issuance of a Negotiated Agreement for Use of Outer Continental Shelf Sand from Flagler County Borrow Area for the Flagler County Dune and Beach Restoration Project, Flagler County, FL

Pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR 1500-1508), and Department of the Interior (DOI) regulations implementing NEPA (43 CFR 46), Flagler County prepared an Environmental Assessment (EA) that considers the use of Outer Continental Shelf (OCS) sand to rebuild a portion of their eroded beach and dune system. The Flagler County Dune and Beach Restoration Project (Local Project) is located immediately adjacent to the federally authorized Flagler County Federal Hurricane and Storm Damage Reduction Project (Federal Project) (BOEM Non-Competitive Negotiated Agreement (NNA) No. OCS-A 0528). The Local Project will extend the northern and southern limits of the Federal project footprint, restoring about 4.1 miles of the Flagler County, Florida shoreline (Attachment 1). The Bureau of Ocean Energy Management (BOEM) contributed to the preparation of the EA and conducted its own independent review before adopting the document.

Proposed Action

The purpose of the Local Project is to reduce future storm damages to infrastructure, public and private homes, and businesses in the Town of Beverly Beach (FDEP R-monuments R-64.5 to R-80) and the City of Flagler Beach (FDEP R-monuments R-94 to R-101). State Road A1A is critical infrastructure located within the Project area and used in emergency evacuation events, as well as recovery efforts following natural disasters, such as Hurricane Matthew in 2016. The Local Project would also increase and maintain recreational opportunities and improve environmental habitat along the beach. The two project reaches are located north and south of and contiguous with the Federal Project. The U.S. Army Corps of Engineers (Corps) excluded the Local Project area from the 2.6-mile Federal Project because of low cost-benefit ratios. Flagler County plans to construct the Local Project following completion of the Federal Project.

Flagler County proposes to construct the Local Project using OCS sand from the Flagler County Borrow Area (FCBA), a subsection of the larger borrow area 3A identified to support both the Federal and Local Projects (Attachment 1). The Project dune would have an average crest elevation of +11.0 feet and slope seaward at 1V:50H before transitioning to the seaward berm. The berm would have a crest elevation of +10 feet and slope seaward at 1V:15H. Dune vegetation and sand fencing would be installed along the restored dune as necessary. The Local Project would require up to 1.3 Million Cubic Yards (MCY) of sand placed on the beach during initial construction. Up to 1.8 MCY of sand may be required from FCBA to meet the placement quantities when considering dredging losses and contingencies. The expected nourishment interval is

11 years and would require between 400,000 to 500,000 CY of sand for each event. Each future nourishment event would require separate environmental review and a separate NNA from BOEM. The Corps' Jacksonville District will be issuing a Department of the Army permit pursuant to Section 404 of the Clean Water Act (33 U.S.C. §1344) and Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. §403) for the Local Project.

BOEM's action is to enter into a two-party NNA with Flagler County for initial construction of the Project and authorize use of up to 1.8 MCY of OCS sand from FCBA. FCBA is located approximately 10 nautical miles offshore of the City of Flagler Beach, Florida. The borrow area is approximately 3,000 feet wide by 4,000 feet long, and water depths range from -52 ft. to -59 ft. NAVD88 and is subdivided into Zones A, B, and C to promote resource optimization (Attachment 1). BOEM would restrict dredging to Zone A until all recoverable compatible material is exhausted followed by Zones B and C respectively. Deviations from this order could be approved following consultation with BOEM. One or more hopper dredges would excavate and hydraulically transport the sand to the Project area via an offshore pump-out station and four pipeline corridors.

Alternatives to the Proposed Action

The Corps previously identified beach nourishment as the preferred alternative to manage erosion and storm damage in Flagler County. The Corps excluded the Local Project area from the 2.6-mile Federal Project because of low cost-benefit ratios; however, the County decided to fund beach nourishment absent federal assistance and requested the Corps and BOEM to authorize the Local Project under respective regulatory authorities. Flagler County and BOEM evaluated two alternatives: no action and beach nourishment (including the use of FCBA) with dune vegetation and sand fencing. The Corps and project proponents limited the number of beach nourishment alternatives in order to maintain a consistent design profile with the adjacent Federal Project footprint.

Environmental Effects

The Corps published a final integrated feasibility report and EA for the Federal Project in September 2014. The Corps was lead agency in preparation of the 2014 Federal Project EA (2014 EA) and BOEM served as a cooperating agency. The document considered and analyzed the potential environmental effects associated with dredging of OCS sand from multiple offshore borrow area alternatives (e.g., 2A, 2B, 2C, and 3A) and placement of material along the Flagler County shoreline. The scope of analysis included the entire FCBA borrow area and placement footprint of the proposed Local Project, not just the Federal Project. The Corps concluded that the proposed Federal Project action would have no significant impact on the quality of the human environment and signed a Finding of No Significant Impact (FONSI) on 22 January 2016. BOEM independently reviewed the 2014 EA and concluded that the EA and associated environmental compliance documentation complied with the relevant provisions of the

CEQ regulations implementing NEPA, DOI regulations implementing NEPA, and other Bureau requirements. BOEM adopted the 2014 EA and signed a FONSI in November 2019 for the Federal Project.

The 2020 Local Project EA (2020 EA) incorporates by reference and summarizes relevant analysis from the 2014 Federal Project EA and provides a detailed analysis of specific actions and attributes not previously analyzed. Flagler County and BOEM identified a suite of environmental commitments necessary to avoid, minimize, and/or reduce and track any foreseeable adverse impacts that may result from the Local Project. Flagler County is responsible for ensuring compliance with all environmental requirements prior to, during, and after construction, as described in the 2020 EA.

Significance Review

Pursuant to 40 CFR 1508.27, BOEM evaluated the significance of potential environmental effects considering both CEQ context and intensity factors. BOEM considered the potential significance of environmental effects in both spatial and temporal context. Potential effects associated with the Local Project are generally reversible because they would be minor to moderate, localized, and short-lived. The only long-term effect within the FCBA would be related to the physical geomorphology due to the removal of OCS sand and limited infilling. BOEM considered the ten intensity factors addressed below:

1. Impacts that may be both beneficial and adverse.

BOEM considered potential adverse effects to the physical environment, biological resources, cultural resources, and socioeconomic resources. FCBA sand composition meets the State of Florida's sediment criteria for native beach compatibility. Project construction would have minor, short-term effects to essential fish habitat (EFH) from dredging and placement activities. There are no hard-bottom resources in the borrow area, placement area, and pipeline corridors. Construction activities and staging of equipment may affect existing dune vegetation; however, the Project includes installation of sand fencing and planting of new dune vegetation on newly constructed areas, as well as revegetation of areas disturbed during construction.

FCBA contains enough sediment volume to support the proposed Local Project and a future nourishment (11-year average nourishment interval). BOEM anticipates that the use of FCBA for the initial construction and subsequent nourishment of the Local Project could result in the depletion of this sand feature. However, Flagler County, in coordination with BOEM, developed a borrow area use plan strategy for the Local Project to optimize the use of sand and avoid and/or minimize environmental impacts. Dredging of FCBA would temporarily impact benthic infauna; however, long term impacts in the same footprint would be avoided by limiting dredging depths and maintaining consistent pre- and post-dredge sediment characteristics. Given the expected nourishment interval of eleven years and the typical range in recovery time of the affected benthic community to be months to a few years, the potential for significant or chronic benthic impacts would be avoided. Some coastal sand dependent species, such as migratory birds or sea turtles, may experience temporary disruptions to foraging and nesting during and following construction. However, those birds and sea turtles that use the beach for foraging or nesting may benefit in the long term from better quality habitat. Flagler County plans to implement standard shorebird monitoring protocols.

Although exposed coquina outcroppings exist along the coast of northern Flagler County, no hard bottom exists in the Local Project area as verified by resource surveys conducted in 2012 and 2019. Beach placement would not directly bury onshore coquina outcroppings, or indirectly bury nearshore hard bottom inshore of the Equilibration Toe of Fill (ETOF) through beach profile equilibration and along-shore / cross-shore transport processes. Construction activities are required to meet all state water quality conditions, including turbidity monitoring, in accordance with Florida Department of Environmental Protection (FDEP) Joint Coastal Permit (JCP) requirements (Permit No: 0379716-001-JC).

2. The degree to which the proposed action affects public health or safety.

Significant effects to public health and safety are not expected. Generally, the Local Project would provide for increased recreational opportunity from the improved beach and dune habitat. Temporary disruption to aesthetics and recreation would occur in small alongshore reaches as the construction progresses along the Local Project area; however, the project would result in long-term recreational improvements. Construction of the dune and beach profile extension would provide protection of existing infrastructure including State Road A1A, which is critical to public safety and serves as a primary hurricane evacuation route. Emissions from construction equipment may temporarily affect air quality. Noise would temporarily increase at the placement locations during construction, and then would return to ambient levels after project completion. BOEM determined that there are no minority or low-income populations in the Project area; therefore, the Local Project would not disproportionately affect populations outlined in Executive Order 12898.

3. Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farmlands, wetlands, wild and scenic rivers, or ecologically critical areas.

There is no farmland, wetlands, wild and Scenic Rivers, or Native American lands that would be potentially impacted. Though current nesting opportunities are diminished because of severe erosion and lower-quality habitat, Loggerhead, green, and leatherback sea turtles nest within the Local Project area. Hawksbill and Kemp's ridley sea turtles occur in coastal waters off Flagler County, but do not currently nest within the Local Project area. Loggerhead critical habitat (LOGG-N-17) and North Atlantic Right Whale critical habitat occur in the Local Project area. The Corps and BOEM will avoid and/or minimize impacts in protected species and designated critical habitat in accordance with requirements outlined the U.S. Fish and Wildlife Service (USFWS) Statewide Programmatic Biological Opinion for beach placement activities (2015), the USFWS Programmatic Piping Plover Biological Opinion (2013), and the National Marine Fisheries Service (NMFS) South Atlantic Regional Biological Opinion (SARBO) (2020). NMFS has designated Essential Fish Habitat (EFH) in and adjacent to the Project area for various demersal, pelagic, and highly migratory species. Flagler County will implement avoidance and minimization measures to minimize effects on those fish species and fish habitat including but not limited to: adherence to the State Water Quality Criteria at the edge of the 150-meter mixing zone, avoiding/minimizing construction overlap with peak recruitment windows for benthic in faunal assemblages and federally managed species, and avoidance of hard bottom and reef resources.

The Corps and Flagler County conducted multiple cultural and hard bottom resource clearance surveys in the Project area including in FCBA, the nearshore, pipeline corridors, and beach placement area. No targets were identified in the FCBA or the pipeline corridors. Three targets were identified within the nearshore and have the potential to represent important historic cultural resources. Flagler County will implement a buffer around these targets to avoid any incidental contact from spudding or anchoring.

*4.	The degree to which the effects on the quality of the human environment are likely to be highly controversial.*

No scientifically controversial effects are expected. There are no scientific, controversial issues associated with the Local Project.

*5.	The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.*

Beach nourishment is a common solution to coastal erosion problems along the Atlantic coast of Florida. The Local Project is similar in scope and activities to other nourishment projects constructed and routinely monitored without documentation of substantial unexpected effects.

*6.	The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.*

No precedent for future action or decision in principle for future consideration is made with BOEM's decision to authorize use of OCS sand resources for construction of the Flagler County shoreline. BOEM considers each proposed use of a borrow area as a new federal action. The Bureau's authorization of the use of FCBA does not dictate the outcome of future leasing decisions. Future actions would also be subject to the requirements of NEPA and other applicable environmental laws.

7. Whether the action is related to other actions with individually insignificant but cumulatively significant impacts.

Significance may exist if it is reasonable to anticipate cumulatively significant impacts that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions. BOEM leased 700,000 CY of sand from a separate portion of borrow area 3A in March 2020 (OCS-A 0528) for use in the adjacent Federal Project. Construction of the Local Project would commence immediately following completion of the Federal Project. Adverse impacts in FCBA and along the Flagler County beach from both projects are expected to be short-term and reversible. The cumulative removal of sand from FCBA, which is less than 0.5 square miles (or approximately 275 acres), would change the shape and characteristics of the bottom habitat in that limited area. The impact would not be significant, however, as there is comparable, undisturbed habitat adjacent to the dredge area.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

No adverse effects to historic or pre-contact resources are expected. Seafloor-disturbing activities (e.g., dredging, anchoring, pipeline placement, etc.) would occur during proposed construction activities. The greatest risk to cultural resources exists in the borrow area, along the pipeline corridor, and within the placement areas on the beach. As previously indicated, cultural resource clearance surveys were conducted within FCBA, the beach placement area, nearshore pump out stations, and pipeline corridor locations. No targets were identified in FCBA. Three targets were identified within the nearshore placement area and have the potential to represent significant important historic cultural resources. The Corps and BOEM coordinated with the Florida Division of Historical Resources and State Historic Preservation Officer (SHPO), as required by Section 106 of the National Historic Preservation Act. The SHPO concurred with the determination that the proposed project would have no adverse effect to historic properties listed, eligible, or potentially eligible for listing in the NHRP provided avoidance of the three nearshore targets. The Corps and/or BOEM will require Flagler County to immediately cease operations and notify SHPO if an unexpected discovery occurs.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973.

Dredging activities within FCBA overlap with the distribution of threatened loggerhead (Northwest Atlantic Distinct Populations Segment (DPS)) and green sea turtles (North Atlantic DPS), and endangered leatherback, hawksbill, and Kemps Ridley sea turtles. Placement of sediment within the designated project reaches may affect nesting sea turtles (loggerhead, leatherback, and greens) and piping plovers. Adherence to state and federal requirements, including sediment compatibility requirements, dredging operational constraints, endangered species observers, sea turtle nest monitoring, *etc.* would avoid and/or minimize impacts. Although no piping plover wintering population critical habitat is present within the project limits, individuals have been observed on the shoreline south of the project limit (ending at FDEP monument R-95) at the Gamble Rodgers Memorial State Recreation Area (located at R-98). The Local Project would not occur in “optimal” piping plover habitat and is not likely to adversely affect the piping plover. The threatened West Indian manatee occurs in coastal and estuarine habitat within Flagler County. The dredge and support vessels may encounter this species and may affect but are not likely to adversely affect the manatee because of slow speeds and relative water depth.

BOEM determined that beach placement of sediment associated with the Local Project is within scope of the USFWS Statewide Programmatic Biological Opinion (revised 2015) and Programmatic Piping Plover Biological Opinion (2013). Flagler County will comply with all relevant reasonable and prudent measures (RPMs) and associated terms and conditions (T&Cs). BOEM determined that dredging activities associated with the Project are within scope and will operate under the NMFS South Atlantic Regional Biological Opinion (SARBO) (2020).

10. Whether the action threatens a violation of Federal, State, or local law or requirements imposed for the protection of the environment.

Flagler County is responsible for ensuring compliance with all environmental mitigation requirements, including compliance with Federal, State, and local laws. Flagler County shall prepare an environmental compliance matrix to document all environmental mitigation requirements and identify roles and responsibilities for implementation and enforcement to ensure compliance prior to, during, and after construction. Additionally, the dredging contractor will be required to provide an environmental protection plan that verifies compliance with relevant environmental requirements.

The FDEP provided a consolidated Joint Coastal Permit (JCP) on 13 April 2020. The JCP constitutes a finding of consistency with Florida’s Coastal Management Program, as required by Section 307 of the Coastal Zone Management Act; it also constitutes certification of compliance with Florida water quality standards pursuant to Section 401 of the Clean Water Act, 33 U.S.C. 1341. The proposed action complies with the Marine Mammal Protection Act. Marine mammals are not likely to be adversely affected by the project and incorporation of safeguards to protect threatened and endangered species during project construction (i.e., vessel speed requirements, protected species observers, etc.) would also protect non-listed marine mammals in the area. Migratory birds may experience minor, short-term interruptions to foraging or resting activities linked to prey smothering or turbidity increases. These effects would be limited, with full recovery of shoreline resources expected. Flagler County will implement measures to avoid impacts to migratory birds, hatchlings, or eggs along with pre- and post-project monitoring requirements.

Consultations and Public Involvement

The Corps distributed a Public Notice to Federal, state, and local agencies and other interested stakeholders in October 2019 following receipt of Flagler County's application for a Department of the Army permit. The Public Notice recognized BOEM's proposed action and sole regulatory authority over the use and conveyance of OCS sand resources under the OCS Lands Act. The Corps and BOEM considered all comments and integrated responses as appropriate.

Conclusion

BOEM considered the consequences of entering into a negotiated agreement authorizing use of OCS sand from FCBA in the Local Project. BOEM contributed to the preparation of and conducted its own independent review of the 2020 EA before adopting the EA prepared by Flagler County (Attachment 2). BOEM finds that the EA and associated environmental compliance documentation complies with the relevant provisions of the CEQ regulations implementing NEPA, DOI regulations implementing NEPA, and other Bureau requirements.

Based on the evaluation of potential impacts and associated mitigating measures discussed in the referenced NEPA document, BOEM finds that entering into a negotiated agreement, with the implementation of the mitigating measures, does not constitute a major Federal action significantly affecting the quality of the human environment, in the sense of NEPA Section 102(2)(C), and would not require preparation of an EIS.

JEFFREY REIDENAUER

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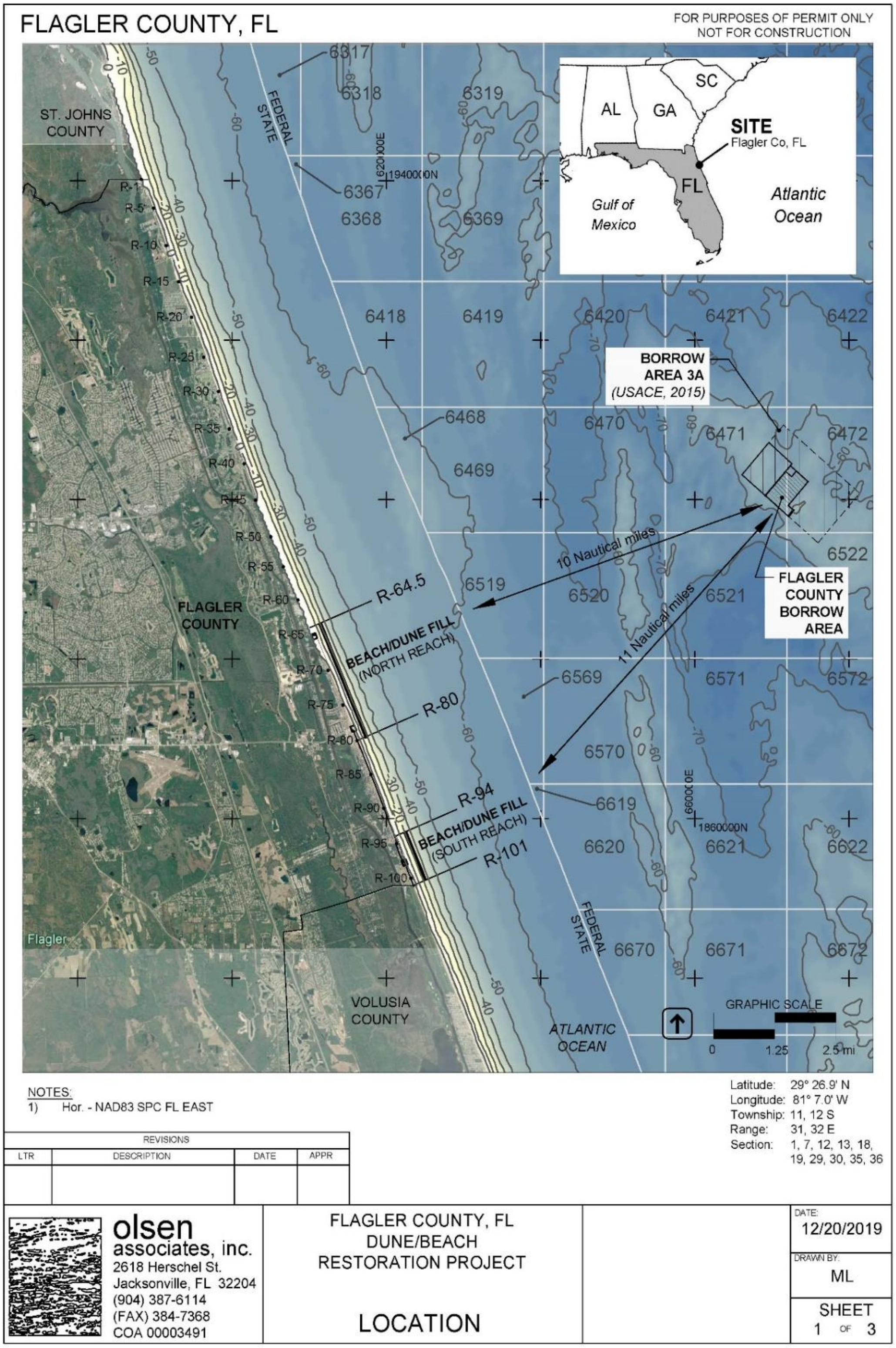
Date: 2020.05.07 08:04:37 -04'00'

Jeffrey Reidenauer
Chief, Marine Minerals Division

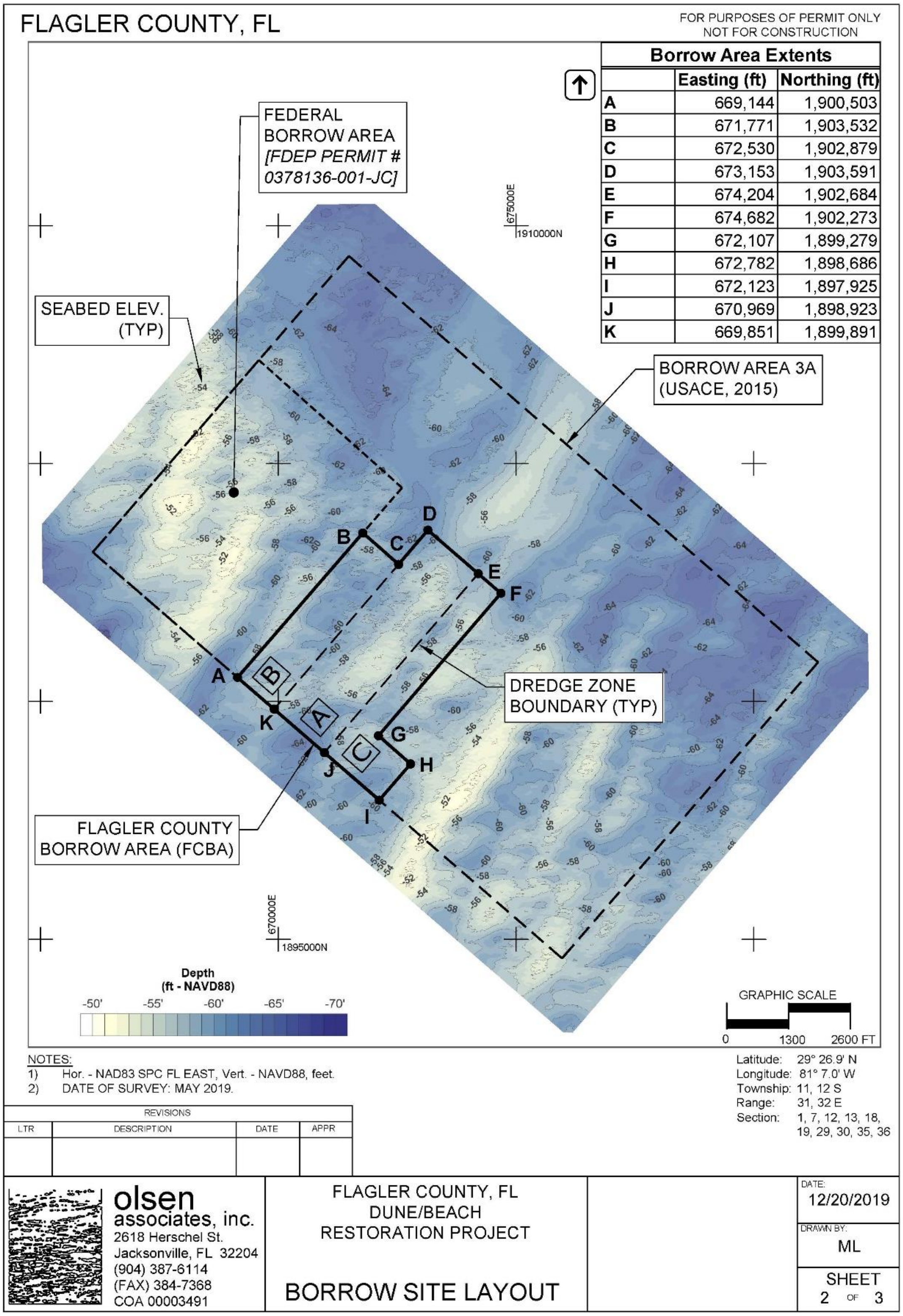
Date

Attachment 1
FCBA Map and Placement Sites



FCBA Location Map and Placement Area

(NOTE: The FCBA borrow area is located within the larger borrow area 3A footprint analyzed in the 2014 EA for the Federal Project)



Detailed Location Map of FCBA showing Federal and Local Project Borrow Areas and dredge zones A, B, and C.

Attachment 2

Flagler County Dune and Beach Restoration Project Environmental Assessment

FINAL ENVIRONMENTAL ASSESSMENT

FLAGLER COUNTY
DUNE/BEACH RESTORATION PROJECT

FLAGLER COUNTY, FL

USACE PERMIT NO. SAJ-2019-02065

FDEP PERMIT NO. 0379716-001-JC

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March 2020

ENVIRONMENTAL ASSESSMENT
FLAGLER COUNTY DUNE/BEACH RESTORATION PROJECT
FLAGLER COUNTY, FL

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FLAGLER COUNTY, FL

1 PROJECT PURPOSE AND NEED

1.1 PROJECT LOCATION

Flagler County is located on the northeast coast of Florida roughly midway between the northern state line and Cape Canaveral and is bordered to the north by St. Johns County and to the south by Volusia County (**Figure 1**). There are no inlets or embayments along the coast, and the beaches are typically fronted by steep dune faces or rock revetment. Shoreline erosion in Flagler County is caused by both storms and natural shoreline processes [United States Army Corps of Engineers (USACE), 2015]. Flagler County has 18 miles of Atlantic Ocean shorefront. The USACE Hurricane and Storm Damage Reduction Project (Federal Project) will place approximately 550,000 cubic yards (cy) of sand along 2.6 miles of shoreline between Florida Department of Environmental Protection (FDEP) control monuments R-80 and R-94 in the City of Flagler Beach with an 11-year nourishment interval (**Figure 1**).

The proposed Flagler County Beach/Dune Restoration Project (Local Project) will extend the limits of the Federal beach fill construction north and south of the Federal project limits, adding about 4.1 miles of restored shoreline following project construction. The project reaches (as defined by the USACE Feasibility Study) are located between FDEP control monuments R-64.5 and R-80 at 6th Street South and between R-94 and R-101 (Flagler/Volusia County line). The borrow area for the project is approximately 10 nautical miles (NM) offshore within a large sand deposit previously delineated by the USACE as part of the Flagler County Hurricane and Storm Damage Reduction Project Feasibility Study and Environmental Assessment -- Borrow Area 3A (USACE, 2015). The borrow area will be divided between the Federal and Local Projects. The portion of the borrow area for Local project is designated as the Flagler County Borrow Area (FCBA) (**Figure 2a**).

1.2 PROJECT HISTORY AND NEED

The shoreline in Flagler County is subject to erosion caused by storms and natural shoreline processes. Shoreline erosion in the Flagler County study reaches threatens oceanfront infrastructure, such as the National Scenic Highway, State Road (SR) A1A, and over 1,476 structures having a combined estimated structural and content value of approximately $340 million. SR A1A, the only north-south hurricane evacuation route for communities along this portion of the coastline, is an integral part of the county's infrastructure and is essential for public safety during evacuation events. The Federal project was evaluated by the USACE with the Bureau of Ocean and Energy Management (BOEM) acting as a cooperating agency in an integrated Feasibility Study and Environmental Assessment (EA) in 2014 (revised in 2015). The 2015 Feasibility Study and EA is being incorporated by reference given the direct overlap of the proposed project footprint.

The purpose of this EA is to analyze new listed species and critical habitat, activities, and/or effects not previously considered in the 2015 USACE Feasibility Study (e.g., expansion of the sand placement footprint to the north and south of the Federal project, increased volume dredged from the proposed borrow area, etc.). Because the borrow area is in Federal waters (more than 3 NM offshore) on the Outer Continental Shelf (OCS), BOEM holds the authority to authorize use of OCS sand. This EA was prepared under contract to Flagler County for adoption by BOEM in support of its decision to authorize use of OCS sand resources.

Flagler County beaches were severely impacted by storm surge and waves from Hurricane Matthew in October 2016 and Hurricane Irma in September 2017. In many areas of the project shoreline, the entire primary frontal dune was completely lost. Beach erosion and dune loss exposed large areas of upland development and infrastructure, including State Road A1A, to increased threats from future coastal storms. Opportunities to reduce the risk of coastal damages and improve conditions were examined in the USACE 2015 Feasibility Study (USACE, 2015).

The proposed Local project will restore two reaches of eroded beach that were severely impacted by Hurricanes Matthew and Irma. The Federal beach project is located between these two reach areas from R-80 to R-94 (**Figures 1** and **3**). The Local project limits include both private and public properties. Public parcels are controlled by the Town of Beverly Beach (one parcel), the City of Flagler Beach, and the State of Florida [Gamble Rogers Memorial State Recreation Area (SRA)]. Sections of the project shoreline are designated as critically eroded by the FDEP. Depending on the timeline for permit issuance, the two projects may be constructed in conjunction with one another, thereby utilizing the Federal project dredge mobilization for the Local project.

1.2.1 PROJECT HISTORY

The Flagler County coastline has experienced sporadic accelerated beach erosion rates due to hurricanes and northeaster storms since its earliest development in the 1920s. The damages to coastal infrastructure influenced local and state shore protection measures in various areas, particularly along SR A1A in Flagler Beach. State assistance has resulted in the construction of revetments, seawalls and temporary structures, structure condemnation, and various shore protection measures by private property owners in response to catastrophic erosion events. Flagler County is particularly at risk of damages from high winds and storm inundation caused by hurricanes and tropical storms during the months of June through November. Winter storms, or northeasters, are thought to have a greater impact on shoreline change than hurricanes in Flagler County because these winter storms occur more frequently and with longer duration of damaging waves and storm surge (USACE, 2015).

Several notable hurricanes that have affected Flagler County include Dora (1964); David (1979); Bob (1985); Dennis, Floyd, and Irene (1999); and Frances and Jeanne (2004). Tropical Storm Gabrielle during the fall of 2001 caused significant erosion, prompting FDEP to include some areas of Flagler County, for the first time, as critically eroded beaches (FDEP, 2008). Tropical Storm Fay caused significant erosion along the Flagler County shoreline in August 2008 (USACE, 2015).

Flagler County beaches are impacted by severe northeaster storm events annually. Florida experienced intense northeaster storm events during the years 1984, 1993, and 1994, all drastically altering beach profiles statewide. Florida's entire Atlantic coast experienced the cumulative effects of several intense northeaster storms in 2007 which intensified erosion in some areas of Flagler County, prompting FDEP to add a shoreline segment at Painters Hill to the 2008 critically eroded beaches listing. The threat of storm damage historically to coastal infrastructure has resulted in coastal armoring throughout several sections of Flagler County (USACE, 2015).

The Town of Marineland at the northern end of Flagler County was the site of the first coastal armoring effort in the County. A 1,350-foot long coquina rock revetment and a series of five coquina rock groins extending approximately 250 feet seaward were constructed in 1938 between what are now FDEP monuments R-1 and R-3. These structures protected the world famous Marineland Oceanarium and Aquatic Park. The Town of Marineland removed the original coquina revetment in 2001 and replaced it with a 1,350-foot long revetment constructed of large granite stones, capped with a sheet pile anchored seawall, to protect the town and oceanarium from storm damage. An additional seawall extends approximately 1,500 feet south of the revetment and is covered by reconstructed dunes and a boardwalk. A 1,000-foot long boardwalk and 1,000 linear feet of beach and dunes were constructed above a portion of the seawall cap as part of the 2001 rejuvenation. Additional public access was also constructed at the southern end of the revetment area (USACE, 2015).

Initial hardening actions along SR A1A, constructed as a result of Hurricane Dora impacts in 1964, included sand and coquina rock placement. In 1981, permits were issued for placement of additional segments of sand placement and coquina rock revetment in areas north and south of the Flagler pier. Granite rock was placed between South 7th Street and South 23rd Street in 1999. The revetment in Flagler Beach has been repaired and restored many times since its initial construction. The Florida Department of Transportation (FDOT) performed 15 emergency or temporary repairs to the Flagler Beach segment of SR A1A at a cost of $847,000 in 2007 alone. FDOT maintenance costs for SR A1A in Flagler Beach averaged $1.25 million per year between 2000 and 2007. The granite revetment currently protecting SR A1A in Flagler Beach extends from FDEP range monument R-80 to R-90 with aging and dilapidated segments of coquina rock protection extending north to approximately R-76 and south of R-90 (USACE, 2015). In early 2020, FDOT completed permanent roadway repairs and drainage improvements on approximately 1.4 miles of SR A1A between 22nd Street and South 9th Street, spending approximately $22.4 million to repair damage from Hurricane Matthew (FDOT, 2020).

The Federal project evaluation included the reaches of the Local project; however, these reaches will now be constructed by Flagler County because the benefit to cost ratio for those areas was too low to justify the use of Federal funds for construction. The Finding of No Significant Impact (FONSI) for the Federal project was signed on January 22, 2016.

Both the Federal and Local projects will utilize portions of the same offshore borrow area (Borrow Area 3A).

1.2.2 PROPOSED ACTION

The Local project will consist of placement of up to 1.3 million cubic yards (Mcy) of sand during the initial restoration with an expected nourishment interval of 11 years, which is consistent with the nourishment interval for the Federal project. The initial restoration may require dredging up to about 1.8 Mcy to address losses during dredging and access issues in the borrow area. Dredging volumes are commonly as much as 1.5 times the design fill placement volumes due to these losses during dredging.

The offshore borrow area is located approximately 10 NM offshore of the City of Flagler Beach shoreline on the OCS in the BOEM South Atlantic Planning Area, Daytona Beach Protraction Area (NH17-08), Blocks 6471 and 6472 (**Figures 1** and **2a**). BOEM is authorized under Public Law 103-426 [43 United States Code (U.S.C.) 1337(k)(2)] to negotiate on a non-competitive basis the rights to OCS sand resources for shore protection projects. BOEM's proposed connected action is to issue a non-competitive negotiated agreement (NNA) authorizing use of the sand source areas at the request of Flagler County.

The scope of the project is based upon consideration of past sand losses, anticipated performance due to differences between the native beach and borrow area sediments, end losses, and the effects of future sea level rise. Future renourishment volumes will depend upon project performance and are expected to require between 400,000 and 500,000 cubic yards. The actual required amount will be based upon project monitoring, and a separate NNA will be requested for each future nourishment event.

The Local borrow area lies within a large sand deposit previously delineated by the USACE as part of the Flagler County Hurricane and Storm Damage Reduction Project Feasibility Study and Environmental Assessment (USACE, 2015). This larger area is known as Borrow Area 3A with a total area of approximately 2,466 acres (998 hectares). The Local borrow area, FCBA, within Borrow Area 3A occupies roughly 345 acres (139 hectares) of seabed. Existing water depths within the FCBA typically range from -56 to -61 ft NAVD88. The borrow area is expected to provide sufficient material for initial sand placement and one renourishment event within the 15-year permit duration of the FDEP and USACE permits for the Local project.

A continuous cut elevation of -62.5 ft NAVD88 has been established for the FCBA with a 2-foot disturbance buffer to -64.5 ft NAVD88. There are three subareas within the Local borrow area: FCBA-A, FCBA-B, and FCBA-C (**Figure 2b**). These subareas have been established considering the shape and configuration of sand thickness available above -62.5 ft NAVD88 and sediment characteristics, principally grain size and color. There are approximately 1.2 Mcy within FCBA-A; 475,000 cy within FCBA-B; and 665,000 cy within FCBA-C. The FDEP permit for the Local project (FDEP Permit No. 0379716-001-JC) requires Subarea A to be used first and depleted prior to dredging in FCBA-B, which will then be dredged and depleted prior to dredging in FCBA-C.

The project will be constructed using a trailing suction hopper dredge and traditional hydraulic sand placement and mechanical dune and berm shaping methods. Sand will be delivered to the beach from up to four offshore mooring points through submerged pipelines. The mooring points and pipelines will be deployed along predetermined pipeline corridors that have been surveyed and cleared of significant cultural and hard bottom resources (**Figure 3**).

The project construction template includes both dune and beach berm features. The dune will be constructed along the landward limits of beach berm and seaward of existing bulkheads, revetments, and/or established dune vegetation. The dune will have a crest elevation of +11.0 ft, on average. The beach berm will have a crest elevation of +10.0 feet and slope gently from onshore to offshore at a slope of 1V:50H before transitioning to the seaward berm slope of 1V:15H. Dune vegetation and sand fencing will be installed along the restored dune as necessary. The beach berm is expected to equilibrate to a more natural beach shape over the first 12 to 24 months following construction. It is anticipated that the seaward slopes of the equilibrated beach profile will generally replicate those along the existing beach.

Geotechnical investigations have determined that the sand from the offshore borrow area is compatible with the native beach and will provide suitable habitat for nesting marine turtles, shorebirds and other marine fauna. Geological data used for borrow area selection and design have been provided to BOEM under separate cover.

1.2.3 PROJECT NEED

The FDEP designated six coastal reaches as critically eroded in 2009. Qualitative assessments and quantitative data and analyses are used to recommend a segment of shoreline as critically eroded. The criteria for the critically eroded designation are a threat to, or loss of, one of four specific interests: upland development, recreation, wildlife habitat, or important cultural resources (FDEP, 2008). The list of critically eroded shorelines is updated annually by FDEP. As of March 2020, there are four areas of shoreline designated as critically eroded in Flagler County (**Table 1).** The segments between R-72 and R-76 and R-94.9 to R-98, which are adjacent to the Local project area, were added by FDEP in March 2020 and will be included in the June 2020 critical erosion report update.

Table 1. Beach reaches in Flagler County with critically eroded designation as of March 2020.

Location	FDEP Control Monument	Approximate Extent (miles)
Marineland	R-01 - R-04	0.6
Painters Hill	R-50 - R-57	1.1
Beverly Beach	R-65.2 - R-66.8	0.3
Flagler Beach	R-66.8 - R-100.9	6.1
Total		**8.1**

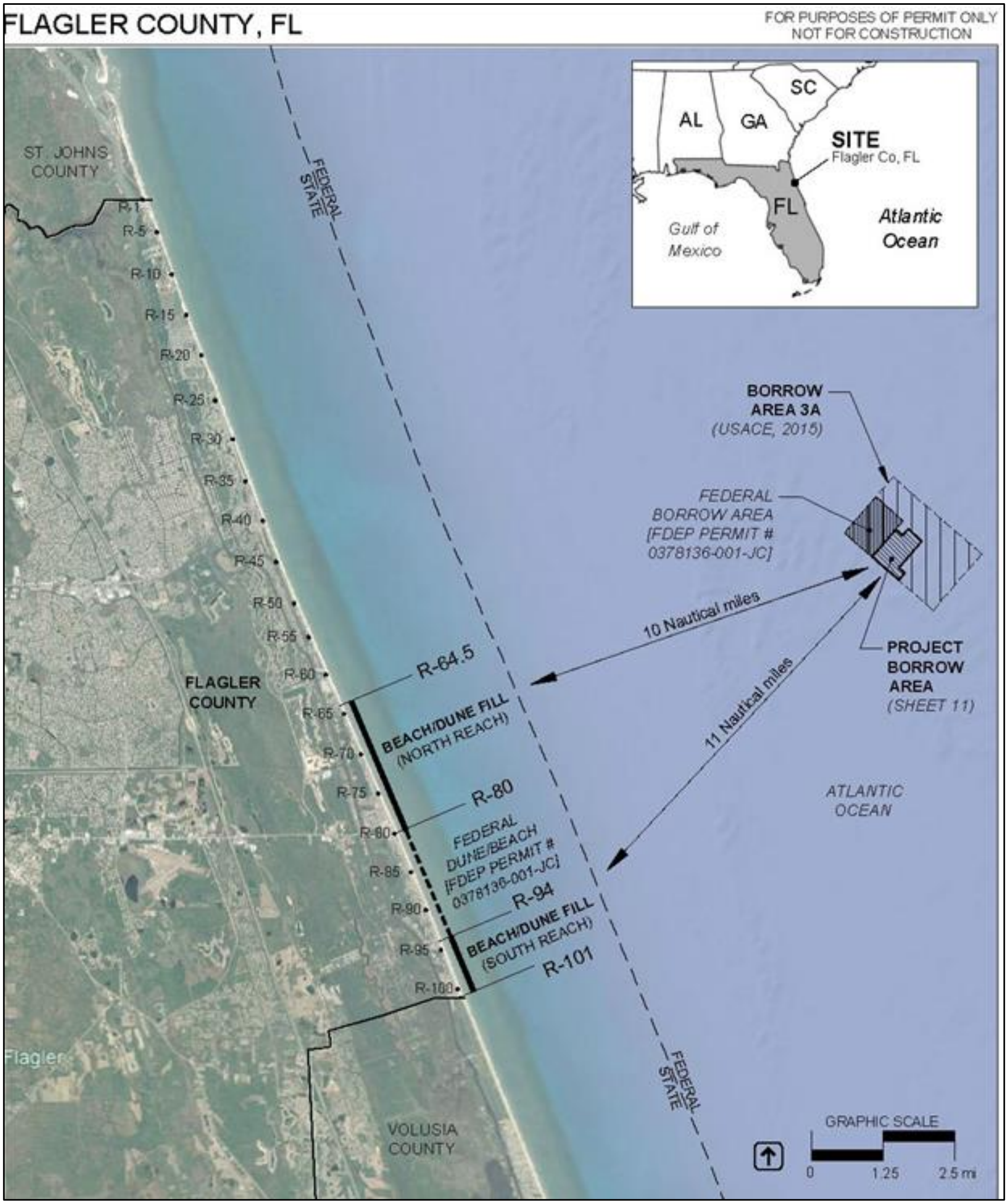

Figure 1. Project location map – Flagler County Dune/Beach Restoration Project.

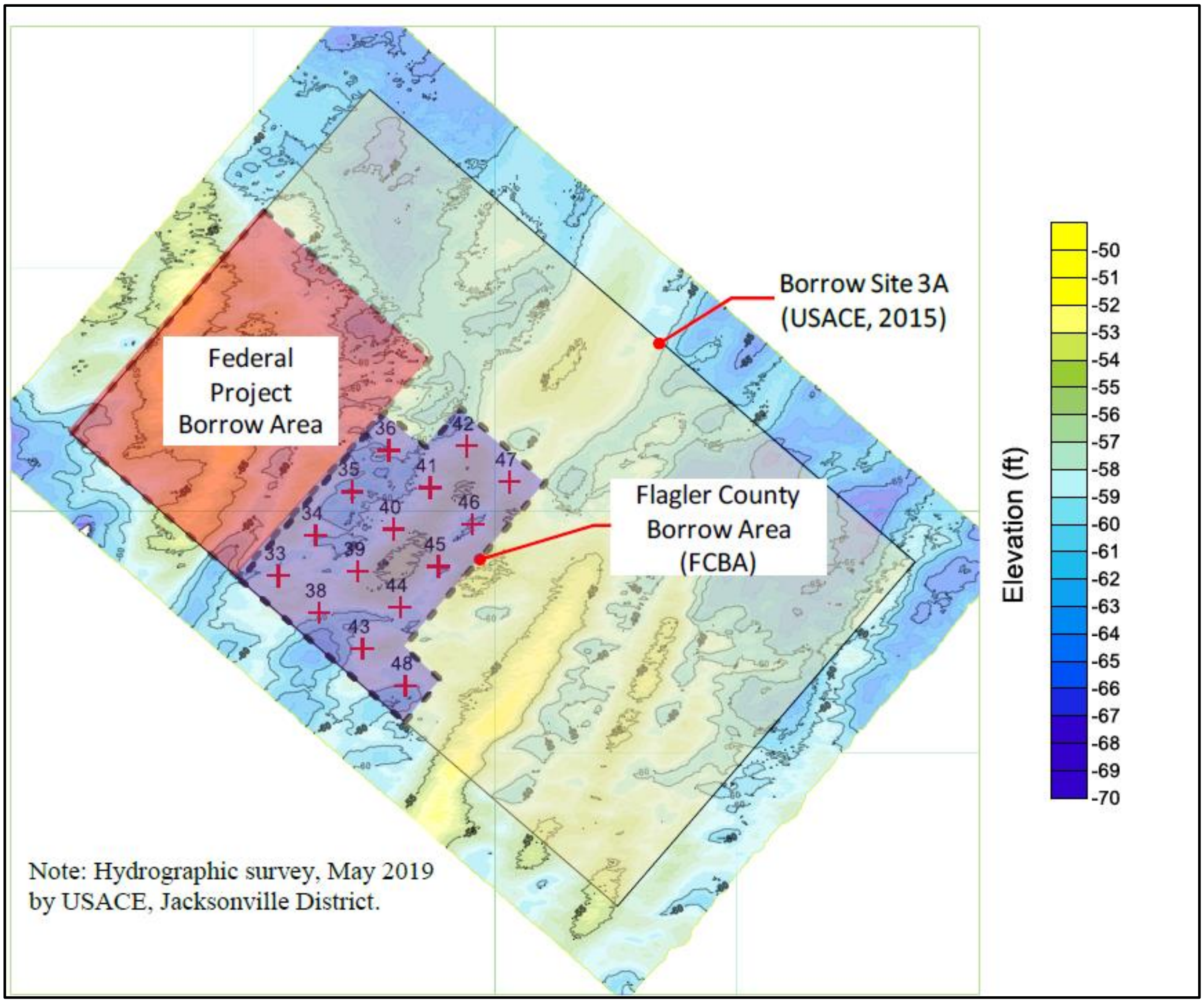

Figure 2a. Borrow Area 3A plan view showing the location of the Flagler County Borrow Area (FCBA) with seafloor elevations and 2019 vibracore locations. The Federal borrow area occupies roughly 490 acres and the FCBA occupies about 345 acres of the 2,466 acres within Borrow Area 3A.

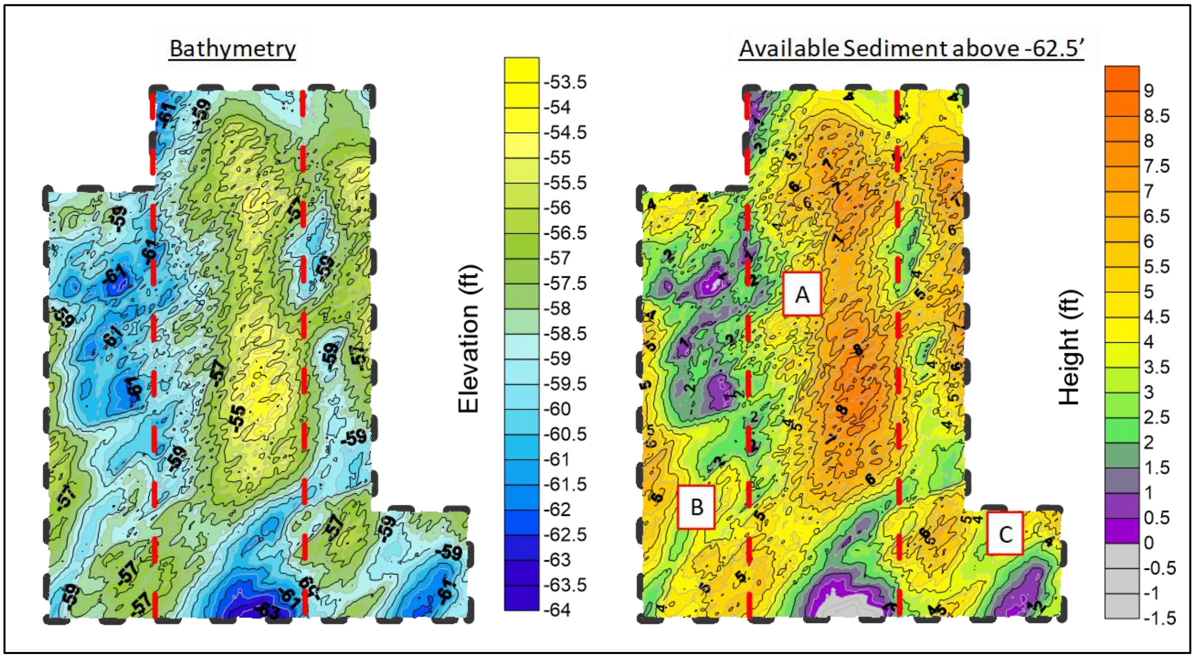

Figure 2b. Bathymetry of FCBA, dredge lanes, and sediment thickness in feet above -62.5 ft, NAVD88 within the three subareas of FCBA.

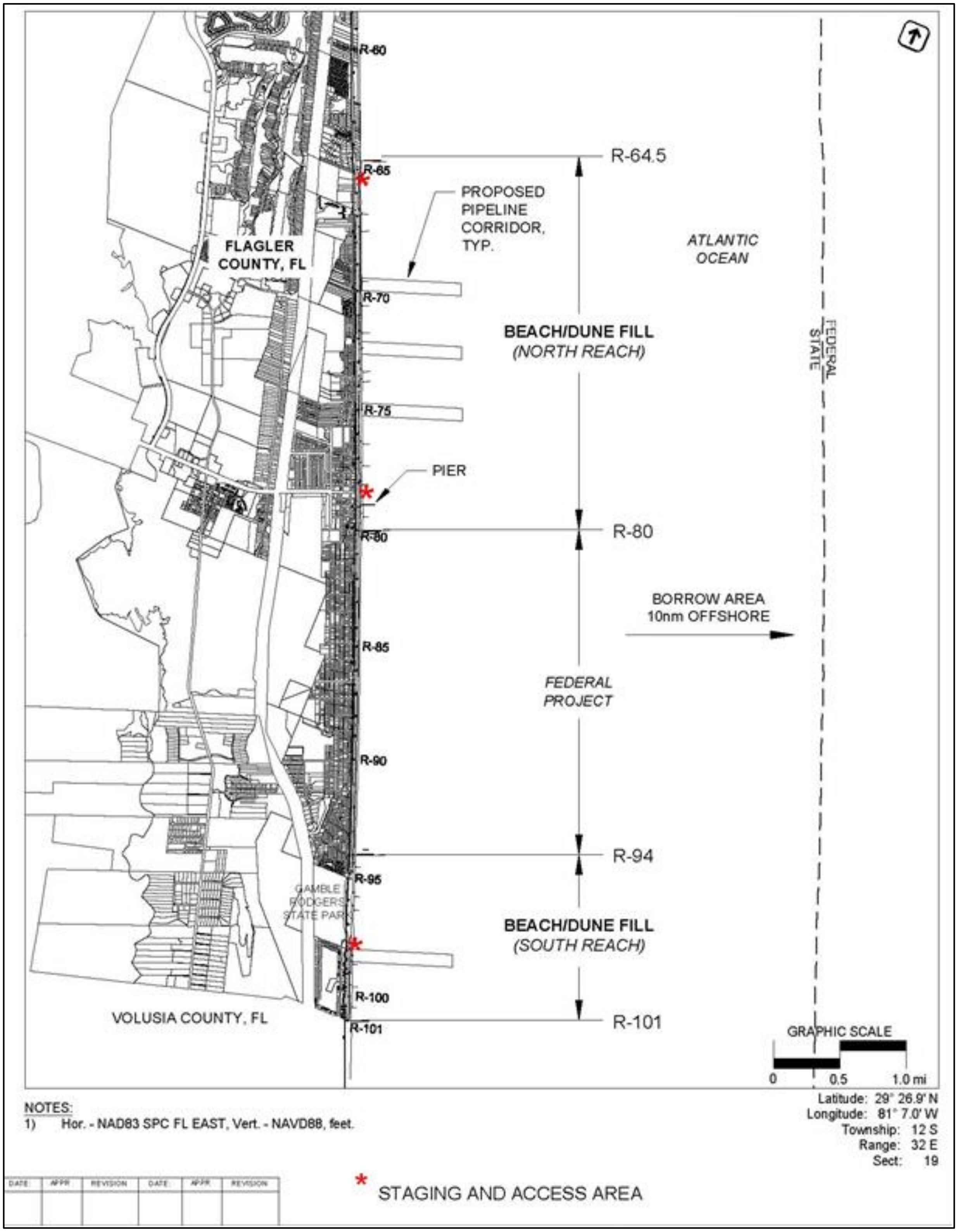

Figure 3. Beach fill placement areas, pipeline corridors, and staging and access areas for the Local and Federal projects in Flagler County.

1.3 PROJECT GOALS AND OBJECTIVES

The goal of the proposed project is to restore two reaches of eroded beach along approximately 4.1 miles (6.6 km) of the Atlantic Ocean shoreline in Flagler County that were severely impacted by Hurricanes Matthew (2017) and Irma (2018). The project beach/dune fill template will require up to 1.3 million Mcy of sand (approximately 60 cy/ft) for the initial nourishment with an expected renourishment interval of 11 years. A dredged volume of 1.8 Mcy is required for initial construction due to anticipated dredging losses and access issues with dredging the borrow area. Subsequent nourishment intervals may include separate NEPA analysis to address new information and update the current analyses. The scope of future renourishment volumes will be based upon project performance.

The Local borrow area, FCBA, is roughly 345 acres (140 hectares) and lies approximately 10 NM offshore of the City of Flagler Beach within a larger sand source area, Borrow Area 3A, identified by the USACE in 2015. The project will be constructed using a hopper dredge. Four pipeline corridors (three in the northern portion and one in the southern portion of the project) are required for project construction (see **Figure 3**). Construction is expected to begin in the fall of 2020 and will last approximately 3 to 5 months.

The Project Action Area (PAA) is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action (50 CFR 402.02). The PAA includes the Local portion of Borrow area 3A (345 acres of 2,465 total acres available in Borrow Area 3A), the 4.1-mile (6.6 km) long beach fill placement area from R-64.5 to R-80 and R-94 to R-101, and unvegetated softbottom habitat within the turbidity mixing zone around the borrow area and beach fill placement areas.

Sixteen vibracores were collected in January 2019 by the USACE Jacksonville District to describe sediments within the offshore borrow area. During permitting of the Local project, one vibracore and its corresponding representative area were removed from the FCBA due to incompatible sediment. The FCBA contains an estimated total of 2.3 Mcy of sand above the -62.5 ft, NAVD88 elevation (**Figure 4**). This sand volume is expected to accommodate the initial restoration and at least one renourishment during the 15-year permit life of the FDEP and USACE permits for the Local project.

The Local project will utilize the same staging and beach access areas to be used for the Federal project. One is near the beach access at Gamble Rogers SRA (**Photos 1a/b**). The second is located at the intersection of SR A1A and Highway 100, two blocks north of the Flagler Beach Pier (**Photo 2**). A third staging/access area will be needed at the north end of the project area, north of R-70. The County will locate the north staging area in previously disturbed upland and/or sparsely vegetated dunes to minimize impacts to existing dune vegetation.

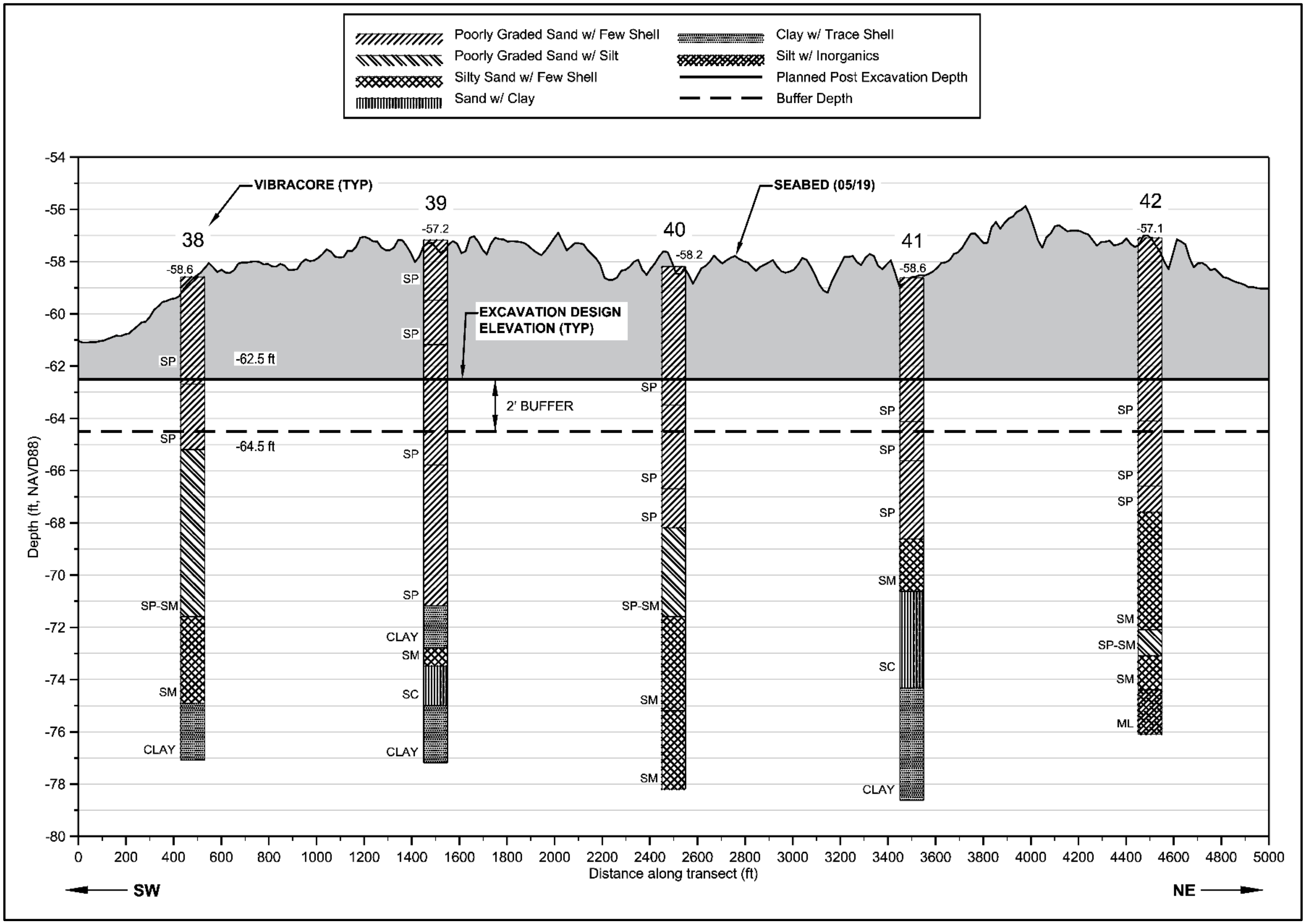

Figure 4: Fence plot of vibracore detail demonstrating the makeup of the FCBA material based on the record provided in the vibracore logs. Location of the cross-section is shown in Figure 5.

Photo 1a. Staging and access area near the beach access at Gamble Rogers SRA at R-98.

Photo 1b. Overhead view of access area at Gamble Rogers SRA taken on August 7, 2019 by Arc Surveying and Mapping Inc.

Photo 2. Construction access and staging area near the Flagler Beach Fishing Pier.

1.4 RELATED ENVIRONMENTAL DOCUMENTS

Related environmental documents can be found in the USACE Feasibility Study (2015). These include the Section 404(b) Evaluation, Coastal Zone Management Consistency Determination, Pertinent Correspondence and Mailing List, Environmental Assessment and Cumulative Effects Assessment for the Federal Project. The FONSI for the Federal project was signed on January 22, 2016. Pertinent previous studies are listed in Section 1.6 of the Feasibility Study (USACE, 2015).

1.5 DECISIONS TO BE MADE

This Environmental Assessment (EA) will evaluate whether construction of the proposed Flagler County Dune and Beach Restoration Project will cause any significant impacts to irreplaceable environmental resources. This document will also aid in BOEM's decision to authorize the use of OCS sand.

1.6 SCOPING AND ISSUES

The proposed project is being coordinated with the following agencies: USACE, FDEP BOEM, USFWS, National Marine Fisheries Service (NMFS), and the Florida Fish and

Wildlife Conservation Commission (FWC). Because the borrow area is in Federal waters, BOEM is a cooperating agency for this EA.

The following issues were identified as relevant to the proposed project and appropriate for further evaluation: cultural resources; threatened and endangered species including sea turtles and whales; turbidity and water quality; fish and wildlife resources and Essential Fish Habitat (EFH); and noise produced during dredging operations. The waters immediately adjacent to the PAA are critical habitat for the northern right whale and loggerhead sea turtle. The beach fill area is designated critical habitat for nesting sea turtles by the USFWS.

Flagler County agrees to implement the Terms and Conditions and protective measures described in the following documents:

- NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions to ensure that swimming sea turtles are not adversely affected by construction activities (Appendix 1 of the Biological Assessment)
- National Oceanic and Atmospheric Administration (NOAA) Vessel Strike Avoidance Measures (Appendix 2 of the Biological Assessment)
- NMFS South Atlantic Division Regional Biological Opinion (SARBO) 2020
- USFWS Statewide Programmatic Biological Opinion (SPBO)
- USFWS Programmatic Biological Opinion (P^3BO) Piping Plover Biological Opinion.

1.7 PERMITS, LICENSES AND ENTITLEMENTS

This project will be performed in compliance with the conditions of FDEP Joint Coastal Permit (JCP) No. 0379716-00-JC. A pre-application meeting was held with the USACE on June 12, 2019; the project was assigned File No. SAJ-2019-02065. A pre-application meeting was held with FDEP- Beaches, Inlets and Ports Program staff via teleconference on July 18, 2019. The Notice of Intent to Issue (NOI) and Draft Permit for the Local project were issued by the FDEP on March 18, 2020. Flagler County published the FDEP NOI on March 25, 2020 in the Flagler/Palm Coast News Tribune. A Biological Assessment (BA) for the Local project has been finalized and is included as **Appendix 1** of this EA.

The proposed project involves discharge of fill material into the waters of the United States and is therefore subject to Section 404 of the Clean Water Act (CWA). This EA serves to initiate formal consultation with NMFS under the provisions of the Magnuson-Stevens Act for potential effects to EFH.

2 ALTERNATIVES

2.1 DESCRIPTION OF ALTERNATIVES

A detailed description of project alternatives is provided in Section 5.2.1 of the Flagler County Hurricane and Storm Damage Reduction Study (USACE, 2015). The Feasibility Study evaluated 20 alternatives including non-structural and structural options. After preliminary evaluation, the alternatives were reduced to the following: No-Action; Relocate SR A1A; Seawalls; Revetments and Sand-Covered Soft Structures; Beach Nourishment (multiple design configurations, beach widths, beach volumes); Groins; Submerged Artificial Reefs; Submerged Artificial Multi-Purpose Reefs; and Dunes and Vegetation. These measures were further screened in USACE (2015) with additional discriminating factors including economic evaluations and sea-level rise effects. USACE (2015) determined that, for the beach section between R-80 and R-94, large-scale beach nourishment was the Preferred Alternative.

The alternatives analysis in the USACE Feasibility Study also showed that the unarmored sections of the beach with SR A1A adjacent (R-64.5 to R-80 and R-98 to R-101) would greatly benefit from the beach and dune restoration and maintenance but these shorelines did not meet the strict USACE economic screening criteria. Ultimately, based on the results of the USACE analysis and the desires of Flagler County, FDOT (which provided funding for the proposed Local project), the Town of Beverly Beach and the City of Flagler Beach, beach and dune restoration is the Preferred Alternative for the Local Project (R-64.5 to R-80 and R-98 to R-101).

2.1.1 No-Action Alternative (Status Quo)

The No-Action alternative represents future conditions without implementation of a beach nourishment project. This alternative provides a comparison for all other measures. Information to describe this alternative was collected during the inventory of existing conditions. The rate of shoreline change will be assumed to continue over the 50-year period of analysis. Present structures and replacement costs will be used into the future. This alternative is most sensitive to the background erosion rate. See Chapter 5 of the USACE Feasibility Study for a detailed analysis of the No-action alternative (USACE, 2015).

2.1.2 Preferred Alternative: Dune and Beach Nourishment

The USACE analysis selected beach and dune extension between R-80 and R-94 (i.e., the Federal Project shoreline) as the Preferred Alternative. The Federal and Local projects are similar in many ways, but the USACE approach towards project selection is different than the Local project. Ultimately, based on the results of the USACE analysis, consistency with the Federal project, and the desires of Flagler County and the FDOT (which provided funding for the Local project), beach and dune restoration is the Preferred Alternative for the Local project that is implementable at current sea level. The dune and beach nourishment alternative consist of a 10-foot seaward extension of the dune and a 20-foot to 80-foot extension of the berm. Over a 50-year project life, it is expected that the total fill volume required for a dune and beach nourishment would fall between 1.33 Mcy

(Reach A, 10-foot dune and 20-foot berm extensions, low Sea Level Change (SLC) scenario), and 42.19 Mcy (Reach A, B, C, and D 10-foot dune and 80-foot berm extension, high SLC scenario). Most of Reach B and all of Reach D identified in the 2015 USACE Feasibility Study are located within the Local Project.

2.2 COMPARISON OF ALTERNATIVES

Table 2. Comparison of Preferred Alternative and No-Action Alternative for the Local project.

EXISTING ENVIRONMENTAL FACTOR	PREFERRED ALTERNATIVE Dune and berm construction using material dredged from offshore borrow site 3A	ALTERNATIVE No Action
VEGETATION	Temporary impact to dune and upper beachface vegetation will occur. Disturbed or removed vegetation will be replanted as a component of the project, which will benefit native species diversity and overall habitat stability	Continued erosion of the dune and upper beach will further stress dune vegetation causing die-back of species.
PROTECTED SPECIES	Direct adverse impacts include: • Alteration of the beach face resulting in potential adverse impact to sea turtle nesting and hatching success (including effects from grade changes, sediment material, over-compaction, escarpment formation, artificial lighting during construction) resulting in potential incidental take of sea turtles • Potential taking of sea turtles with hopper dredge or relocation trawler (if utilized) • Possible encounters with North Atlantic Right Whales (NAWR) by dredge and support vessels during dredge and disposal operations. Protected species observers are on board vessels to identify and implement slow down procedures to avoid risk of NARW vessel strike. Unlikely to encounter manatees in the open ocean; no effects are expected.	Continued loss of sea turtle nesting habitat on the beach.
HARDBOTTOM RESOURCES	No hardbottom resources are present within or adjacent to the project limits or borrow area based on project-specific remote sensing and diver surveys. No adverse effects are expected.	No impacts would occur.
FISH AND WILDLIFE RESOURCES	Short-term impact to dune and beach habitat due to burial/disturbance, but long term benefit through increase in these habitats for nesting shorebirds and benthic fauna. Temporary impacts (3 to 5 months) to fish in the water column and benthic resources during dredging activities.	Continued loss of dune and beach habitat.
ESSENTIAL FISH HABITAT	Short-term turbidity would be present at the borrow area and surf zone during 3 to 5 month construction period. No hardbottom resources were identified within the borrow area during subsurface survey; therefore, no impacts would occur to this resource. No placement of material in the nearshore.	No impacts would occur.
COASTAL BARRIER RESOURCES	Coastal barrier resources (Units FL-P07P and P05A) would be enhanced through restoration of natural habitat. No structural components are proposed.	Continued loss of beach habitat associated with CBRA Units FL-P07P and P05A.
WATER QUALITY	Direct adverse impacts include a temporary increase in turbidity at the borrow site and beach fill area lasting 3 to 5 months. Turbidity would be monitored during project construction and work would cease if turbidity is not in compliance with Florida water quality standards.	No impacts to water quality would occur.
AIR QUALITY	Direct adverse short-term impacts include small, localized, temporary increases in concentrations of nitrogen dioxide (NO2), sulfide (SO2), carbon monoxide (CO), volatile organic compounds (VOCs), and particulate matter (PM) mostly associated with the dredge. no long-term impacts to air quality would occur	No impacts would occur.
NOISE	Temporary 3 to 5 month increase in noise at the borrow area and beach placement sites during construction.	No impacts would occur.
AESTHETIC RESOURCES	Temporary decrease in the aesthetic appeal of the beach during sand placement; long-term increase in the appearance of the beach.	Long-term decline in appearance of the beach as it continues to erode.
RECREATION RESOURCES	Inability to utilize beach during construction; long- term benefit of increased recreational space following construction. Minor temporary impact to recreational boaters required to avoid the dredge and associated vessels during construction.	Long-term decline in beach available for use by recreational interests.
NAVIGATION	Temporary impacts to vessels (3 to 5 months) utilizing the Atlantic Ocean near the Borrow Area 3A sub-areas and utilizing the nearshore areas during sand pump-out. Normal navigational use would resume immediately upon project completion.	No impacts would occur.
HISTORIC AND CULTURAL RESOURCES	Results of project-specific cultural resource surveys have been coordinated with SHPO. Borrow Area 3a and the pipeline corridors have been approved for use with a no effect determination for historic properties by letter dated March 13, 2020.	No direct impact historic resources but does allow for continued shoreline erosional forces
NATIVE AMERICANS	No adverse effects on Native American properties.	No adverse effects on Native American properties.

2.3 MITIGATION

The proposed project is located within both terrestrial and neritic critical habitat areas for the loggerhead sea turtle: Terrestrial Critical Habitat Unit LOGG-T-FL-03 and Neritic Critical Habitat Unit LOGG-N-15. The project may result in the "take" of sea turtles by possible nest destruction; reduced hatching success; reduced nesting success resulting from over-compaction of nourished beaches, unnatural escarpments and equipment lights related to project construction; or possible entrainment by the trailing suction hopper dredge or relocation trawler. The project may be constructed outside of sea turtle nesting season, avoiding direct adverse effects to nesting sea turtles. Relocation trawling is not currently proposed since the project will be constructed outside of sea turtle nesting season beginning in the fall of 2020. If relocation trawling is deemed necessary to minimize the potential for sea turtle take during hopper dredging operations, it would be conducted in compliance with the Terms and Conditions of the 2020 SARBO.

Should construction extend into sea turtle nesting season, a nest relocation program would be implemented to avoid and minimize the potential for incidental take of sea turtles during construction activities according to the Terms and Conditions of the USFWS Biological SPBO dated March 13, 2015. Sea turtle monitoring (daily nest surveys and nest relocations) will be performed by the authorized FWC sea turtle permit holder for Flagler County.

The proposed sand source is compatible with existing beach sediment, thereby maintaining the beach as suitable sea turtle nesting habitat, provided that appropriate conservation measures are implemented during and following project construction. Potential impacts to sea turtles will be mitigated by manipulating the configuration of the placed material to achieve a more turtle-friendly profile. In order to minimize potential impacts to nesting females and sea turtle hatchlings, the proposed beach fill design incorporates a dipping 1:55 slope over the seaward 100 feet of the berm, effectively lowering the seaward edge of the berm by 3.5 ft. over a nearly 200 ft. distance. The seaward-dipping seaward slope should minimize the potential for escarpment formations, prevent ponding on the new beach berm, and assist in directing hatchlings seaward to the ocean.

The project will be constructed using a hopper dredge. Flagler County shall comply with the *NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions,* NOAA Vessel Strike Avoidance Measures, and the Terms and Conditions and Reasonable and Prudent Measures of the 2020 NMFS SARBO, the USFWS SPBO dated March 13, 2015, and the USFWS Programmatic Biological Opinion for piping plover (P^3BO) issued on May 22, 2013. A BA has been prepared to fulfill the requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended (**Appendix 1**). The BA evaluates the potential impacts of the proposed Local project on federally-listed endangered and threatened species and critical habitat for listed species and describes the avoidance, minimization and conservation measures proposed by Flagler County.

The waters immediately offshore of the beach fill site and transiting from the beach fill site to the borrow area for the proposed Local project are located entirely within the limits of

Northern Right Whale Southeast U.S. Coast Critical Habitat Unit 2 (50 CFR Part 226). The borrow site is outside of the boundary of designated critical habitat. Flagler County will adhere to the Terms and Conditions of the 2020 SARBO which requires aerial surveys in critical habitat and daytime observers from December 1 to March 31. The SARBO also requires the hopper dredge to not get closer than 750 yards to a right whale. The Environmental Protection Specifications shall require the Contractor to receive and provide updates of right whale sightings during the period between December 1 and March 31.

Proper monitoring and posting of educational signs may reduce the potential for adverse impacts to nesting shorebirds during project activities. In order to comply with the Migratory Bird Treaty Act (16 U.S.C. 701 *et seq*.) and minimize the potential for project-related impacts to nesting shorebirds, the County will adhere to FWC standard guidelines for protection of nesting shorebirds between February 15 and August 31 and the shorebird monitoring and protection conditions provided in FDEP Permit No. 0379716-00-JC for the Local project. These conditions include establishment of appropriate buffer zones and travel corridors around locations where shorebirds have engaged in nesting behavior. Flagler County also agrees to the Terms and Conditions of the USFWS P^{3}BO dated May 22, 2013 for non-optimal habitat to minimize the potential for incidental take of wintering piping plovers and their foraging habitat. These measures include adherence to the appropriate seasonal windows to the maximum extent practicable to minimize the potential for direct disturbance of wintering piping plovers; modification of pipeline alignment and associated construction activities to reduce impacts to foraging, sheltering, and roosting; facilitating awareness of piping plover habitat by educating the public on ways to minimize disruption to the species; and providing the mechanisms necessary to monitor impacts to piping plovers if present within the PAA.

Construction is expected to begin in the fall of 2020 and will last approximately 3 to 5 months. Elevated turbidity levels will be limited to the 150-m turbidity mixing zone around the borrow area and beach fill placement areas. In their EFH consultation letter dated June 11, 2014 for the Federal project, NMFS stated that in open areas, adherence to the State Water Quality Criteria at the edge of the 150-meter mixing zone is normally sufficient protective of fishery resources. The proposed construction window during the fall months would also minimize impacts to EFH by avoiding or minimizing overlap with peak recruitment windows in the spring for benthic infaunal assemblages and federally managed fisheries. There are no submerged aquatic vegetation (SAV) or hardbottom/reef resources in the PPA (see **Section 3.2.1**); therefore, these EFH resources will not be impacted and no mitigation is required.

3 AFFECTED ENVIRONMENT

3.1 OCEANOGRAPHIC SETTING

Flagler County is located on the northeast coast of Florida between the Florida/Georgia state line to the north and Cape Canaveral to the south (see **Figure 1**). Flagler County encompasses approximately 18 miles of sandy shoreline on a coastal barrier island. No inlets or embayments occur along the coast, and the beaches are typically fronted by steep dune faces or rock revetment. Flagler County beaches are influenced heavily by wind, wave, and current energy, particularly during storm events.

3.1.1 TIDES AND WAVES

Tides in Flagler County have a mean tidal range of 3.64 ft (1.11 m) and are semidiurnal. **Table 3** summarizes tidal data from the nearest tide stations to the project area on the ocean side of the island [NOS Station 8720692 (State Road A1A Bridge)] and on the back-bay side of the barrier island [NOS Station 8720833 (Smith Creek, Flagler Beach)]. The State Road A1A Bridge Station is located at Matanzas Inlet, approximately 17 miles north of Flagler Beach, and the Smith Creek tide station is located directly west of Flagler Beach.

Table 3. Tide data from the State Road A1A (ocean side) and the Smith Creek (back bay side) of Flagler Beach.

Tidal Datum	Elevation Relative to MLLW (feet)	
	State Road A1A	Smith Creek
Mean High Water (MHW)	3.80	0.94
North American Vertical Datum (NACD 88)	2.28	0.78
Mean Tide Level (MSL)	1.95	0.52
Mean Low Water (MLW)	0.16	0.07
Mean Lower Low Water (MLLW)	0.00	0.00

Note: Table adapted from USACE, 2015 Final Feasibility Study and EA

The project area is fully exposed to the open ocean in all seaward directions and is vulnerable to wave energy from both short period wind-waves and longer period open-ocean swells. Large swells from hurricanes and tropical storms moving through the Atlantic can propagate long distances, causing erosion along the Flagler County shoreline.

Mean seasonal offshore wave height from WIS hindcast data (1980-1999) ranges from 2.2 ft (0.7 m) in July to 4.6 ft (1.4 m) in October (USACE, 2015). The summer months experience milder conditions, with smaller wave heights, compared to the late fall and winter months which experience an increase in wave height in response to nor'easter activity. East-northeast wave conditions predominate in all months except June through August, when waves most often arrive from the east (June and August) or east-southeast (July). Overall, the dominant wave directions range from northeast to southeast and reflect both open-ocean swell and locally generated wind-waves (USACE, 2015). Similar patterns in seasonality were documented in wave period. Short-period, locally- generated wind waves are common throughout the year with the dominant wave period occurring between 5.0 and 5.9 seconds (USACE, 2015).

Similar to wave height, the shortest period waves occur more frequently during the summer months. During the fall and winter months, higher-energy, longer-period storm swells occur more frequently. The percentage of waves with periods greater than 12 seconds increases from a low of 0.3% in June to a high of 13.4% in September (height of hurricane season) (USACE, 2015).

3.1.2 WATER CURRENTS

The Florida Gulf Stream is the primary ocean current in the project area. The current is located approximately 60 miles offshore of Flagler County and, except for intermittent local reversals, flows northward. Average annual current velocity is approximately 28 miles per day, varying from an average monthly low of 17 miles per day in November to an average monthly high of approximately 37 miles per day in July (USACE, 2015).

Nearshore currents in the vicinity of the project area are not directly influenced by the Gulf Stream, however, interaction with incident waves may indirectly influence these currents (USACE, 2015). Littoral currents influence the distribution of sediment along the Flagler County shoreline. Generally, the long-term direction and magnitude of this littoral transport is determined by longshore currents, which are generated by oblique wave energy. Cross-shore currents may have a higher short-term influence but can result in both temporary and permanent erosion of sandy beaches in Flagler County (USACE, 2015). The magnitude of these cross-shore currents is determined by wave characteristics, the angle from which the waves are propagating, configuration of the beach, and the nearshore profile (USACE, 2015).

The project beach is considered an open-coast beach situated well away from tidal inlets, nearshore shoals, and other shore-altering features. The two closest inlets to the project area are Matanzas Inlet (non-navigable) to the north (17 miles) and Ponce de Leon Inlet to the south (27 miles). The distance between the inlets and the PAA is greater than the influence of inlet tidal fluctuations. As such, the influence of the ebb and flood currents on local currents is negligible (USACE, 2015).

3.2 GEOLOGY AND GEOMORPHOLOGY OF THE STUDY AREA

Florida currently occupies a portion of the geological unit known as the Floridian Plateau (USACE, 2015). The Floridian Plateau is a partly submerged platform that represents the seaward extension of the coastal plain of Georgia and Florida. It is nearly 500 miles long and up to 400 miles wide (Shrober and Obreza, 2008; USACE, 2015). The submerged portions of the plateau define the area of the continental shelf that extends into the ocean to a depth of approximately 300 ft (USACE, 2015). The plateau has existed for millions of years, alternating between dry land due to periods of relative drops in sea level and shallow seas during periods of inundation. Its core consists of metamorphic rocks buried beneath a thick layer of sedimentary rock composed mostly of limestone (USACE, 2015). A wide variety of mineral deposits are left behind during each dry land exposure which have formed the present-day sandy beaches, offshore bars, and barrier islands in Flagler County (Randazzo and Jones, 1997; USACE, 2015).

The Local project borrow area, FCBA, is located approximately 10 NM offshore of the City of Flagler Beach shoreline on the OCS in the BOEM South Atlantic Planning Area, Daytona Beach Protraction Area (NH17-08), Blocks 6471 and 6472. The FCBA lies within a large sand deposit previously delineated by the USACE as part of the Flagler County Hurricane and Storm Damage Reduction Project Feasibility Study and Environmental Assessment (USACE, 2015). This larger area is known as Borrow Area 3A. FCBA, within Borrow Area 3A, occupies roughly 345 acres (139 hectares) of seabed (see **Figures 1** and **2a**). FCBA represents bathymetric peaks or ridges on the seascape rather than level sea bottom. The sand ridges are elongated shoals comprised of mostly sandy sediments (**Figure 5**). The ridges tend to be semi-permanent features that have slowly formed into linear mounds by currents over time. Water depths in the borrow area range from -54 ft to -63 ft NAVD88 with typical depths between -56 ft to -61 ft NAVD88.

3.2.1 SUBSURFACE CONDITIONS

There are no SAV habitats or hardbottom/reef resources in the PAA. Intermittent exposure of beach outcrops had been reported north of R-50 along the Flagler County shoreline with possible unconfirmed outcrops within the project area (FDEP, 1999). A side scan sonar survey was conducted offshore of the project area in 2011 in support of the USACE Feasibility Study. The 2011 side-scan survey suggested the presence of “near surface” exposed rock features between the 10 ft and 15 ft contours. These signatures ran perpendicular to the shoreline as isolated features or clusters and were labeled as “presumed hardbottom” in the nearshore hardbottom study by Dial Cordy and Associates Inc. (DCA) in 2011 (**Figure 6**). Ground-truthing of these signatures was not conducted. The USACE conducted a follow up study in 2012 to characterize the features identified as “presumed rock” in the 2011 study. Georectified areas from the 2011 survey were re-surveyed with higher resolution side scan sonar. No hardbottom features were found during this survey but ground-truthing by divers was not performed (USACE, 2015).

A high-resolution aerial photography and nearshore side scan survey of the project area was conducted in June 2019. The side scan survey also included the four pipeline corridors. Divers from Coastal Eco-Group, Inc. (CEG) conducted 15 verification dives on July 16, 2019 on features that were similar in appearance to the “presumed hardbottom” in the 2011 survey (DCA, 2011) (**Figures 7** and **8**). These features did not appear to represent consolidated hardbottom; they were irregular in shape and occurred throughout the entire project area shoreline. The fifteen dive sites included representative signatures within the pipeline corridors and nearshore environment, immediately offshore of the projected ETOF and landward of the ETOF. No hardbottom was found at these fifteen sites. The bottom consisted of sand and/or shell hash in the nearshore areas (**Photo 3**), and sand and muck in the offshore areas in the pipeline corridors.

A comprehensive remote sensing survey for cultural resources within the entire Borrow Area 3A was completed on July 21, 2019 by Panamerican Consultants, Inc. under contract to the USACE (Panamerican Consultants, Inc., 2019). No magnetic anomalies or sonar contacts were found within Borrow Area 3A, which includes FCBA (see **Figure 2a**). The side scan sonar survey revealed a relatively flat sand bottom with no hardbottom or benthic features. The bottom was determined to be unconsolidated marine sediment dominated by coarse sediment.

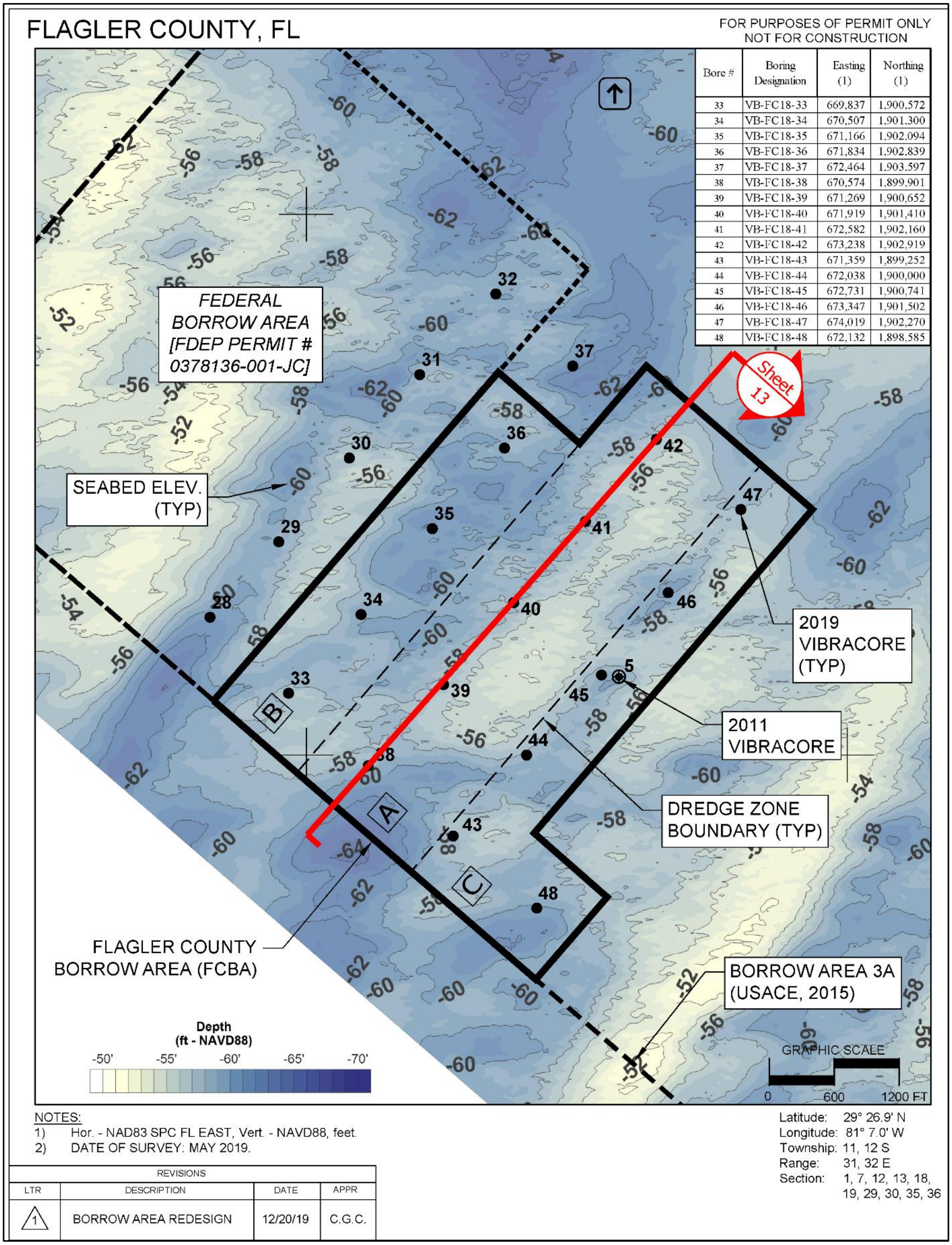

Figure 5. Bathymetry of FCBA and the surrounding seabed showing the elongated sand ridges and typical dredge zone boundary which targets these bathymetric peaks in the borrow area.

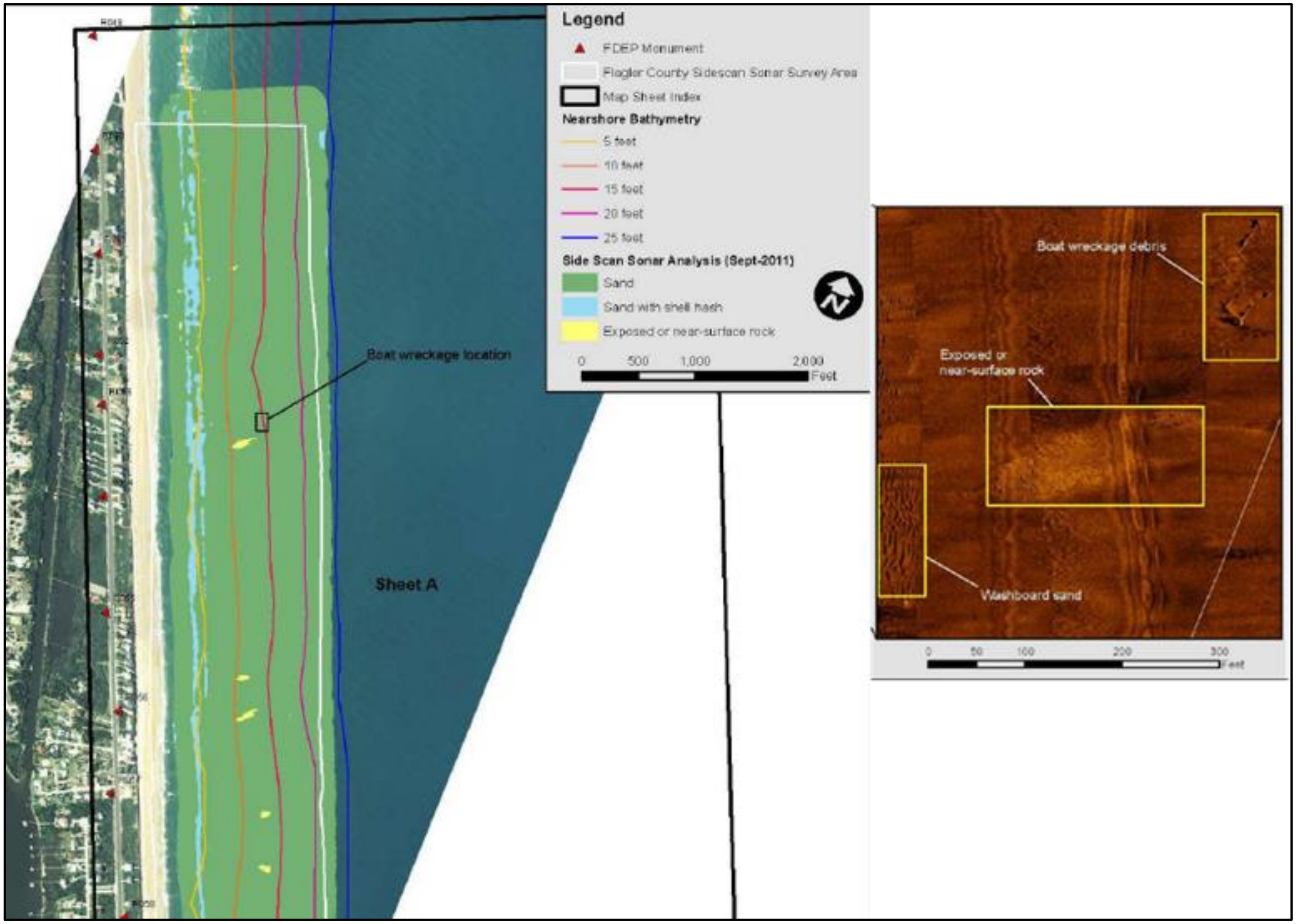

Figure 6. Left. Map of “presumed rock” features from 2011 side scan sonar (isolated, shore-perpendicular yellow features). Right. Close-up of 2011 side scan sonar showing boat wreckage and feature interpreted as “presumed exposed rock” (Source: Dial Cordy and Associates, 2011).

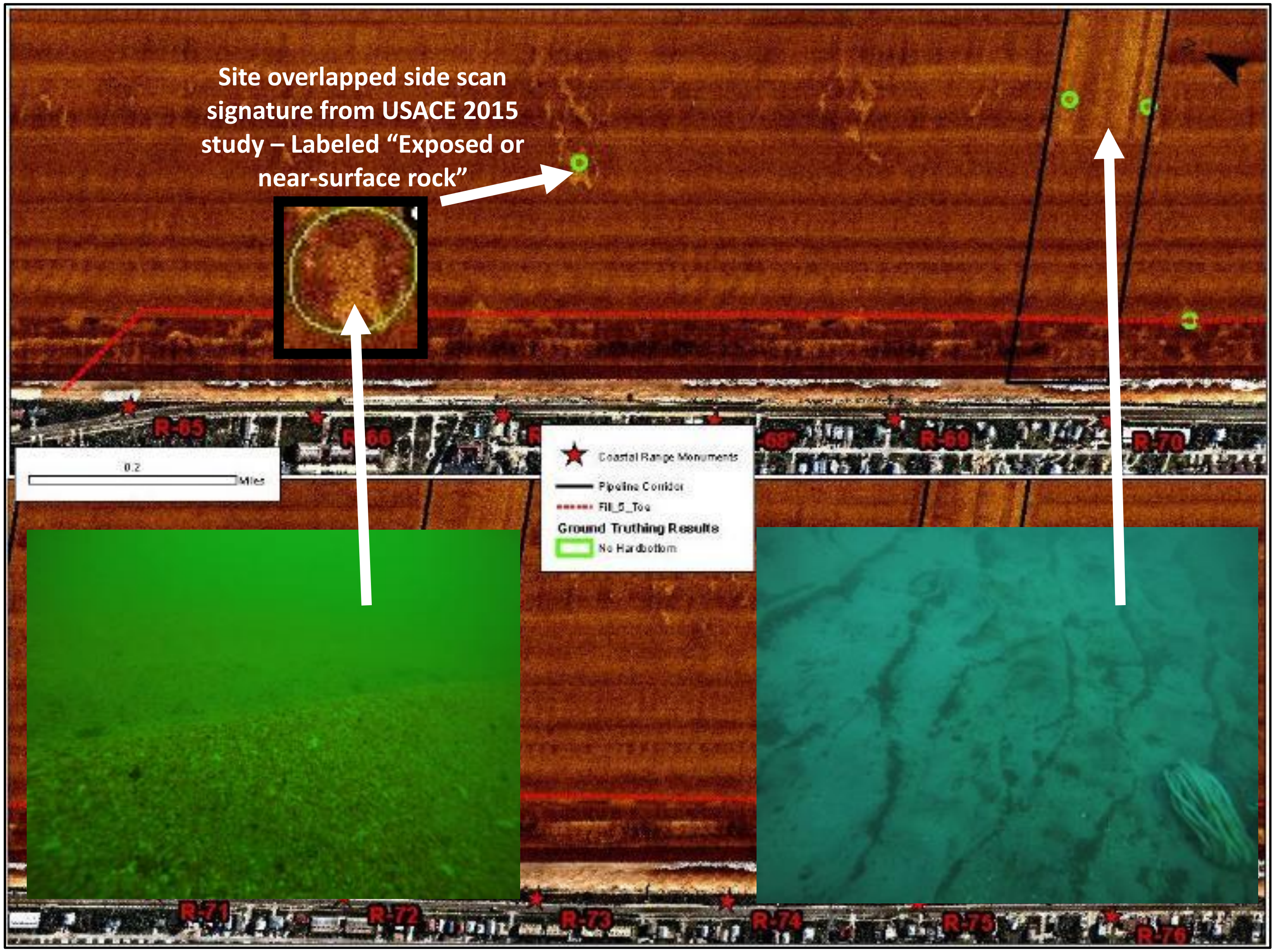

Figure 7. 2019 side scan sonar imagery in the project area showing one signature that overlapped with the 2011 survey (zoom of this feature show in black frame and green circle). No hardbottom was found in 2019.

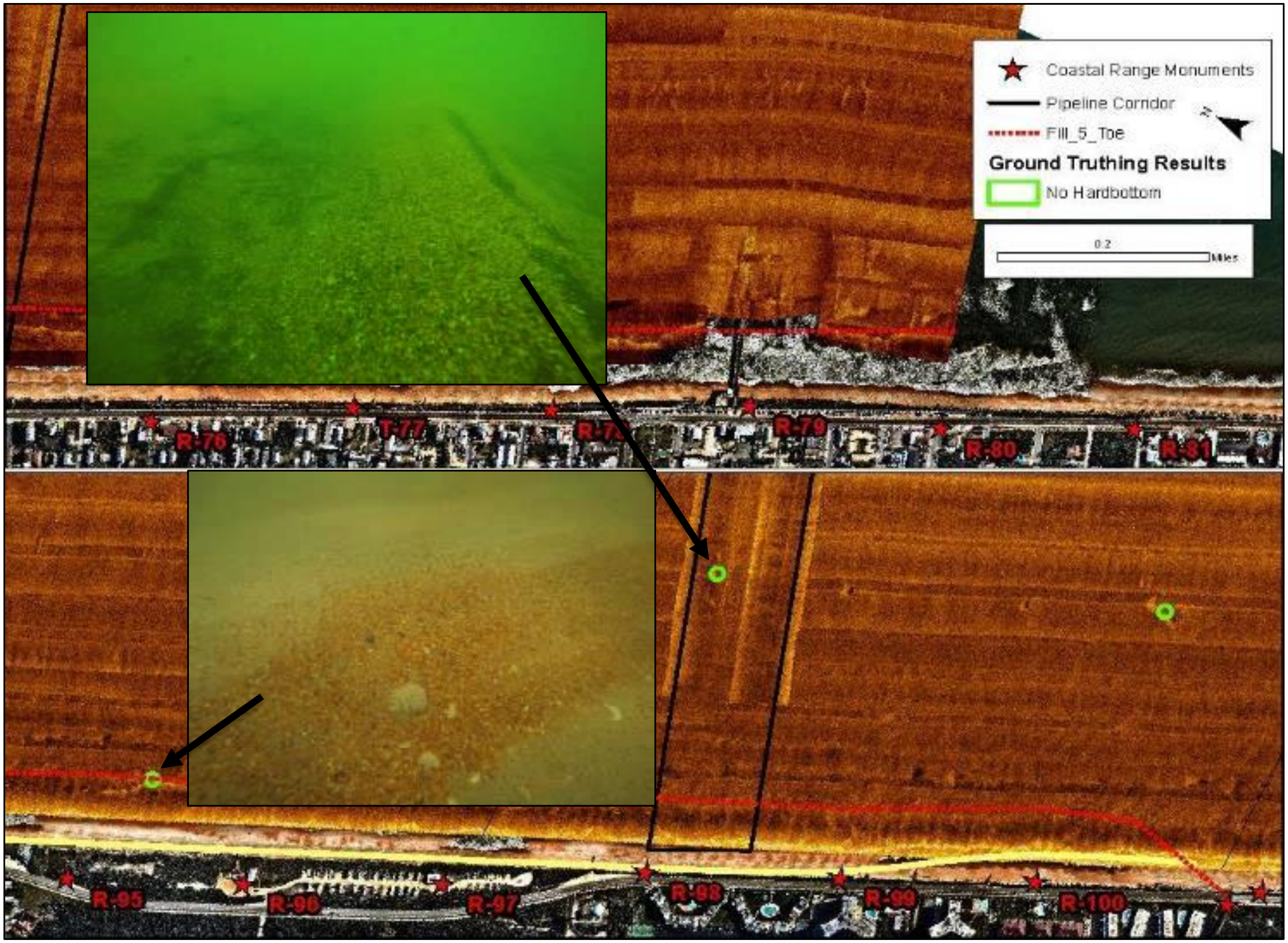

Figure 8. 2019 side scan sonar imagery in the PAA with photographs of representative ground-truthing sites. No Hardbottom was found in the 2019 field investigations.

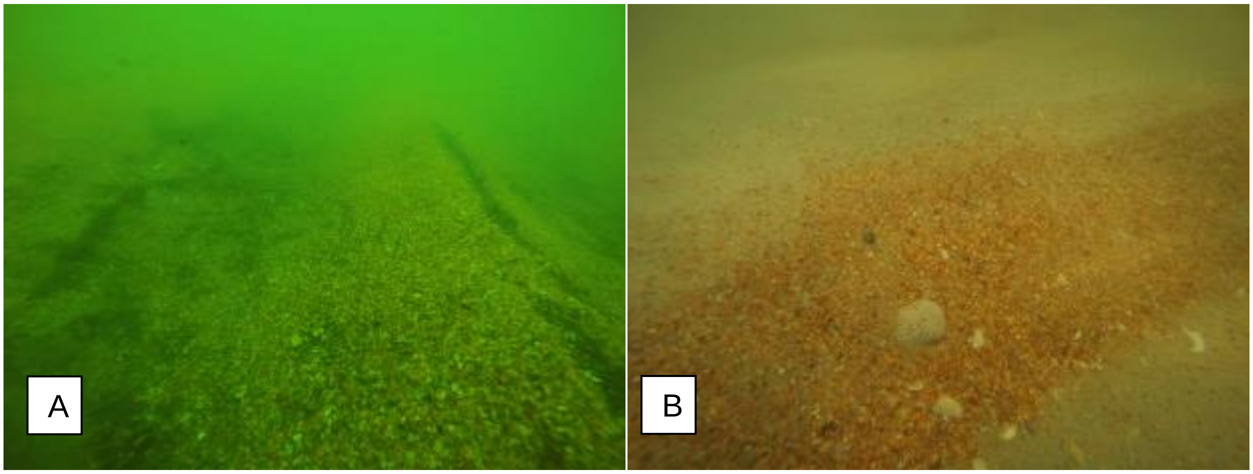

Photo 3. Representative images of ground-truthed side scan sonar signatures from verification dives on July 16, 2019. A) Southern pipeline corridor, B) Landward of the ETOF at R-95.

3.2.2 SEDIMENT AND BEACH FILL CHARACTERISTICS

Flagler County is unique compared to the counties to the north and south in that the shoreline sediment contains a higher percentage of coarse shell hash which produces a larger median grain size and steeper beach profiles. The shoreline has mild concave curvature from north to south, transitioning to a headland at Flagler Beach. Shoreline irregularities along the generally curved shoreline are attributed to nearshore hard bottom exposed rock outcrops which influence shoreline erosion and accretion. The FDEP completed a shoreline change rate study in July of 1999; the study concluded that the beaches of Flagler County are subject to cyclic erosion and accretion but are relatively stable based on data from 1952 to 1993 (USACE, 2015).

Table 4 and **Figure 9** show recent sediment grain characteristics of the FCBA in comparison with beach sediment. The FCBA sand for the Local project compares favorably with existing beach sediments. The native beach and borrow area materials vary in color. The native beach sand of Flagler County is commonly viewed as having an orange-yellow color, especially across the upper beach berm, that is related mostly to the shell materials in the beach. The most notable difference between the native beach and borrow sediments is that native beach sediments have a wider range of sizes than the borrow area material. The borrow area sand is slightly coarser, on average, than the native beach sediments and appears to have more uniform sediment sizes. All sampled borrow area sediments fall well within the range of grain sizes found on the native project area beach.

The borrow area composite samples have a median grain size ranging from 0.22 mm to 0.23 mm and a mean grain size range of 0.26 mm to 0.27 mm. The difference in these sizes is indicative of the amount of shell fragments and hash in the borrow area sediment. The sorting value, σ, of the composite ranges from 0.88φ to 0.94φ. The sorting value provides a description of the degree to which sediments in the composite sample are similarly sized. Smaller values of σ, closer to σ =0.5, indicate very poorly graded (or well sorted) samples in which the sediment grains are similarly sized.

Visual shell content at the native beach and offshore borrow area are very similar. The native beach contains about 19.2% shell while borrow area sediment composites contain about 20.1% to 21.1% shell. Carbonate content evaluation, determined by burn testing on select samples and visual assessment on all others, reveals a range of carbonate (shell) content from 9% to 35% with an average of about 21% for the three subareas in FCBA (see **Figure 2b**).

Table 4. Summary comparison of native beach sediment to the proposed FCBA composite sediment with overfill ratios.

	Folk and Ward (1957) Method			Method of Moments					Munsell Color				
	D_{16} (mm)	D_{50} (mm) (Median)	D_{84} (mm)	Mean (phi)	Mean (mm)	Sorting (phi)	Carbonate Content (%)	Passing #230 (%)	Hue	Value	Chroma	Overfill James (1974)	Overfill Dean (2000)
Native Beach Composite	0.13	0.18	0.57	2.11	0.23	1.04	19.2	0.23	10Y	7	2	1.00	1.00
Borrow Area FCBA-A Composite	0.16	0.23	0.45	1.88	0.27	0.94	20.1	1.58	10YR	6	1		
Borrow Area FCBA-B Composite	0.16	0.22	0.41	1.92	0.26	0.91	21.1	1.70	10YR	6	1		
Borrow Area FCBA-C Composite	0.16	0.23	0.45	1.87	0.27	0.88	20.6	1.67	10YR	6	1		

Notes: Fines are percent material passing No. 230 sieve. Percent shell determined from carbonate burn testing. Source: OAI, 2020.

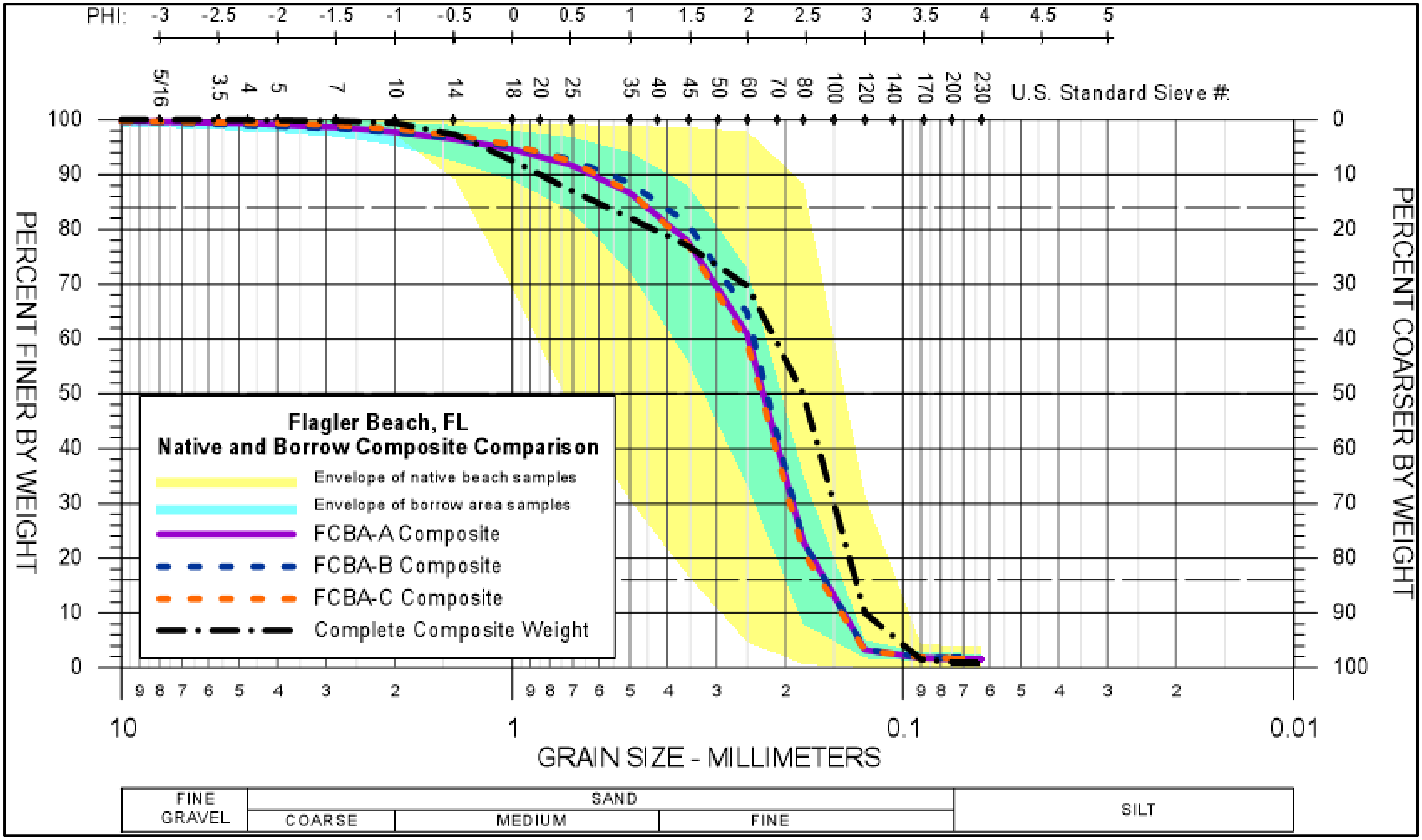

Figure 9. Cumulative grain size curves for the FCBA compared to native beach sediments in the project area.

3.3 VEGETATION

3.3.1 DUNE AND SCRUB COMMUNITIES

The sandy beaches along Flagler County are typically fronted by a line of dunes ranging in height from 10 to 23 ft Mean Sea Level (MSL). The dunes are characterized by relatively steep faces and are composed primarily of coquina shell hash and fine quartz sand (USACE, 2015).

Vegetation on the dune face is regularly exposed to harsh environmental disturbances, including salt spray and sand burial from onshore winds blowing across the ocean and open sand beach (FNAI, 2010; USACE, 2015). In addition to these stressors, plants on the upper beach are also subject to occasional inundation during high seasonal or storm-related tides and periodic destruction by strong wave activity. Due to these persistent stressors, the dune and upper beach vegetation community is typically composed of plants that are able to rapidly re-colonize after disturbances (USACE, 2014; Myers and Ewel, 1990).

The project fill area extends along 4.1 miles of Atlantic Ocean shoreline in southern Flagler County. Most of the project area lies along the portion of Flagler County where SR A1A is located immediately adjacent to the beach. Landward of SR A1A, the area is developed with light commercial, single-family residence, condominiums, hotels, and resort areas. Approximately 0.5 miles of the project shoreline lies within Gamble Rogers SRA.

The beach dune vegetation is a predominantly herbaceous plant community consisting of wide-ranging coastal species on the upper beach and foredune. These areas are classified as coastal scrub (FLUCCS 322) (FLUCCS, 1999). This community is built by sea oats *(Uniola paniculata)* and grasses that can tolerate sand burial including bitter panic grass (*Panicum amarum*) and saltmeadow cordgrass (*Spartina patens*) (Myers and Ewel, 1990). Camphorweed *(Hetrotheca subaxillaris)* grows with sea oats often where sand burial is absent or moderate within a disturbed community. Seacoast marsh elder *(Iva imbricata),* a succulent shrub, is found at the seaward base of the foredune. These species may also occupy the face left from dune disturbance due to storm erosion where sand is not yet stabilized by vegetation (Myers and Ewel, 1990).

The upper beach area (seaward of the foredune) is less stable and frequently disturbed by high spring or storm tides, and is continually re-colonized by annual species such as sea rocket *(Cakile lanceolata.),* crested saltbush (*Atriplex cristata)*, and Dixie sandmat (*Chamaesyce bombensis);* or by trailing species like railroad vine *(Ipomoea pes-caprae),* beach morning glory *(Ipomoea imperati)*, and the salt-tolerant grasses seashore paspalum (*Paspalum vaginatum*) and seashore dropseed (*Sporobolus virginicus)* (Taylor, 1998). Other species found in the beach dune community include dune sunflower *(Helianthus debilis),* sand spur *(Cenchrus spp.)*, and shoreline seapurslane *(Sesuvium portulacastrum)* (USACE, 2015). **Photo 4** shows existing dune vegetation conditions at R-97 and R-98, and **Photo 5** shows between R-70 and R-71 during a site inspection on July 17, 2019.

Seaward of the dune vegetation line, the beach fill area is classified as Marine - Unconsolidated Substrate (sand) from the supratidal to subtidal areas. Within this broad unvegetated zone, where the majority of the beach nourishment work will occur, there are several different sub-zones. The area is classified as swimming beach (FLUCCS 181). Seaward thereof is the nearshore open sand/benthic habitat at the shoreline (FLUCCS 652). The remainder of the renourishment project footprint falls into the FLUCCS Water Bodies classification for the sandy/muddy seabed of the Atlantic Ocean (FLUCCS 571).

Photo 4. Existing dune vegetation between R-97 and R-98.

Photo 5. Existing dune vegetation and beach face between R-70 and R-71.

3.3.2 SEAGRASSES

There are no seagrasses located within or in the vicinity of the PAA.

3.4 THREATENED AND ENDANGERED SPECIES

This section summarizes the biology and critical habitat of protected species potentially affected by the proposed project. A BA has been prepared to fulfill USACE requirements as outlined under Section 7(c) of the ESA as amended (**Appendix 1)**. The BA evaluates potential impacts of the proposed Local project on federally-listed endangered and threatened species and critical habitat for listed species and describes the avoidance, minimization and conservation measures proposed by Flagler County. The proposed Local project is covered by, and Flagler County will adhere to, the Terms and Conditions and Reasonable and Prudent Measures of the NMFS SARBO dated March 27, 2020, the USFWS SPBO dated March 13, 2015, and USFWS P^{3}BO dated May 22, 2013.

3.4.1 Sea Turtles

There are five species of sea turtles that occur in the coastal waters off Flagler County. The loggerhead sea turtle (*Caretta caretta*) constitutes the majority of the turtle nests in this region; however, low numbers of green sea turtle (*Chelonia mydas*) and leatherback sea turtle (*Dermochelys coriacea)* nests are also reported in Flagler County. A single Kemp's ridley (*Lepidochelys kempii*) nest was reported in 2012. Although hawksbill sea turtle (*Eretmochelys imbricata*) nests have not been documented in Flagler County, this portion of the Western Atlantic is within their range and individuals may be found offshore. The nesting season for all species of sea turtles is May 1 through October 31, inclusive of the hatching season. Nesting generally ends by September in the region.

The loggerhead sea turtle (*Caretta caretta*) was listed by the USFWS as threatened throughout its range on July 28, 1978 (43 FR 32808) (NMFS and USFWS 2008). Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific and Indian Oceans. The loggerhead sea turtle occurs in open water as far as 500 miles (804.7 km) from shore, but is mainly found over the continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers. The loggerhead favors warm temperate and subtropical regions in relatively close proximity to shorelines. Similar to other sea turtle species, water temperature influences the movements of loggerheads, and they do not usually appear at summer foraging grounds until June, although some individuals can be found in Virginia as early as April. Immature stages of loggerheads (i.e. juveniles/sub-adults) which forage in the northeastern U.S. migrate south in the fall as water temperatures drop and north in the spring.

Loggerhead sea turtles are found in the open ocean offshore areas of Flagler County. The loggerhead sea turtle is responsible for the majority of nesting in Flagler County with an annual average of approximately 140 nests/year (~12.0 nests/km; ~19.3 nests/mile) along approximately 6.1 miles (9.8 km) of study area (23rd St. N at Beverly Beach to the Flagler/Volusia County line).

The green turtle (*Chelonia mydas*) was listed on July 28, 1978 as threatened except in Florida and the Pacific Coast of Mexico (including the Gulf of California) where it was listed as endangered (43 FR 32808). On April 6, 2016, NMFS and USFWS issued a final rule to list eleven (11) DPSs under the ESA, three were listed as endangered and eight were listed as threatened. Green sea turtles in Florida belong to North Atlantic DPS which was listed as threatened under the ESA. This rule supersedes the 1978 final listing rule for green sea turtles (NMFS and USFWS, 2016).

The green sea turtle primarily utilizes shallow habitats such as lagoons, bays, inlets, shoals, estuaries and other areas with an abundance of marine algae and seagrasses. Individuals observed in the open ocean are believed to be migrating to feeding grounds or nesting beaches (Meylan, 1982). Hatchlings often float in masses of algae (*Sargassum* spp.) in convergence zones. Coral reefs and rock outcrops are often used as resting areas. In Flagler County, green sea turtles comprised 8% to 29% of the total nests between 2004 and 2011.

Green sea turtle hatchlings are believed to feed mainly on jellyfish and other invertebrates. Adult green sea turtles prefer an herbivorous diet and frequent shallow water flats for feeding (Fritts et al., 1983). Adult turtles feed primarily on seagrasses such as *Thalassia testudinum*.

The leatherback sea turtle (*Dermochelys coriacea*) was listed as endangered throughout its range on June 2, 1970 (35 FR 8495), with critical habitat designated in the U.S. Virgin Islands on September 26, 1978 and March 23, 1979 (43 FR 43688–43689 and 44 FR 17710–17712, respectively). The leatherback sea turtle is mainly pelagic, inhabiting the open ocean and diving nearly continuously to great depths, and seldom approaches land except for nesting (Eckert, 1992).

The leatherback sea turtle is probably the most wide-ranging of all sea turtle species, occurring in the Atlantic, Pacific and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain and Norway; as far south as Australia, Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (FWC, 2018; NFWL, 1980). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al., 1983). Leatherback nesting locations are worldwide, with the Pacific Coast of Mexico supporting the world's largest known concentration of nesting leatherbacks (FWC, 2018). A total of 32 leatherback nests were documented in the PAA between 2004 and 2011, representing only 1% of the total nests on Flagler County beaches during this period.

The Kemp's ridley sea turtle (*Lepidochelys kempii*) was listed as endangered throughout its range on December 2, 1970 (35 FR 18320). Of the seven extant species of sea turtles, the Kemp's ridley has declined to the lowest population level. Recent studies suggest increased nesting activities and an overall increase in population size due to increased hatchling production and survival rates of immature turtles. In 2011, the Kemp's ridley bi-national recovery plan was approved by NMFS, USFWS, and SEMARNAT (2011) for protection of all life stages in adjacent waters in Mexico and developmental habitat throughout the Gulf of Mexico and U.S. Atlantic to ensure the recovery of the species.

Adults are primarily restricted to the Gulf of Mexico, although juveniles may range throughout the Atlantic Ocean since they have been observed as far north as Nova Scotia (Musick, 1979). Nearly the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles (306 km) south of the Rio Grande. One Kemp's ridley nest was documented by the Volusia/Flagler turtle patrol in 2012. No nests were documented from 2013-2018. This nest was laid on June 13, 2012 and emerged on August 5, 2012 with a 48% hatchling success rate.

The hawksbill sea turtle (*Eretmochelys imbricata*) was listed as endangered on June 2, 1970 (35 FR 8495) with critical habitat designated in Puerto Rico on May 24, 1978 (43 FR 22224). Hawksbills generally inhabit coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, in water depths of less than 70 ft. Of the approximately 15,000 females estimated to nest annually throughout the world, the Caribbean accounts for about 20 to 30 percent of the world's hawksbill population (USWFS, 2015). There are only five regional populations with more than 1,000 females nesting annually: Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly, 1999). Mexico is the most important region for hawksbills in the Caribbean with about 3,000 nests per year (Meylan, 1999). In the Pacific United States, the hawksbill sea turtle nests only on main island beaches in Hawaii, primarily along the east coast of the island of Hawaii (USFWS, 2015). No hawksbill sea turtle nests have been recorded in Flagler County, Florida. It is unlikely that the proposed project activities will affect this species.

3.4.1.1 Sea turtle nesting habitat

Loggerhead sea turtles in Flagler County are members of the Northwest Atlantic DPS Peninsular Florida Recovery Unit (PFRU). The USFWS designated specific areas in the terrestrial environment as critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle on July 10, 2014 with an effective date of August 11, 2014 (79 FR 39755). The designation includes occupied critical habitat along 685 miles of shoreline in Florida, encompassing approximately 87% of the nesting within the recovery unit (USFWS, 2015).

All of Flagler County is located in Critical Habitat Unit LOGG-T-FL-03 which extends south into Volusia County (**Figure 10**). The loggerhead sea turtle is responsible for the majority of nesting in Flagler County with an annual average of approximately 140 nests/year (~12.0 nests/km; ~19.3 nests/mile) along approximately 6.1 miles (9.8 km) of study area (23rd St. N at Beverly Beach to the Flagler/Volusia County line). Between 2011 and 2018, the earliest *C. caretta* nest recorded by the Volusia/Flagler turtle patrol was on May 2, and the latest recorded nest was on August 26. Loggerheads appear to nest on a two-year or three-year cycle.

One nest was completely washed out in 2011 by Hurricane Irene. A second nest in 2011 was completely washed out by high tide. One nest was found completely encased in roots in 2015. In 2016, one nest was completely washed out by Hurricane Matthew, and in 2017, a major storm washed away one nest in June. Loggerhead sea turtle nesting success [ratio of nesting emergences to non-nesting emergences (i.e. false crawls)] within the FWC index beaches (Flagler Beach and Gamble Rogers SRA) is variable over the 10-year period (**Table 5**). However, the 10-year average (65% nesting success) is slightly higher than the typical 1:1 ratio of nests to false crawls for loggerhead sea turtles. Nesting success is higher in Gamble Rogers SRA than in Flagler Beach. Over the 10-year monitoring period shown in **Table 5**, Gamble Rogers SRA had the highest nesting success in 2014 (91%) and the lowest in 2015 (58%). Flagler Beach had the highest nesting success in 2017 (70%) and lowest in 2012 (40%). Hatchling success data in Flagler County are shown in **Table 6**. Between 2011 and 2018, hatchling success ranged from 82% (2016) to 87% (2014 and 2017) from 2011 through 2018.

According to Volusia/Flagler County turtle patrol data, between 2011 and 2018, the earliest green sea turtle nest in Flagler County was June 7, and the latest recorded nest was September 27. The annual nesting average for the two index beaches, combined from 2009 through 2018, is approximately 14.6 nests/year (~2.4 nests/mile) along the approximately 6.1 miles (9.8 km) of study area (23rd St. N at Beverly Beach to the Flagler/Volusia County line). Nesting success was not calculated for *C. mydas* as annual nest numbers are low for the 10-year period (**Table 5**). Hatchling success from 2011 through 2018 ranged from 72% in 2011 to 95% in 2018 (**Table 7**).

Fourteen *D. coriacea* nests were recorded by FWC from 2009 through 2018 (**Table 5**). The earliest nest was on April 18 in 2011, and the latest nest on July 6 in 2015 by Volusia/Flagler turtle patrol. Nesting success was not calculated for *D. coriacea* as nest numbers were very low during the 10-year period (**Table 5**). Hatchling success for the leatherback sea turtle is shown in **Table 8;** it ranges from 13% in 2013 to 93% in 2017.

Figure 10. Loggerhead sea turtle critical habitat in the PAA.

Table 5. Loggerhead, green, and leatherback sea turtle nesting and false crawl data within a majority of the Local and Federal Project Areas, 2009 through 2018 (FWC FWRI, 2018).

Year	Beach	Length (km)	Loggerhead Nest	Loggerhead False Crawl	Loggerhead Nesting Success	Green Turtle Nest	Green Turtle False Crawl	Leatherback Nest	Leatherback False Crawl
2009	Flagler Beach	9.6	42	55	43%	3	4	2	0
2009	Gamble Rogers Memorial SRA	1.8	29	7	81%	2	0	0	0
2010	Flagler Beach	9.6	95	89	52%	5	6	0	0
2010	Gamble Rogers Memorial SRA	1.8	28	9	76%	3	0	0	0
2011	Flagler Beach	9.6	72	57	56%	9	2	3	0
2011	Gamble Rogers Memorial SRA	1.8	27	4	87%	2	1	0	0
2012	Flagler Beach	9.6	121	178	40%	11	0	3	0
2012	Gamble Rogers Memorial SRA	1.8	51	25	67%	3	1	0	0
2013	Flagler Beach	9.6	111	77	59%	20	8	0	0
2013	Gamble Rogers Memorial SRA	1.8	39	9	81%	8	4	1	0
2014	Flagler Beach	9.6	83	77	52%	3	8	0	0
2014	Gamble Rogers Memorial SRA	1.8	30	3	91%	0	0	0	0
2015	Flagler Beach	9.6	116	64	64%	12	1	1	0
2015	Gamble Rogers Memorial SRA	1.8	26	19	58%	5	0	1	0
2016	Flagler Beach	9.6	188	115	62%	3	0	1	0
2016	Gamble Rogers Memorial SRA	1.8	46	30	61%	0	0	0	0
2017	Flagler Beach	9.6	122	53	70%	45	15	1	0
2017	Gamble Rogers Memorial SRA	1.8	54	10	84%	9	3	0	0
2018	Flagler Beach	9.6	88	92	49%	3	3	1	0
2018	Gamble Rogers Memorial SRA	1.8	30	19	61%	0	1	0	0

Notes: Nesting data were provided by FWC, Statewide Beach Survey Program. Flagler Beach is 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) to 1.8 km N of Flagler/Volusia Co Line (29.44168, -81.10897). Gamble Rogers Memorial SRA is 1.8 km N of Flagler/Volusia Co Line (29.44168, -81.10897) to Flagler/Volusia Co Line (29.42718, -81.10236).

Table 6. Loggerhead sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	94	10409	8295	304	83%
2012	141	14928	12226	387	85%
2013	138	14690	11877	490	84%
2014	93	9987	8237	494	87%
2015	125	13904	11122	372	83%
2016	188	19935	15748	607	82%
2017	126	13447	11249	413	87%
2018	111	11483	9141	477	84%

Source: Volusia/Flagler Turtle Patrol

Table 7. Green sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	6	683	478	15	72%
2012	12	1412	1077	58	80%
2013	23	2788	2416	122	91%
2014	1	115	86	5	79%
2015	11	1378	1212	9	89%
2016	3	362	316	7	89%
2017	19	2371	2112	26	90%
2018	2	243	225	5	95%

Source: Volusia/Flagler Turtle Patrol

Table 8. Leatherback sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	3	253	138	6	57%
2012	3	280	110	1	40%
2013	1	82	11	0	13%
2016	1	91	62	1	69%
2017	1	90	82	2	93%
2018	2	157	121	0	77%

Source: Volusia/Flagler Turtle Patrol

3.4.1.2 Sea Turtle Nearshore Habitat

On July 10, 2014, NMFS designated specific areas in the neritic environment as critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtles; effective August 11, 2014 (79 FR 39855). Specific areas for designation included 38 occupied marine areas within the range of the Northwest Atlantic Ocean DPS with Physical or Biological Features (PBFs) and Primary Constituent Elements (PCEs) identified for loggerhead neritic habitat. Neritic habitat designated by NMFS "consists of the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 m (656 ft), including inshore bays and estuaries" (NMFS, 2014). The PBFs and PCEs of neritic habitat occur in five habitat categories: nearshore reproductive, foraging, winter, breeding, and constricted migratory. NMFS nearshore reproductive Critical Habitat Unit LOGG-N-15 spans from the northern Flagler County line south into Volusia County (**Figure 10**).

3.4.2 North Atlantic Right Whale

The North Atlantic right whale (*Eubalaena glacialis*) is a federally-listed endangered aquatic mammal protected under the Endangered Species Act. It was listed by NMFS on June 2, 1970 (35 FR 8495). The North Atlantic right whale is considered the world's most endangered large whale with a total population of approximately 458 individuals in the western Atlantic in 2015 (Pace et al., 2017). The eastern Atlantic population is nearly extinct (NMFS, 2005). North Atlantic right whales may be found in ocean waters along the east coast Atlantic seaboard from December through March as they gather on coastal and shelf calving grounds along the coast of Georgia and Florida. Migrations south to the calving grounds occur by pregnant females during mid-November (Kraus and Rolland, 2007). The southeastern United States (Altamaha River, Georgia to Sebastian Inlet, Florida) was designated as Critical Habitat for the North Atlantic right whale because of these calving grounds in June 1994 (NMFS, 2005). In the late winter and early spring, right whales leave the southeast waters and travel north to a feeding and nursery areas in Cape Cod Bay, Massachusetts (Kraus and Rolland, 2007). In August 2017, an Unusual Mortality Event (UME) was declared by NMFS with 12 mortalities occurring since June 7, 2017. Most occurred in Canada; none were off the coast of Florida.

Wintering and calving grounds occur in the southeastern United States, while feeding and nursery grounds occur in the north western Atlantic. North Atlantic right whales feed on zooplankton, primarily copepods. Physical oceanographic features and the topography of feeding areas play a major role in where right whales preferably skim waters to filter zooplankton. Cool water temperatures and deep-water depths (100-200 m) adjacent to steep sloping topography are preferable areas for feeding (NMFS, 2005; Winn et al., 1986; Clapham et al., 1999).

Effective February 26, 2016, critical habitat for the North Atlantic right whale was revised to include two new areas in the Gulf of Maine and Georges Bank region (Unit 1) and the Southeast U.S. coast (Unit 2) (50 CFR Part 226) which includes the beach fill areas in the PAA (**Figure 11**).

North Atlantic right whales occur offshore of Flagler County. Right whale sightings by the Marineland Right Whale Project from 2001 through 2011 are shown in **Figure 12**. There are numerous reports of right whales immediately offshore of the beach fill areas of both mother and calf and individual and group sightings (**Figure 13**). The sightings span from November 29 through March 29 for the period of January 1, 2009 through June 10, 2019. Most sightings occur in January and February. The offshore borrow area, FCBA, is located outside of critical habitat (**Figure 13);** however, the project vessels transit corridor will extend through Critical Habitat Unit 2. Fewer sightings are reported near the borrow area, potentially due to its more remote location approximately 10 NM offshore.

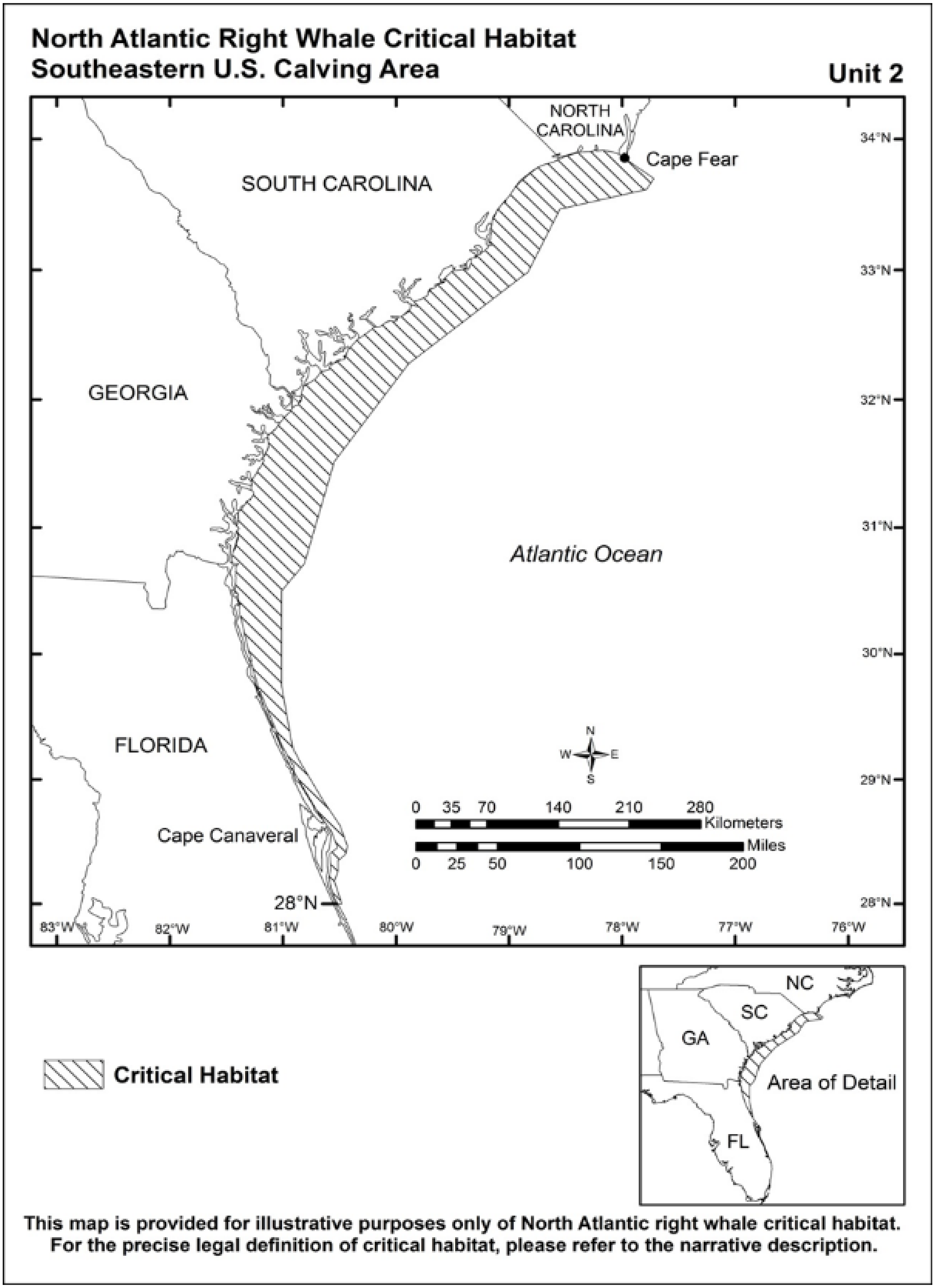

Figure 11. North Atlantic Right Whale Critical Habitat Unit 2. Source: NMFS, 2016.

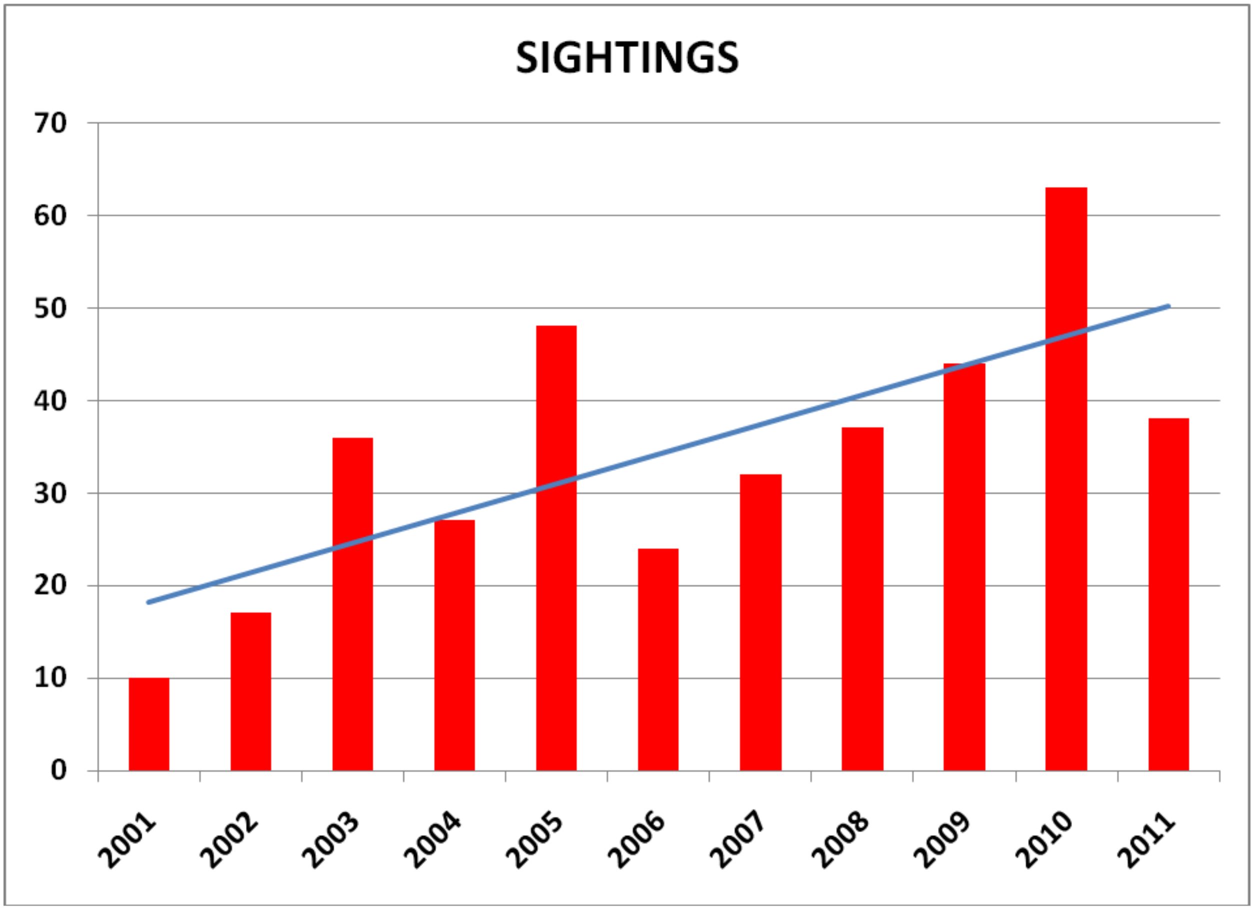

Figure 12. Marineland Right Whale Project Data. The number of total whale sightings per year, including a simple linear trend line. Source: Associated Scientist at Woods Hole, Inc Marineland Right Whale Project (USACE, 2015).

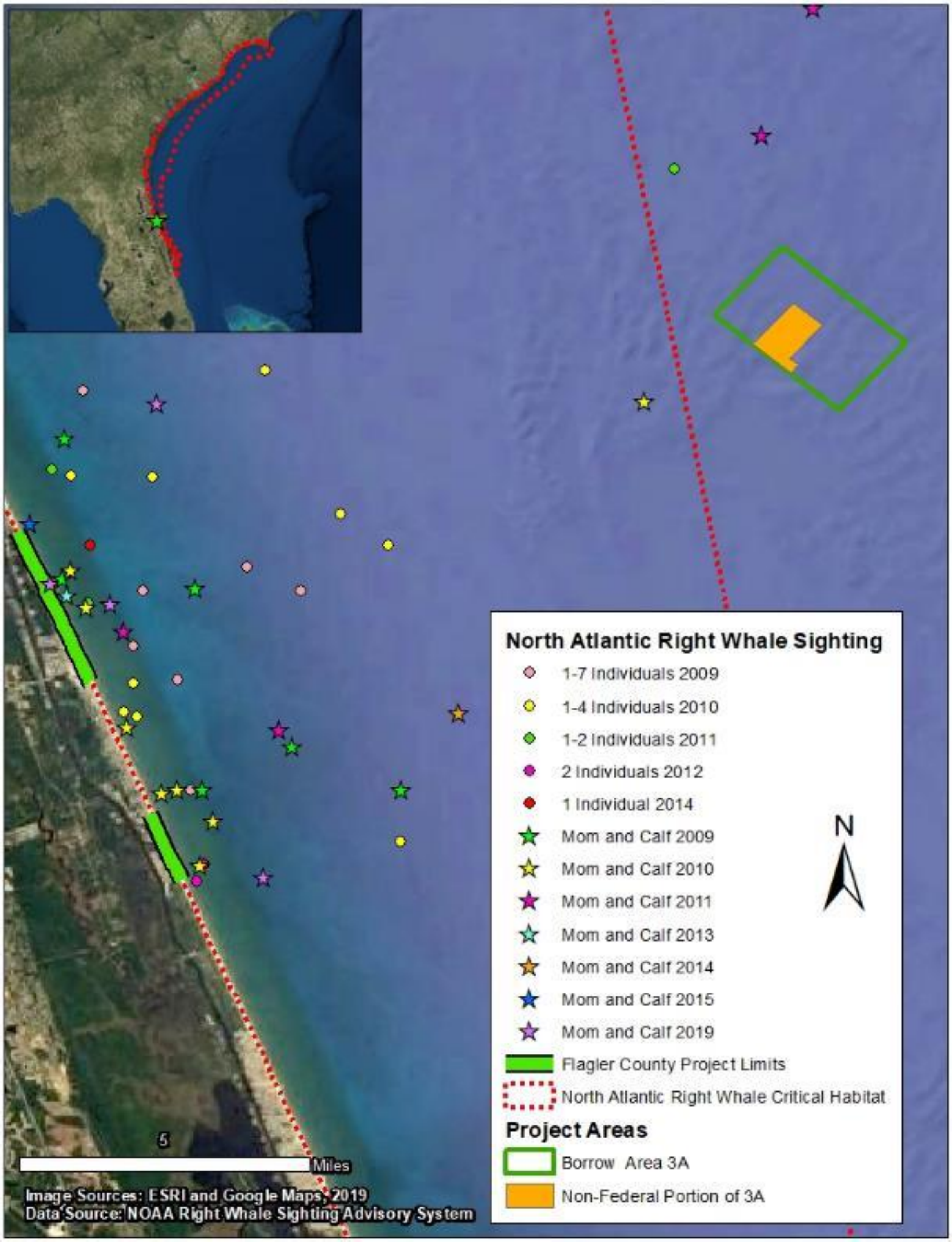

Figure 13. North Atlantic right whale sightings, January 1, 2009 through June 9, 2019. Source: NOAA Right Whale Sighting Advisory System (2019).

3.4.3 Piping Plover

The piping plover (*Charadrius melodus*) is a federally-listed threatened migratory shorebird that is endemic to North America. This species was listed by the USFWS as threatened on January 10, 1986. Much of the decline in the piping plover population has been attributed to habitat destruction, disturbance by humans and pets, and predation. In order to reduce the threat of population decline, the USFWS designated areas along the southeast US coastline as critical habitat for wintering piping plovers, which provides necessary protection for this species during migration and residency on wintering grounds. Critical habitat for piping plover in its wintering range was designated on July 10, 2001 (66 FR 17; 36038-36143); it includes the land from the seaward boundary of mean low low water (MLLW) to where densely vegetated habitat, not used by the species, begins and where the constituent elements no longer occur. One hundred thirty-seven (137) areas along the coasts of North Carolina, South Carolina Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas were designated as critical habitat for the wintering piping plover. There is no federally designated piping plover critical habitat in the project area. Although this species does not breed in Florida, wintering habitat is present. The closest critical habitat is the Ponce de Leon Inlet Unit FL-34 located approximately 26 miles south of the PAA (USFWS, 2001).

The USFWS Programmatic Piping Plover Biological Opinion (P^3BO) for wintering piping plover and its designated critical habitat, dated May 22, 2013, identified all Federal, State, and County publicly owned land within one mile of an inlet as Optimal Piping Plover Areas. The definition of an Optimal Piping Plover Area includes the statement that coastal processes are allowed to function mostly unimpeded within these areas. Matanzas Inlet is approximately 17 miles north of the project area, and the Ponce de Leon inlet is approximately 26 miles south of the project area. Therefore, the project aera is not location within an Optimal Piping Plover Area.

Piping plovers overwinter along the majority of the Florida coastline. Suitable wintering habitat for piping plover consists of intertidal beaches, mudflats, sandflats, dunes, offshore spoil islands, lagoons, and salt marshes, where birds roost and forage for invertebrates such as polychaetes, insect larvae, crustaceans, and mollusks.

Piping plover were not documented in the February USFWS wintering shorebird surveys in Flagler County from 2014 through 2019. The beach sand in Flagler County may not provide the foraging habitat needed by this species (per. comm. with Billy Brooks, USFWS, 2019). Three individuals were observed by USACE biologists in August 2011 on the upper beach in Gamble Rogers SRA at R-95 (USACE, 2015).

Figure 14 shows piping plover sightings reported to eBird between January 1, 2014 and May 21, 2019 between R-65 and R-100; this range includes the Federal nourishment project area which is authorized under a separate permit. There were only two days, both in 2015, where piping plovers were recorded. On September 28, one bird was reported, and on February 8, four birds were reported. The typical wintering stopover for piping plover lasts from October to March (Doonan et. al, 2006).

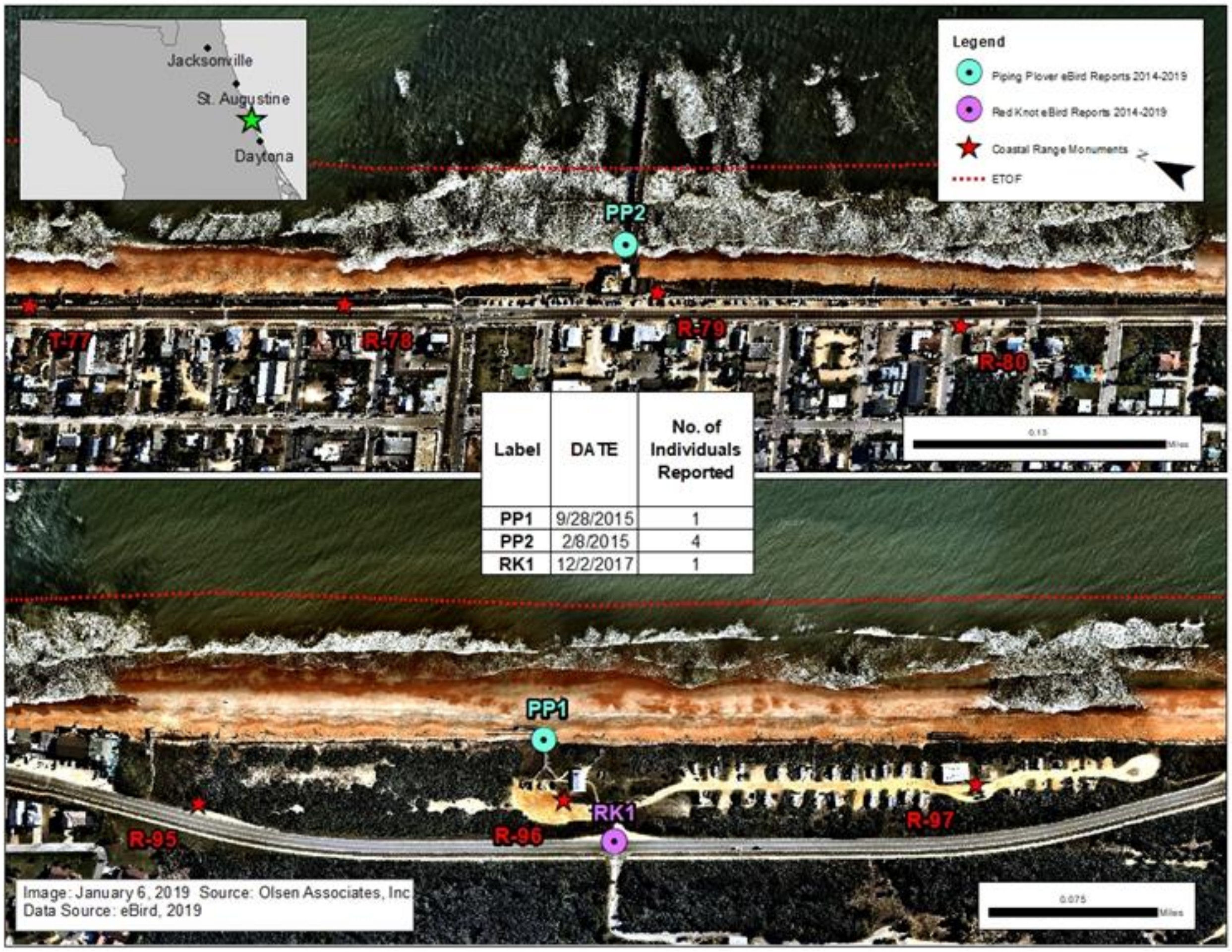

Figure 14. Wintering piping plover and red knot sightings in the Flagler Beach PAA – January 1, 2014 through May 21, 2019.

3.4.4 Red Knot

The rufa red knot (*Calidris canutus rufa*) was listed as threatened throughout its range by the USFWS on December 11, 2014 (79 FR 73705); the final rule became effective on January 12, 2015. In the last 15 years, the overall population of red knots has declined approximately 85%, decreasing from an estimated 150,000 individuals to approximately 25,000 (Schwarzer, 2011; Thibault and Levisen, 2013). The final rule identifies the loss of breeding and non-breeding habitats as a result of sea level rise, shoreline stabilization, and Arctic warming; reduced prey availability; increased predation in breeding habitat; and increased frequency and severity of asynchronies in the timing of annual migrations as the basis for the listing of threatened. There is no designated or proposed critical habitat for the rufa red knot at this time.

Red knots are observed in Florida year-round, although they are most frequently documented between November and May (Niles et al., 2008). Surveys of wintering red knot populations in Florida during 2005-2006 revealed a statewide abundance of approximately 4,000 individuals (Niles et al., 2008). Florida wintering populations are concentrated on the west coast in the Tampa Bay area and on the east coast north of

Cape Canaveral. No critical areas for species survival have been described in Flagler County, and sightings in the project area are rare.

Red knots were not documented in the February USFWS wintering shorebird surveys in Flagler County from 2014 through 2019, and the beach sand in Flagler County may not support the foraging habitat needed by this species (per. comm. with Billy Brooks, USFWS, 2019). **Figure 14** shows eBird reports of red knots from January 1, 2014 through May 21, 2019 between R-65 and R-1. The only red knot sighting reported in the eBird database occurred on December 2, 2017; a single red knot was reported just south of R-96 in the south fill area for the Local project. The coordinates of the sighting are well landward of the project fill limits and existing dune. The USACE Integrated Study (2015) reported the most recent sighting in 2007 in Gamble Rogers SRA. The likelihood of red knots occurring on the beaches throughout Flagler County is very low (USACE, 2015).

3.4.5 Other Protected Marine Mammals

All marine mammals that may be present in waters offshore of Flagler County are protected under the Marine Mammal Protection Act of 1972 and/or the Endangered Species Act of 1973. Rare, threatened, or endangered marine mammal species that may occur within the coastal waters off Flagler County during their migration patterns include bottlenose dolphin (*Tursiops truncates*), sperm whale (*Physeter macrocephalus*), humpback whale (*Megaptera novaeangliae*), fin whale (*Balaenoptera physalus*), sei whale (*Balaenoptera borealis*), and blue whale (*Balaenoptera musculus*). These whale species are generally restricted to shelf waters while feeding or breeding or where deep water approaches the coast. It is unlikely that these whale species would be found in the vicinity of the borrow site due to its relatively shallow water depths. The applicant will adhere to all marine mammal safety precautions outlined in the NMFS SARBO (2020).

Although generally reported as rare, little is known about the population size of pygmy sperm whales (*Kogia breviceps*) along the Atlantic coast, particularly because of their offshore distribution and uncertainty in species identification. The species is not listed as endangered or threatened under the ESA due to insufficient information with which to assess population trends (NMFS, 1999). Pygmy sperm whales commonly beach themselves on southeast Florida beaches, and approximately 20 to 30 strandings are recorded each year within the State of Florida (Odell, 1991). Short-finned and long-finned pilot whales (*Globicephala* spp.) also strand along the beaches of southeast Florida. Similar to the status of the pygmy sperm whale, pilot whales are not listed under the ESA or by the State of Florida due to insufficient data to determine population trends (NMFS, 1999).

3.5 FISH AND WILDLIFE RESOURCES

3.5.1 Beach and Dune Habitat

Native and migratory shorebirds may occasionally use the project area for foraging and resting. Terns (*Sterna* spp.), gulls (*Larus* spp.), sandpipers (*Tringa*, *Calidris* and *Actitis* spp.), plovers (*Charadrius* spp. and *Pluvialis* spp.), skimmers (*Rynchops niger*), turnstones (*Arenaria interpres*), oystercatchers (*Haematopus palliatus*), sanderling (*Calidria alba*), dunlin (*Calidris alpine*), short-billed and long-billed dowitchers (*Limnodromus griseus* and *L. scolopaceus*), and willet (*Catoptrophorus semipalmatus*) are common shorebirds that utilize Florida's beaches for resting and feeding (Audubon, 2011).

3.5.2 Nearshore Soft Bottom Community

The shallow subtidal soft bottom habitat [< 3 ft (1 m)] contains a dense population of benthic invertebrates. In Florida, these environments are often dominated by a relatively even mix of polychaetes (primarily spionids), gastropods (*Oliva* sp., *Terebra* sp.), portunid crabs (*Arenaeus* sp., *Callinectes* sp., and *Ovalipes* sp.) and burrowing shrimp (*Callianassa* sp.). In slightly deeper water [3 to 10 ft (1 to 3 m)], the dominant fauna are polychaetes, haustoriid and other amphipod groups, and bivalves (*Donax* spp. and *Tellina* sp.) (Marsh et al., 1980; Goldberg,1985; Gorzelany and Nelson, 1987; Nelson, 1985; Dodge et al., 1991). Three key beach-habitat indicator species are identified by Florida's Comprehensive Wildlife Conservation Strategy and inhabit Florida's nearshore softbottom areas: mole crabs (*Emerita talpoida*), ghost crabs (*Ocypode quadrata*), and coquina clams (*Donax* spp.). Ghost crabs forage and burrow along the upper portion of the beach while the mole crab and coquina clams are suspension feeders that burrow within the swash zone of the beach. All three indicator species are preyed upon by shorebirds and fish and are fundamentally important to the functions of the beach biological community (Peterson et al., 2000).

3.6 ESSENTIAL FISH HABITAT

The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) requires identification of habitats needed to create sustainable fisheries and comprehensive fishery management plans with habitat inclusions. The Act also requires preparation of an EFH assessment and coordination with the NMFS when EFH impacts occur. EFH is defined by Congress in the MSFCMA as "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The act requires federal agencies to consult on activities that may adversely influence EFH designated in the Fishery Management Plans (FMP). Activities having direct (e.g., physical disruption) or indirect (e.g., loss of prey species) effects on EFH must be addressed, and activities may be site specific or habitat wide. Any adverse result(s) must be evaluated individually and cumulatively.

The Flagler Beach Dune/Beach Restoration Project area falls under the jurisdiction of the South Atlantic Fisheries Management Council (SAFMC) which is responsible for the conservation and management of fish stocks within the federal 200-mile limit of the Atlantic Ocean off the coasts of North Carolina, South Carolina, Georgia, and the Florida Atlantic coast to Key West. The SAFMC currently manages eight fisheries: coastal migratory pelagics, coral and live bottom habitat, dolphin and wahoo, golden crab, shrimp, snapper/grouper, spiny lobster, and *Sargassum*. Of these eight fisheries, the Snapper-Grouper complex was listed as overfished in the original habitat plan for the South Atlantic Region (SAFMC, 1998). As of 2019, the SAFMC states that, because of the mixed species nature of the Snapper-Grouper complex, management of this fishery as a whole is very challenging and the condition of many species in the complex is unknown (SAFMC, 2019). Recreational and commercial Snapper-Grouper fisheries are highly regulated, and progress continues to be made as more species are removed from the overfished list each year. Management of the Atlantic Red Drum was transferred from the SAFMC to the Atlantic States Marine Fisheries Commission (ASMFC) in 2008 as 100% of the catch is taken in state waters.

The SAFMC broadly defines EFH habitats for all managed fisheries in a generic management plan amendment which contains life stage based EFH information for each of the managed species. EFH identified in fisheries management plans (FMP) Amendments of the SAFMC are listed in **Table 9** (SAMFC, 1998). **Table 10** outlines general habitat types identified as EFH or Habitat Area of Particular Concern (HAPC) for the fisheries managed by the SAFMC (NMFS, 2017). The PAA encompasses only marine/offshore habitats associated with the Water Column EFH and soft bottom habitat EFH. The FCBA is located within Snapper-Grouper and Spiny lobster EFH and encompasses elongated unconsolidated sand ridges typically occurring in water depths of -56 ft NAVD88 to -61 ft NAVD88 with depths as shallow as -54 ft NAVD88 (**Figure 15**). Within Borrow Area 3A. FCBA occupies roughly 345 acres of seabed, which represents approximately 14% of the overall Borrow Area 3A (2,466 acres). The larger shoal area identified by the USACE as Area 3 in the 2015 Feasibility Study, which contains Borrow Area 3A, spans about 12,000 acres.

In addition to SAFMC designations, the PAA is habitat for the Atlantic Highly Migratory Species which are managed internationally through the International Commission for the Conservation of Atlantic Tunas (ICCAT) and nationally under the Magnuson-Stevens Act through a FMP administered by NOAA Fisheries, Office of Sustainable Fisheries. EFH has been designated and described for over 40 Atlantic Highly Migratory Species. The ASMFC manages two species that may occur in the PAA: Bluefish (*Pomatomus saltatrix*) and Summer Flounder (*Paralichthys dentatus*).

Table 9. South Atlantic Fisheries Management Council EFH.

Estuarine Areas	Marine Areas
Estuarine Emergent Wetlands Estuarine Scrub-Shrub Mangroves Submerged Aquatic Vegetation Oyster Reefs and Shell Banks Intertidal Flats Palustrine Emergent and Forested Wetlands Aquatic Beds Water Column	Live Hardbottom/Worm Reefs Coral and Coral Reef Artificial / Manmade Reefs Sargassum Water Column

Table 10. South Atlantic Fisheries Management Council general habitat types identified as EFH or HAPC. Project area habitats are highlighted in gray.

Essential Fish Habitat	**Fisheries/Species**	**HAPC's**
Wetlands		
Estuarine and marine emergent wetlands	Shrimp, Snapper-Grouper	Shrimp: state designated nursery habitats and mangrove wetlands
Tidal palustrine forested wetlands	Shrimp	
Submerged Aquatic Vegetation		
Estuarine and marine submerged aquatic vegetation	Shrimp, Snapper-Grouper, Spiny Lobster	Snapper-Grouper, Shrimp
Shell bottom		
Oyster reefs and shell banks	Snapper-Grouper	Snapper-Grouper
Coral and Hardbottom		
Coral reefs, live/hardbottom, medium to high rock outcroppings from shore to at least 183 meters.	Snapper-Grouper, Spiny Lobster, Coral, Coral Reefs and Live Hard/bottom Habitat	The Point, Ten Fathom Ledge, and Big Rock, marine protected areas; worm reefs off central east coast of Florida and nearshore hardbottom; coral and hardbottom habitat from Jupiter through the Dry Tortugas, FL; Deepwater Coral HAPCs
Rock overhangs, rock outcrops, manganesephosphorite rock slab formations, and rocky reefs		Blueline Tilefish (in Snapper-Grouper)
Artificial reefs	Snapper-Grouper	Special Management Zones
Soft bottom		
Subtidal, intertidal non-vegetated flats	Shrimp	
Offshore marine habitats used for spawning and growth to maturity	Shrimp	
Sandy shoals of capes and offshore bars	Coastal Migratory Pelagics	Sandy shoals; Cape Lookout; Cape Fear; Cape Hatteras and Hurl Rocks
Troughs and terraces intermingled with sand, mud, or shell hash at depths of 150 to 300 meters		Golden Tilefish (in Snapper-Grouper)
Water Column		
Ocean-side waters, from the surf to the shelf break zone, including Sargassum	Coastal Migratory Pelagics	
All coastal inlets	Coastal Migratory Pelagics	Shrimp, Snapper-Grouper
All state-designated nursery habitats of particular importance	Coastal Migratory Pelagics	Shrimp, Snapper-Grouper
High salinity bays, estuaries	Cobia (in Coastal Migratory Pelagics)	Spanish mackerel: Bogue Sound, New River, NC; Broad River, SC
Pelagic Sargassum	Dolphin	
Gulf Stream	Shrimp, Snapper-Grouper, Coastal Migratory Pelagics, Spiny Lobster, Dolphin-Wahoo	
Spawning area in the water column above the adult habitat and the additional pelagic environment	Snapper-Grouper	

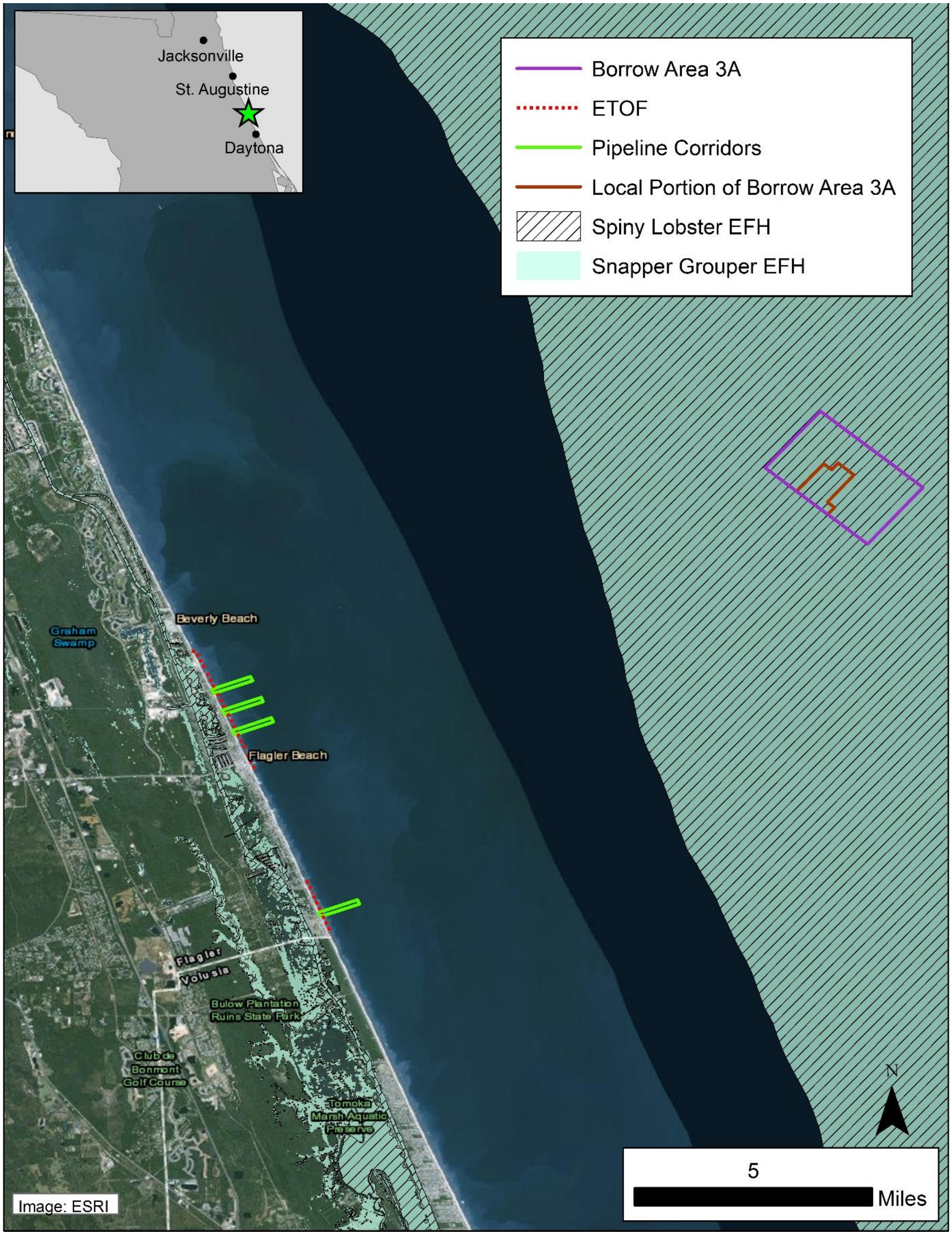

Figure 15. EFH within the PAA for the Local project.

In addition to EFH for each species or group of species, provisions of the MSFCMA also include Habitat Areas of Particular Concern (HAPC). HAPC are ecologically important subsets of identified EFH and are particularly susceptible to anthropogenic degradation. HAPC may include highly sensitive intertidal and estuarine habitats, habitats used for migration, spawning and nursery purposes, and offshore areas of high habitat value or vertical relief. No HAPC occur in the PAA.

Flagler County completed a side-scan survey of the nearshore and four pipeline corridors seaward of the Local project area beach in June 2019 to investigate the possible presence of hardbottom resources in those areas. The side-scan results were diver-verified by CEG marine scientists in July 2019 (see **Section 3.2.1**). No hardbottom resources were found along the nearshore or pipeline corridors for the Local project. The bottom consisted of sand and or shell hash in the nearshore areas (see **Photo 3**) and muck in the areas further offshore in the pipeline corridors.

3.6.1 MARINE WATER COLUMN

The SAFMC designates the marine water column as EFH. Specific habitats in the water column can best be defined in terms of gradients and discontinuities in temperature, salinity, density, nutrients, light, etc. These 'structural' components of the water column environment exhibit spatial and temporal variability. Therefore, there are various and potentially distinct water column habitats for a broad range of species and life stages within species (SAFMC, 2014). Most marine fish and shellfish broadcast spawn pelagic eggs and therefore most species utilize the marine water column during some portion of their life cycle.

3.6.1.1 Coastal Migratory Pelagics **(Table 11)**

Gilmore et al. (1981) reported 91 species from the surf zone habitat of the South Atlantic region; 62 of these species were coastal pelagic. The major coastal migratory pelagic families occurring in nearshore waters of eastern Florida are requiem sharks (Carcharhinidae), eagle and cownose rays (Myliobatidae), ladyfish (Elopodae), tarpon (Magelapodae), anchovies (Engraulidae), herrings (Clupeidae), mackerels (Scombridae), jacks and pompanos (Carangidae), mullets (Mugilidae), bluefish (Pomatomidae), and cobia (Rachycentridae) (SAFMC, 1998). Fall and winter are commonly the times of peak activity in the coastal pelagic environment, but species migrate over shelf waters of the nearshore and surf zone throughout the year. Some species travel singularly or in small groups, like tarpon, and cobia. Other species form large schools, such as cownose rays, anchovies, herrings, and mullets (SAFMC, 1998).

Larger predatory species particularly sharks, Tarpon, Bluefish (*Pomatomus saltatrix*), and Crevalle Jack (*Caranx hippos*) may be attracted to aggregations of anchovies, herrings, and mullets that typically occur in nearshore areas in late summer or fall. The local distribution of most species depends on water temperature and quality, especially turbidity that fluctuates seasonally (Gilmore, 2001). Rapid drops in air temperature and atmospheric pressure associated with passing cold fronts often initiate southerly migrations of managed coastal pelagic species including Spanish Mackerel (*Scomberomorus maculatus*) and Bluefish along the Florida coast.

Table 11. Fishery Management Plans (FMP) and managed species for the SAFMC (revised 1/2019). A=species managed by the Atlantic States Marine Fisheries Commission.

Fishery Management Plan		Common Name	Scientific Name
Snapper-Grouper FMP	Sea Basses and Groupers (Serranidae) 20 species	Bank Sea Bass	*Centropristis ocyurus*
		Black Grouper	*Mycteroperca bonaci*
		Black Sea Bass	*Centropristis striata*
		Coney	*Cephalopholis fulva*
		Gag	*Mycteroperca microlepis*
		Goliath Grouper	*Epinephelus itajara*
		Graysby	*Cephalopholis cruentata*
		Misty Grouper	*Epinephelus mystacinus*
		Nassau Grouper	*Epinephelus striatus*
		Red Grouper	*Epinephelus morio*
		Red Hind	*Epinephelus guttatus*
		Rock Hind	*Epinephelus adcensionis*
		Rock Sea Bass	*Centropristis philadelphica*
		Scamp	*Mycteroperca phenax*
		Snowy Grouper	*Epinephelus niveatus*
		Speckled Hind	*Epinephelus drummondhayi*
		Warsaw Grouper	*Epinephelus nigritus*
		Yellowedge Grouper	*Epinephelus flavolimbatus*
		Yellowfin Grouper	*Mycteroperca venenosa*
		Yellowmouth Grouper	*Mycteroperca interstitialis*
	Snappers (Lutjanidae) 10 species	Blackfin Snapper	*Lutjanus buccanella*
		Cubera Snapper	*Lutjanus cyanopterus*
		Gray Snapper	*Lutjanus griseus*
		Lane Snapper	*Lutjanus synagris*
		Mutton Snapper	*Lutjanus analis*
		Queen Snapper	*Etelis oculatus*
		Red Snapper	*Lutjanus campechanus*
		Silk Snapper	*Lutjanus vivanus*
		Vermilion Snapper	*Rhomboplites aurorubens*
		Yellowtail Snapper	*Ocyurus chrysurus*
	Porgies (Sparidae) 7 species	Jolthead Porgy	*Calamus bajonado*
		Knobbed Porgy	*Calamus nodosus*
		Longspine Porgy	*Stenotomus caprinus*
		Red Porgy	*Pagrus pagrus*
		Saucereye Porgy	*Calamus calamus*
		Scup	*Stenotomus chrysops*
		Whitebone Porgy	*Calamus leucosteus*

Table 11. (cont.) Fishery Management Plans (FMP) and managed species for the SAFMC (revised 1/2019). A=species managed by the Atlantic States Marine Fisheries Commission.

Fishery Management Plan Name		Common Name	Scientific Name
Snapper-Grouper FMP	Grunts (Haemulidae) 5 species	Cottonwick	*Haemulon melanurum*
		Margate	*Haemulon album*
		Sailor's Choice	*Haemulon parra*
		Tomtate	*Haemulon aurolineatum*
		White Grunt	*Haemulon plumieri*
	Jacks (Carangidae) 5 species	Almaco Jack	*Seriola rivoliana*
		Banded Rudderfish	*Seriola zonanta*
		Bar Jack	*Caranx ruber*
		Greater Amberjack	*Seriola dumerili*
		Lesser Amberjack	*Seriola fasciata*
	Tilefishes (Malacanthidae) 3 species	Blueline Tilefish	*Caulolatilus microps*
		Sand Tilefish	*Malacanthus plumier*
		Golden Tilefish	*Lopholatilus chamaeleonticeps*
	Triggerfishes (Balistidae) 2 species	Gray Triggerfish	*Balistes capriscus*
		Ocean Triggerfish	*Canthidermis sufflamen*
	Wrasses (Labridae) 1 species	Hogfish	*Lachnolaimus maximus*
	Spadefishes (Eppiphidae) 1 species	Atlantic Spadefish	*Chaetodipterus faber*
	Wreckfish (Polyprionidae) 1 species	Wreckfish	*Polyprion americanus*
		King Mackerel	*Scomberomorus cavalla*
		Spanish Mackerel	*Scomberomorus maculatus*
Highly Migratory Species FMP		Little Tunny	*Euthynnus alletteratus*
		Bigeye Tuna	*Thunnus obesus*
		Bluefin Tuna	*Thunnus thynnus*
		Blue Marlin	*Makaira nigricans*
		Sailfish	*Istiophorus platypterus*
		Swordfish	*Xiphias gladius*
		White Marlin	*Tetrapturus albidus*
		Yellowfin Tuna	*Thunnus albacares*
		Sharks-several species	
Dolphin-Wahoo FMP		Dolphin Fish	*Coryphaena hippurus*
		Wahoo	*Acanthocybium solanderi*
Bluefish FMP (A)		Bluefish	*Pomatomus saltatrix*
Summer Flounder FMP (A)		Summer Flounder	*Paralichthys dentatus*
Shrimp FMP		Brown Shrimp	*Farfantepenaeus aztecus*
		Pink Shrimp	*Farfantepenaeus duorarum*
		Rock Shrimp	*Sicyonia brevirostris*
		Royal Red Shrimp	*Pleoticus robustus*
		White Shrimp	*Litopenaeus setiferus*
Golden Crab FMP		Golden Crab	*Chaceon fenneri*
Spiny Lobster FMP		Spiny Lobster	*Panulirus argus*
Coral, Coral Reefs, and Live/Hard Bottom Habitat FMP		Sea Fans, Whips, Precious Corals, Sea Pens And Scleractinian Corals	*Class Anthozoa*
		Fire Corals And Hydrocorals	*Class Hydrozoa*
Sargassum FMP		Sargassum	*Sargassum fluitans*
			Sargassum natans

Due to their distribution throughout the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, Highly Migratory Species (HMS) such as Atlantic tunas (8 species), swordfish (2 species), sharks (73 species), and billfish (4 species) are managed on the national level by NMFS, not the SAFMC. Management of these species was combined into a single Consolidated Atlantic Highly Migratory Species Fishery Management Plan (Consolidated HMS FMP) by NMFS in 2006 (NMFS, 2006). EFH for highly migratory species was updated in Amendment 1 in 2009, and the review process was re-initiated in late 2013. All of these species have the potential to occur in the PAA, although their highly mobile and migratory nature would make them transient, and individuals have the ability to avoid activity in the project area during project construction.

Coastal sharks commonly occur in inshore or nearshore waters. NMFS managed species that may occur in the study area include Blacknose (*Carcharhinus acronotus*), Spinner (*C. brevipinna*), Bull (*C. leucas*), Dusky (*C. obscurus*), Sandbar (*C. plumbeus*), Tiger (*Gaelocerdo cuvier*), Sand Tiger (*Carcharias taurus*), Bonnethead (*Spyrna tiburo*), and Lemon (*Negaprion brevirostris*). Sharks and rays reproduce through internal fertilization and bear live young or eggs in shelf or inshore waters (species dependent). Females often seek shallow water before releasing live pups or depositing eggs (NMFS, 1999a). Sharks are opportunistic scavengers for much of their lives, feeding in both the water column and on the bottom. Ideal EFH identified by NMFS (1999a) for shark species include coastal waters within the study area of less than 82-foot (25 meter) depths (SAFMC, 1998).

Coastal pelagic fishes, excluding rays and sharks typically spawn in open shelf waters that result in planktonic eggs and larvae. As larvae transform into juveniles, some may enter inshore estuarine habitats while others, like the Florida pompano, migrate into shallow nearshore where they will remain until obtaining a certain size or age (SAFMC, 1998). Most coastal pelagic fishes feed in the water column on nekton (drifting organisms) or plankton. Diets of individual species diversify with size and age based upon the corresponding forage morphology of body shape and jaw mechanism. For example, mackerels and jacks change from an early diet of zooplankton-feeding larvae to an opportunistic adult diet consisting of pelagic and benthic organisms. Some species like juvenile and adult pompano, feed mostly on benthic organisms including clams, mole crabs, and other crustaceans. Coastal pelagic species managed by SAFMC include the Cero (*Scomberomorus regalis*), King Mackerel (*S. cavalla*), Spanish Mackerel (*S. maculates*), and Little Tunny (*Euthynnus alletteratus)* (SAFMC, 1998). For the coastal pelagic species, EFH includes sandy shoals of capes and offshore bars, high profile rocky bottom, and barrier island ocean-side waters from the surf zone to the shelf break zone, as well as all coastal inlets and state designated nursery habitats of particular importance to coastal migratory pelagic (SAFMC, 1998).

<u>King Mackerel (*Scomberomorus cavalla)*</u>

King Mackerel are reef-associated fish, often occurring in clear waters over outer reef areas, and inshore and continental shelf waters (Collette and Nauen, 1983). This species feeds primarily on fishes, with smaller portion of its diet coming from penaeid shrimp and squid. Large schools have been found to migrate over considerable distances along the Atlantic US coast, when water temperatures allow. It is an important species for recreational and commercial fisheries throughout its range and is valued as a sport fish year round in Florida. Juveniles may occur in inshore seagrass beds (SAFMC, 2014a).

Spanish Mackerel (*Scomberomorus maculatus*)
Spanish Mackerel are epipelagic, typically residing in deeper waters; however, they are often found near the surface in large schools (FLMNH, 2014). Spanish Mackerel frequently occur around barrier islands and in the passes between the islands. The larvae occur offshore with juveniles residing both offshore and nearshore in beach surf. Spanish Mackerel feed primarily on small fish, including herrings, jacks, and sardines, as well as shrimp and squid. This species is known to migrate in large schools over great distances along the shoreline. While the King Mackerel is valued in sport fishing all year long, the Spanish Mackerel is fished primarily in the winter months (SAFMC, 2019a).

3.6.1.2 Atlantic Highly Migratory Species (**Table 12**)

Atlantic Sharpnose Shark (*Rhizoprionodon terraenovae*)
The Atlantic Sharpnose Shark is common in warm-temperate and tropical waters from the Bay of Fundy in the north, south to the Yucatan, as well as along the coast of Brazil. This species is a year-round resident off the coast of South Carolina and Florida and is known to seasonally migrate between inshore and offshore waters; sharks move offshore in the winter and return inshore in the spring to mate and give birth (FLMNH, 2014a). Atlantic Sharpnose Sharks are commonly found in the surf zone, as well as in estuaries and harbors. Despite its ability to tolerate lower salinity levels, the Atlantic Sharpnose Shark does not enter freshwater (FLMNH, 2014a). This species primarily feeds on small fish, including menhaden, eels, silversides, wrasses, jacks, toadfish, and filefish, as well as worms, shrimp, crabs, and mollusks.

Blacknose Shark (*Carcharhinus acronotus*)
The Blacknose Shark has a limited distribution, occurring only in the western Atlantic Ocean from North Carolina south to southern Brazil, including the Bahamas, Gulf of Mexico and the Caribbean Sea. This species is found inshore in coastal tropical and warm temperate waters over sandy and coral bottoms. Blacknose Sharks are commonly found year-round off the Florida coast. Their diet includes small fishes, such as pinfish, croakers, porgies, anchovies, spiny boxfishes, and porcupinefish. Blacknose Sharks are also known to feed on octopus. Blacknose Sharks are relatively small with an average length of 4.1 ft. and a maximum length of 4.6 ft. Maturity is reached at approximately two years of age for both males and females and life expectancy ranges from 10-16 years for females and 4.5-9 years for males. Mating typically occurs in late May/early June with a 10-11 month gestation period (FLMNH, 2014b).

Blacktip Shark (*Carcharhinus limbatus*)
Blacktip Sharks are circumtropical, occurring in coastal, shelf and island waters. In the western Atlantic Ocean, this species ranges from New England, where it is rare, south to Florida, including the Gulf of Mexico and Caribbean Sea (FLMNH, 2014c). Blacktip Sharks occur both inshore and offshore, however this species is not a true pelagic

species. These sharks are common in nearshore waters around bays, mangrove swamps, river mouths, and other estuaries, as well as offshore in deeper waters near coral reefs. Blacktip Sharks often form large schools that migrate seasonally north-south along the coast (NMFS, 2006). Female sharks migrate inshore to estuarine nursery grounds to give birth and the pups remain in these inshore waters for the first year of their lives.

Bonnethead Shark (*Sphyrna tiburo*)

Limited to warm waters in the Northern Hemisphere, the Bonnethead Shark range in the Atlantic Ocean is from New England south to the Gulf of Mexico and throughout the Caribbean Sea. A small shark species (< 3.3 ft.) that inhabits shallow coastal waters, the Bonnethead is found off the Carolinas and Georgia coastlines during the spring and summer, moving south to the warmer waters off the Florida coastline during winter. Bonnetheads tend to group by gender in small schools of up to 15 individuals and mate during the spring and fall or perhaps even year-round in Florida waters. The gestation period is approximately four to five months, the shortest among all shark species. This species is at a low risk due to its high population numbers by the World Conservation Union (IUCN) (FLMNH, 2014d).

Bull Shark (*Carcharhinus leucas*)

The Bull Shark is a large, shallow water species that inhabits temperate seas and estuaries. Bull Sharks prey on a variety of ray-finned fishes as well as other elasmobranchs. Very little is known about the Bull Shark life cycle, however females generally have a longer lifespan of about 16 years, compared to 12 years for males. Major nursery areas have been identified as low-salinity estuaries including the Indian River Lagoon, Florida where young Bull Sharks reside until they are about 9 years old, and then move into adult habitat offshore (FLMNH, 2012e). Although rare, gravid females and juvenile Bull Sharks have been documented in South Carolina estuaries (Castro, 1993). Bull Sharks constitute 18 percent of the shark catch in the directed shark fishery of the Central Gulf coast of Florida and were reported to be the seventh most commonly taken shark in Melbourne Beach, Florida (FLMNH, 2012f). Bull Sharks are vulnerable to overfishing because of their slow growth and limited reproductive potential.

Dusky Shark (*Carcharhinus obscurus*)

The Dusky Shark, a species of special concern from Florida to Massachusetts, is common throughout temperate and tropical waters occurring from the surf zone to well offshore to depths up to 400 m (NMFS, 2014a). The average maximum life span is approximately 40 years with reproduction occurring every 3 years either between June and July or December and January. Their diet includes squid, and bony and cartilaginous fishes. The Dusky Shark undergoes long migrations associated with seasonal temperature changes. Currently, the Dusky Shark is prohibited from recreational and commercial possession. However, the Dusky Shark, like many other shark populations, continues to decline due to illegal, longline, and bycatch fisheries (NMFS, 2014a).

Finetooth Shark (*Carcharhinus isodon*)
The Finetooth Shark is distributed throughout the western Atlantic Ocean from North Carolina south through the Gulf of Mexico, including Cuba and the southeastern coast of Brazil. Sighting of Finetooth Shark have been documented in the eastern Atlantic Ocean in Senegal and Guinea-Bissau, however these species have not been confirmed and may be misidentified Spinner Sharks (FLMNH, 2014f). Finetooth Sharks are coastal species, typically found along the shore in depths less than 10 m. Adult and juvenile Finetooth Sharks are common in shallow waters off South Carolina during the summer and migrate to Florida during the winter. This species feeds on small fishes, such as Mullet, Spanish Mackerel, Spot Croaker, and Atlantic Menhaden, as well as marine invertebrates, such cephalopods and crustaceans (FLMNH, 2014f).

Great Hammerhead Shark (*Sphyrna mokarran*)
Great Hammerhead Sharks are circumtropical and the western Atlantic range is from North Carolina south to Uruguay, including the Gulf of Mexico and Caribbean regions. Found in both the open-ocean and shallow coastal waters, the Great Hammerhead migrates seasonally moving to cooler waters during the summer months. The average life span is approximately 20-30 years. The largest adult on record caught off the coast of Sarasota, Florida, weighed 450 kg. As an active predator, the Great Hammerhead feeds on a wide variety of stingray, crabs, squid, octopus, lobsters, groupers, catfishes, jacks, grunts, and flatfishes. Fished both commercially and recreationally, Great Hammerheads are highly valued for their fins while the meat is rarely consumed by humans. The population is vulnerable to overfishing in part due to their biennial reproductive cycle, coastal longline fishing, and as bycatch (FLMNH, 2014g).

Lemon Shark (*Negaprion brevirostris*)
The Lemon Shark is a common tropical shallow water shark, inhabiting coral reefs and shallow northwestern Atlantic Ocean coastal waters from New Jersey to Brazil as well as the Gulf of Mexico and Caribbean waters. The primary U.S. population is found off south Florida, with adults observed in waters north of Virginia in the summer. The majority of their diet consists mainly of bony fish and crustaceans including catfish, mullet, jacks, croakers, porcupine fish, cowfish, guitarfish, stingrays, eagle rays, crabs and crayfish. Gravid females return to shallow nursery grounds during April to September to give birth. Nurseries are generally located in shallow waters around mangrove islands off Florida and the Bahamas (NMFS, 2006a). The Lemon Shark is targeted by longline fishery, commercial and recreational fishermen along the US Atlantic Ocean and Caribbean is also caught as by-catch in both pelagic and gillnet fisheries. Fins are highly prized and there is some concern that the western north Atlantic populations are in decline (FLMNH, 2014h).

Nurse Shark (*Ginglymostoma cirratum*)
Inhabiting littoral waters on both sides of tropical and subtropical Atlantic, Nurse Sharks are a shallow water species often found motionless on sand, under coral reefs or rocks during the day (NMFS, 2006a). However, Nurse Sharks are nocturnal and are very active at night. Large juveniles and adults generally occur around deeper reefs and rocky areas, while young juveniles tend to inhabit shallow coral reefs, grass flats, and

mangrove islands in depths less than 4 meters. Nurse Sharks exhibit site fidelity for resting sites and often return to the same cave or crevice each day (FLMNH, 2014i). The Nurse Shark is an opportunistic predator that consumes a variety of small fishes, primarily grunts. Their reproductive cycle is biennial and mating primarily occurs from mid-June to early July with mating grounds observed in Florida Keys (Castro, 2000). Nurse Shark maximum life span is reported to be 24 years in captivity. Nurseries include shallow turtle grass beds, shallow coral reefs, and around mangrove islands. A small area has been set up for protection of mating sharks at Fort Jefferson in the Dry Tortugas (NMFS, 2006a).

Sand Tiger Shark (*Carcharias taurus*)

Sand Tiger Sharks are found worldwide, with the exception of the eastern Pacific Ocean. In the Western Atlantic Ocean this species is found from the Gulf of Maine south to Argentina (FLMNH, 2014j). Sand Tiger Sharks are commonly found in shallow, coastal waters including the surf zone, shallow bays, coral and rocky reefs, and deeper areas on continental shelves. This species feeds on small fish, including herrings, bluefishes, flatfishes, eels, mullets, snappers, hakes, porgies, croakers, bonito, remoras, sea robins, and sea basses, as well as rays, squid, crabs, lobster and other small sharks. Sand Tiger Sharks are protected by NMFS and regulated in the commercial longline shark fishery along the U.S. east coast.

Sandbar Shark (*Carcharihnus plumbeus*)

The Sandbar Shark is a cosmopolitan species inhabiting temperate and tropical waters. In the Western Atlantic the Sandbar Shark ranges from southern New England south to Florida, the Gulf of Mexico and Brazil and is the most abundant shark species in this region (FLMNH, 2014k). Sandbar Sharks are common in shallow, coastal waters over continental shelves, oceanic banks, and island terraces, as well as harbors, estuaries, and at the mouths of rivers and bays. Primary nursery grounds for the western Atlantic population of sandbar sharks occur in shallow waters along the coast from Long Island, NY to Cape Canaveral, FL (Castro, 1993).

Scalloped Hammerhead (*Sphyrna lewini*)

The Scalloped Hammerhead is a circumglobal coastal pelagic species, and is found in western Atlantic Ocean waters from New Jersey (US) south to Brazil including the Gulf of Mexico and Caribbean waters. Young Scalloped Hammerheads live in large schools while adults tend to be solitary. Seasonal migration occurs along the eastern United States and nursery grounds have been found in nearshore coastal waters off the Atlantic Coastline of South Carolina (Castro, 1993). Scalloped Hammerheads are one of the most common sharks utilizing the estuarine water of the Carolinas and the Gulf of Mexico during the summer months (Castro, 1983; Castro, 1993). Neonates are present off the South Carolina coast as early as May. It has been suggested that due to the few neonates or small juveniles present off the Florida coast, South Carolina may be the center of the nursery for Scalloped Hammerheads (Castro, 1993). The average lifespan is expected to be over 30 years. Scalloped Hammerheads spend the majority of the day closer inshore, moving offshore in search of prey at night. Prey items primarily include teleost fishes and a variety of invertebrates as well as other sharks and rays.

Along with being targeted for their fins, Scalloped Hammerheads experience overfishing via gillnets, longlines and as bycatch in driftnet fisheries (FLMNH, 2014l).

Spinner Shark (*Carcharhinus brevipinna*)
The Spinner Shark, a common coastal pelagic occupying warm-temperate and tropical waters, is found in US waters from North Carolina to the northern Gulf of Mexico. Depth of habitat ranges from 0 m to 100 m (FLMNH, 2014m). The Spinner Shark forms schools off the Florida and Louisiana coastlines moving inshore during spring and summer months to reproduce and feed. The Spinner Shark has its nursery grounds in the shallow waters of the Carolinas and grows approximately 20 cm during the first six months of life in waters off the Florida Atlantic coast. Spinner Sharks are vulnerable to longline fishing pressure in the commercial shark fishery and by-catch in the pelagic longline fishery (FLMNH, 2014m).

Tiger Shark (*Galeocerdo cuvier*)
Tiger Sharks are circumglobal, found both offshore and inshore throughout the world's temperate and tropical waters; with the exception of the Mediterranean Sea (FLMNH, 2014n). This species generally prefers turbid, coastal waters and is common in river estuaries, harbors, and inlets. Tiger Sharks undergo seasonal migrations, moving from temperate water in the warmer months to tropical waters in the cooler months. One of the largest shark species, Tiger Sharks commonly reach lengths of 10 to 14 ft. and weigh over 850 to 1,400 lbs. (FLMNH, 2014n). Tiger Sharks are opportunistic feeders and prey on a variety of sea creatures, including sea turtles, rays, other sharks, boney fishes, sea birds, dolphins, squid, various crustaceans and carrion.

3.6.1.3 Snapper-Grouper Complex

The Snapper/Grouper Management Complex has the greatest species richness of the eight managed fisheries with 55 listed species from 10 families (**Table 11**). Additionally, many of the species in the Snapper-Grouper complex are long-lived, slow growing, and late to mature, making this fishery difficult to manage. Several of the species in this complex are estuarine and nearshore dependent for specific life stages. Essential Fish Habitat for these species includes area inshore of the 200 m isobath, such as submerged aquatic vegetation, estuarine emergent wetlands, tidal creeks, estuarine scrub/shrub, oyster reefs and shell banks, unconsolidated bottom, artificial reefs, and coral reefs and live hardbottom. The EFH that occurs in the proposed project area support various life stages of species in the snapper-grouper complex. Because the Snapper-Grouper Complex is highly diverse and a majority of the species included have the potential to occur within the project area, individual species descriptions will not be provided in this report.

The fisheries and adult habitat of most of these species exist well offshore of the project area; however, young stages of several reef fishes utilize nearshore hardbottom (SAFMC, 1998). Habitats associated with the project area that have been named by SAFMC as EFH for early life stages of reef fishes include macroalgae, unconsolidated sediments, artificial reefs, and live hardbottom. Exposed hardbottom has not been found in the nearshore zone offshore of the project fill area or within the submerged pipeline corridors. Reef fish of importance that are not included in the management by SAFMC include Tarpon (*Megalops atlanticus*), Common Snook (*Centropomus undecimalis*), Striped Croaker (*Bairdiella sanctaeluciae*), Florida Pompano (*Trachinotus carolinus*), Summer Flounder (*Paralichthys dentatus*), and Southern Flounder (*P. lethostigma*). Of these, the Tarpon, Common Snook, and Florida Pompano are managed by the State of Florida. Furthermore, Florida Pompano, Flounder, and Tarpon are considered to be Aquatic Resources of National Importance (ARNI) by the U.S. Environmental Protection Agency (EPA) under jurisdiction of the Clean Water Act Section 404 (q) 1992 Memorandum of Agreement with USACE.

Many marine species in eastern Florida use hardbottom habitat during all or a portion of their life cycle. Fisheries managed by the SAFMC that have EFH designated in demersal hardbottom habitat include the snapper/grouper complex, spiny lobster, and corals. Hardbottom habitats support the most diverse assemblages of fishes off eastern Florida. Gilmore et al. (1981) reported 255 species for offshore reefs and 109 species associated with nearshore hardbottom habitat. The most common fish families occupying hardbottom are groupers (Serranidae), snappers (Lutjanidae), grunts (Haemulidae), porgies (Sparidae), spadefishes (Ephippidae), damselfishes (Pomacentridae), and wrasses (Labridae).

Many reef fishes experience developmental migrations by using a continuum of cross-shelf habitats that are an integral part of their life cycle. Species migrate across the shelf from shallow nursery areas before returning to offshore spawning grounds (SAFMC, 1998). Hardbottom, including nearshore hardbottom, provides the connection for young stages of species making developmental migrations from inshore areas to offshore spawning grounds (Lindeman et al., 2000). Disruption of habitat connections can alter growth and ultimately reproduction of individuals that contribute to local demographic patterns. Other reef fishes such as damselfishes, blennies, and gobies settle onto reefs for the plankton and remain for their entire lives within a very small area of the habitat.

Most reef fishes begin life feeding on zooplankton but change diet with size and age. Some species, such as snappers and groupers, are carnivorous from early stages, changing only the size of the food items as they grow, while others feed on zooplankton as juveniles and then switch to benthic prey as they mature (Sweatman, 1993). Consequently, some reef fishes depend on the hardbottom for food, whereas many others depend on plankton and nekton across the reef or surrounding soft bottom areas.

Table 12. Atlantic Highly Migratory species expected to occur within or offshore of the Flagler County Project Area (NMFS 2014c, 2006, 1999 (revised 8/04)) N=neonate, J=juvenile; A=adult.

Common Name	**Scientific Name**	**EFH (Near South Amelia Island)**	**EFH Region**
Atlantic Sharpnose Shark	*Rhizoprionodon terraenovae*	N, J= shallow coastal waters, bays, estuaries to 25m isobath A= 25m isobath to 100m isobath	Coastal/Pelagic
Blacknose Shark	*Carcharhinus acronotus*	N, J, A= shallow coastal waters to 25m isobath	Coastal
Blacktip Shark	*Carcharhinus limbatus*	N, J= shoreline to 25m isobath A= shallow coastal waters to 50m isobath	Coastal
Bonnethead Shark	*Sphyrna tiburo*	N, J, A= shallow coastal waters, inlets, estuaries less than 25m deep	Coastal
Bull Shark	*Carcharhinus leucas*	J= shallow coastal waters, inlets, estuaries less than 25m deep	Coastal
Dusky Shark	*Carcharhinus obscurus*	N= shallow coastal waters, inlets, estuaries and offshore to 90m isobath J= shallow coastal waters, inlets, estuaries to 200m isobath A= coastal waters to 200m isobath	Coastal/Pelagic
Finetooth Shark	*Carcharhinus isdon*	N, J, A= shallow coastal waters to 25m isobath	Coastal
Great Hammerhead Shark	*Sphyrna mokarran*	J, A= shallow coastal waters to 100m isobath	Coastal
Lemon Shark	*Negaprion brevirostris*	N, J, A= shallow coastal waters, inlets, estuaries to 25m isobath	Coastal
Nurse Shark	*Ginglymostoma cirratum*	J, A= shoreline to 25m isobath	Coastal
Sand Tiger Shark	*Carcharias taurus*	N, A= shallow coastal waters to 25m isobath	Coastal
Sandbar Shark	*Carcharhinus plumbeus*	N, J= shallow coastal waters to 25m isobath A= shallow coastal waters to 50m isobath	Coastal
Scalloped Hammerhead Shark	*Sphyrna lewini*	N= shoreline to 25 miles offshore J= shoreline to 200m isobath A= 25m isobath to 200m isobath	Coastal
Spinner Shark	*Carcharhinus brevipinna*	N= shallow coastal waters to 25m isobath J= shallow coastal waters to 200m isobath A= shallow coastal waters to 100m isobath	Coastal
Tiger Shark	*Galeocerdo cuvier*	N= shallow coastal waters to 200m isobath J= shallow coastal waters to 100m isobath A= 25m isobath to 200m isobath	Coastal/ Pelagic

3.6.1.4 Penaeid Shrimp

The Penaeid shrimp species managed by the SAFMC and potentially occurring in the study area include brown shrimp (*Farfantepenaeus aztecus*), pink shrimp (*F. duorarum*), and white shrimp (*Litopenaeus setiferus*) (SAFMC, 2019b). For penaeid shrimp, EFH encompasses a series of habitats used throughout their life history with two basic phases: adult and juvenile benthic phase, and planktonic larval and post-larval phase (SAFMC, 1998). Benthic adults aggregate to spawn in shelf waters over coarse calcareous sediments and feed on zooplankton in the water column as they make their way into inshore waters.

<u>White Shrimp (*Litopenaeus setiferus*)</u>

White shrimp are distributed through the western Atlantic Ocean from New York to Campeche, Mexico, including the Gulf of Mexico. This species thrives in estuaries on muddy bottoms and are the most abundant in areas with extensive estuarine marshes. Approximately three weeks after mating, the post-larval shrimp enter the estuaries via tide and wind generated currents and migrate upstream to their preferred nursery grounds. Within the estuary, young white shrimp move into tidal creeks to forage and seek protection from predators; these shrimp remain in the nursery habitat until late spring/early summer when they migrate into larger creeks and eventually offshore to spawn. White shrimp are the first of the penaeid shrimp species to be commercially harvested and marketed for consumption (SCDNR, 2014).

<u>Brown Shrimp (*Farfantepenaeus aztecus*)</u>

Brown shrimp are distributed from Massachusetts to the Yucatan in Mexico, including the Gulf of Mexico and the Florida Keys. Similar to white shrimp, brown shrimp are typically found over muddy bottoms in estuaries. The life history of the brown shrimp is similar to that of the white shrimp. The species is estuary dependent, utilizing tidal creeks and rivers as nursery habitat (SCDNR, 2014).

<u>Pink Shrimp (*Farfanepenaeus duorarum*)</u>

Pink shrimp are distributed from the Chesapeake Bay to the Yucatan in Mexico, including the Gulf of Mexico and the Florida Keys. The life history of the pink shrimp is similar to that of the white shrimp. The spawning period for pink shrimp occurs during the spring and summer and overlaps the spawning period for the white shrimp. The pink shrimp is estuary dependent, utilizing tidal creeks and rivers as nursery habitat. However, unlike white and brown shrimp, pink shrimp prefer sand/shell bottoms (SCDNR, 2014).

3.6.1.5. Atlantic States Marine Fisheries Commission Managed Species

<u>Bluefish (*Pomatomus saltatrix*)</u>

Bluefish occur in temperate and tropical water around the globe with the exception of the eastern Pacific Ocean. Along the East Coast of the U.S., Bluefish range from Maine to eastern Florida. Bluefish spawn offshore in the open ocean; the larvae develop in continental shelf water and migrate into nearshore habitats and estuaries (Fishwatch, 2014). Juveniles typically inhabit sandy bottoms, but have been observed over muddy bottoms and in vegetated areas. Adult Bluefish reside both inshore and offshore. Bluefish are caught in both commercial and recreational fisheries. This species is currently managed under the joint management authority of the Mid-Atlantic Fisheries Management Council and the Atlantic States Marine Fisheries Commission.

Summer Flounder (*Paralichthys dentatus*)

The Summer Flounder's range spans from Nova Scotia, Canada in the north along the east coast south to Florida; however this species is the most abundant in the Mid-Atlantic from Massachusetts to North Carolina. Summer Flounder inhabit both inshore and offshore waters throughout their life cycle. Spawning occurs offshore and the larvae migrate to nursery areas in coastal and estuarine areas (ASMFC, 2014). Juvenile Summer Flounder are typically found buried in the sediments of marsh creeks, mudflats, seagrass beds, and open bays; adults mostly inhabit sandy areas along the sea floor but are also known to occur in marsh creeks, seagrass beds, and sand flats (Fishwatch, 2014a). This species is currently managed under the joint management authority of the Mid-Atlantic Fisheries Management Council and the Atlantic States Marine Fisheries Commission.

Red Drum (*Sciaenops ocellatus*)

Red Drum are distributed on the Atlantic Coast from Massachusetts to Florida. Juveniles are most common in inlets and estuaries. Fish older than age four inhabit deeper waters. Adults migrate south in the winter using offshore routes and inshore to the north in the spring. Spawning occurs at night in nearshore waters during the summer and fall. Eggs are carried into low salinity estuarine areas by tidal action after hatching within 24 to 36 hours. Juveniles feed on small crabs and shrimp and as they grow the diet includes larger fish and invertebrates. Males mature between 1 and 4 years old and females between 3 and 6. Red Drum are managed by the Atlantic State Marine Fisheries Commission which sets recreational creel and size limits (ASMFC, 2019).

3.6.2 SOFT BOTTOM (Subtidal and Intertidal Non-Vegetated Flats)

Intertidal flats are critical components of coastal habitats, serving as nursery areas, refuges, and feeding grounds for a variety of animals (SAFMC, 1998). An important aspect of ecosystem function in intertidal flats is the ebb and flood of the tide over the flats; the flooding tide brings food and predators onto the flat while the ebbing tide provides residents a period of refuge from mobile predators. This dynamic environment provides EFH including nursery grounds for early life stages of various estuarine dependent, benthic species; refuge and foraging grounds for several forage species and juvenile fishes; and foraging grounds for specialized predators. Important fishes and invertebrates, including commercially important paralichthid flounders, Red Drum, Spotted Sea Trout, Mullet, Gray Snapper, blue crab, and Penaeid shrimp utilize the intertidal flat as a nursery.

The intertidal flats provide refuge for schools of anchovies, silversides, menhaden, croaker, pinfish, mojarra, Black Seabass, and Gag Grouper. These species seek out the intertidal flats as refuge during emigration from estuarine nursery habitats to the sea, as well as utilizing this area to maintain their position within the system as current velocities on the flats area generally lower than deeper in the water column. Intertidal flats also provide a rich and diverse feeding ground for many specialized predators including whelks, blue crabs, oysters and hard clams, predatory fishes, and shorebirds.

The proposed Flagler County Beach and Dune Nourishment Project fill area encompasses approximately 50 acres of dry, sandy beach; 67 acres of intertidal flat/surf zone; and 68 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 66 acres of shallow, subtidal habitat that will be gradually affected by beach fill equilibration. Subtidal areas in the project area include unconsolidated bottom habitat which is defined by the USGS as all wetland and deep-water habitats with at least 25% cover of particles smaller than stones and vegetative cover less than 30%.

Research has indicated that the surf zone is important nursery habitat for some fish species and that these fish have high site fidelities (Ross and Lancaster, 1996). Surf zone fishes use the same prey invertebrates from the same intertidal-shallow habitat as shorebirds (McLachlan, 2001). Therefore, it is reasonable to assume that degradation of foraging habitat due to changes in prey density similarly affects habitat value for surf zone fishes (Peterson et al., 2006). *Donax* spp., a preferred food source for shorebirds such as sanderlings (Loesch, 1957) and ruddy turnstones (Schneider, 1982), is also targeted by surf fishes such as Florida pompano and flounders (Leber, 1982). Manning (2003) demonstrated experimentally that feeding on *Donax* spp. by Florida pompano is inhibited by shell augmentation in surface sediments because the fish are confused by and often ingest surface shell instead of living clams. Amphipods and other small crustaceans represent the sole prey for many post-larval and small juvenile fishes, including juvenile pompano (Bellinger and Avault, 1971), which recruit in the spring to surfzone habitat.

3.7 COASTAL BARRIER RESOURCES

The Coastal Barrier Resources Act (CBRA) of 1982 (FWS PL 97-348) dissuades development on largely undeveloped coastal barriers along the Atlantic, Gulf, and Great Lakes coasts by prohibiting use of Federal expenditures. The intent of the Act is to remove the Federal incentive to develop these areas by making them not eligible for Federal expenditure and financial assistance. This promotes conservation of coastal barriers by restricting Federal expenditure in the sensitive habitats. Because this is a Local project funded by Flagler County, CBRA is not applicable to federal investment in the beach fill placement.

CBRA Unit P05A Matanzas River is located immediately north of Marineland, outside of the PAA. CBRA Unit P06P, an Otherwise Protected Area (OPA), is located at the Washington Oaks Garden State Park from FDEP monument R-12 to R-16 (also outside of the PAA). CBRA Unit P07P is an OPA that lies immediately south of the Federal project at the Gamble Rodgers Memorial SRA from R-95 to R-101; the beach fill site is within the PAA for the Local project (USACE, 2015). **Figure 16** shows the limits of OPA Unit P07P with bathymetry survey contours and the FCBA. The FCBA is located approximately 12 miles waterward of the east limits of Unit P07P at the 30-ft bathymetric contour; therefore, there is no federal action related to BOEM's decision to authorize OCS sand resources.

3.8 WATER QUALITY

The waters off coastal Flagler County within the PAA are listed as Class III waters under the criterion as "suitable for fish consumption, recreation, propagation and maintenance of a healthy, well-balanced population of fish and wildlife" (Ch 62-302.400 (1) F.A.C.). Classifications are organized in order of the degree of protection required, with Class I water having generally the most stringent water quality criteria, and Class V the least. Class I, II and III surface waters share water quality criteria established to protect fish consumption, recreation, and the propagation and maintenance of a healthy, well-balanced population of fish and wildlife (Ch. 62-302.400 (4) F.A.C.) (USACE, 2015).

A key limiting factor for coastal water quality in Florida is turbidity. Turbidity measures the light-scattering properties of the water quantitatively and is expressed in Nephelometric Turbidity Units (NTU). The properties of the material suspended in the water column that create turbid conditions are not reflected well in turbidity measurements. Very fine organic particulate matter, and sand-sized sediments that are re-suspended around the seabed by local waves and currents are major sources of turbidity in coastal areas (Dompe and Haynes, 1993). Turbidity is usually lowest in the summer months and highest in the winter months, corresponding with winter storm events and the rainy season (Dompe and Haynes, 1993) (USACE, 2015). In Class III waters, Florida state guidelines limit turbidity values to no greater than 29 NTU above ambient levels outside the turbidity mixing zone during beach restoration activities.

3.9 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The USACE did not report any hazardous, toxic, and/or radioactive waste producers within or adjacent to the offshore borrow area and beach fill areas in their integrated Feasibility Study and EA in 2015 (USACE, 2015). The magnetometer survey of the borrow area conducted for the USACE in July 2019 did not detect any signals which suggest the potential presence of explosives of concern (MEC) and/or unexploded ordnance (UXO) in Borrow Area 3A (which contains the Local FCBA).

3.10 AIR QUALITY

The popularity and urbanization of the beaches within Flagler County contribute to a large number of motorized vehicles in the vicinity of the project area at any given time. Sea breezes that are usually present along the shore promote good air quality as airborne pollutants are readily dispersed by the ocean-generated winds (USACE, 2015). Emissions in Florida are continually decreasing and are at the lowest they have ever been on record (https://floridadep.gov/air). Flagler County is an attainment area, and FDEP does not regulate marine or mobile emissions sources in attainment areas. No air quality permits will be required for the proposed project.

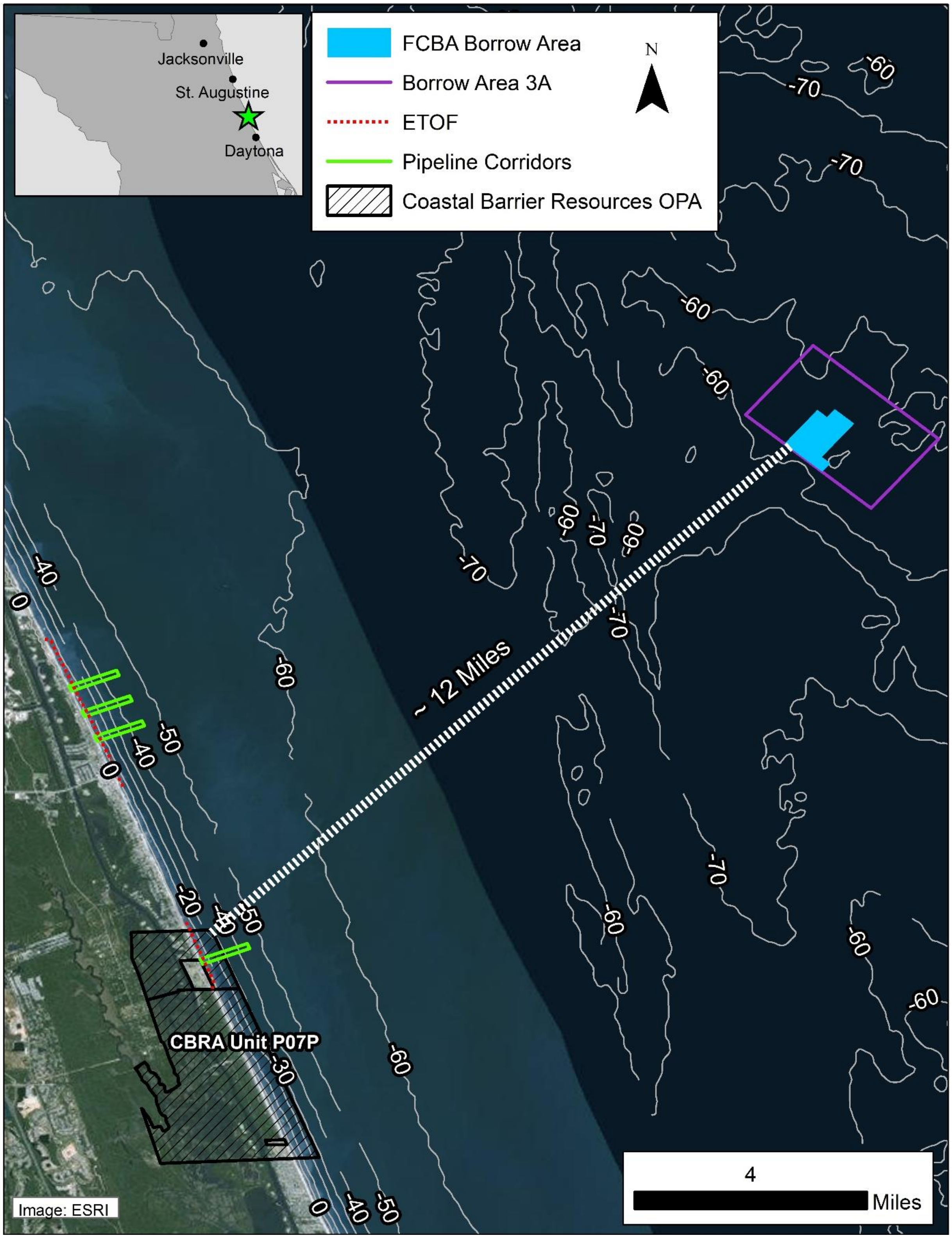

Figure 16. CBRA OPA Unit P07P within the PAA in relation to the FCBA.

3.11 NOISE

Ambient noise levels in Flagler County are low to moderate and are typical of recreational environments. The major noise producers include the breaking surf, adjacent commercial and residential areas, and traffic (boat, vehicular, and airplane) (USACE, 2015).

3.12 AESTHETIC RESOURCES

NEPA requires consideration of aesthetic resources as amended and USACE Engineering Regulation (ER) 1105-2-100. These are defined as “those natural and cultural features of the environment that elicit a pleasurable response” from the observer, most notably from the predominantly visual sense. The uniquely colored orange sand of Flagler County beaches, and the ability to see the beach, dunes, and ocean from SR A1A, is an example of additional aesthetic qualities valued by members of the community as shown in **Photo 6**. Erosional features of the beach and its adverse impact to the area’s aesthetic quality cannot be effectively quantified since these values are subjective (USACE, 2015).

3.13 RECREATION RESOURCES

The project area is a popular spot for sunbathing, swimming, surfing, walking, and fishing, in addition to a variety of other active and passive activities. The recreational capacity of the beach within the PAA is being threatened with ongoing erosion. Summer months comprise peak use period but the spring and fall months are also active. The Flagler County beaches are generally used by relatively few people during the winter months due primarily to low air temperatures (40°F to 60°F) and frequency of northeast winds which produce strong waves and high tides (USACE, 2015). Recreational use of the offshore borrow area by fishermen is limited (USACE, 2015).

The total number of beach visits in Flagler County in 2010 was estimated to be 626,467 (for the entire year). This estimate is based on projections provided by the State of Florida “Trends and Conditions Report - 2008” for northeast Florida, the 2007 Florida Statewide Recreation Plan (SCORP), and county tourism allocation projections developed for the Nassau County Florida General Reevaluation Report (USACE, 2008). The number of visits is projected to increase to 791,295 in 2020 and 1,265,250 by 2050 (USACE, 2015).

3.14 NAVIGATION

Recreational boaters frequently use and transit through the offshore waters of Flagler County in the vicinity of the PAA. Boating in the area of the dredge equipment will be restricted due to equipment and pipeline activities, but only temporarily while the beach is being renourished. Once the project has been completed, navigation will resume unhindered (USACE, 2015).

Photo 6: View of Flagler Beach between R-70 and R-71 on July 16, 2019 showing the distinct orange sand.

3.15 HISTORIC RESOURCES

As part of the 2015 USACE Feasibility Study, the Jacksonville District sponsored a cultural resource survey and investigation of the southern Flagler County beach between R-50 and the Flagler/Volusia County line (Brockington and Associates, 2010). The results of this investigation were considered during NEPA coordination for the Federal project and the Federal project FONSI is based, in part, upon these findings. Survey tasks were completed in accordance with criteria defined under Section 106 of the National Historic Preservation Act of 1996 as amended; the Archaeological and Historic Preservation Act; the Abandoned Shipwreck Act of 1987; and the Advisory Council on Historic Preservation revised 36 CFR Part 800 Regulations. All survey work completed with Section 267.12 F.S. Chapter 1A-32 and 46 FAC and the Florida Division of Historic Resources. The study found that the proposed beach nourishment project was unlikely to affect archaeological resources within the project area (Brockington and Associates, 2010).

Historically significant architectural properties within the project area include the High Tides at Snack Jack Restaurant (8FL305), and the Flagler Beach Pier (8FL885). The Pier was originally constructed in 1928 but has been reconstructed or significantly repaired numerous times due to continual storm damage and wave action (**Photo 7**). The original entrance pavilion was replaced in 1964 with the current A-framed design. Additionally, the SR A1A Oceanshore Boulevard (8FL286) is a historic landscape feature that extends along the entire length of the survey corridor and is a designated National Scenic Byway eligible for inclusion in the National Register of Historic Places (NRHP) (USACE, 2015).

Source: Brockington and Associates, Inc., 2010.
Photo 7: Flagler Beach Fishing Pier Building, circa 1950's.

The USACE Jacksonville District completed a remote sensing survey of the Federal nearshore placement area and Borrow Area 3A in July 2019 and a terrestrial magnetometer survey of the Federal beach placement area on July 31- August 1, 2019 (Panamerican Consultants Inc., 2019). The Federal nearshore placement area is located outside of the PAA of the proposed Local project. The Local project borrow area is located within Borrow Area 3A. No magnetic anomalies or sonar contacts were found within Borrow Area 3A which includes the Local project borrow area (FCBA) (Panamerican Consultants Inc., 2019). bThe results were coordinated with the Florida State Historic Preservation Office (SHPO) in August 2019. SHPO concurred in a letter dated September 26, 2019 that sand borrowing activities in Borrow Area 3A will have no effect on historic properties (DHR Project No. 2019-5234).

Panamerican Consultants identified three targets in the Federal nearshore placement area which have the potential to represent significant historic cultulral resources. Avoidance of these three targets was recommended, and if not possible, the targets were required to be investigated further by arachaeological divers. The USACE and BOEM determined that the proposed project would have no effect to historic properties, contingent upon the maintained avoidance of Target USACE-0130 with a 150-ft buffer, and the avoidance of Target USACE-0131 and Target USACE-0132 with 100-ft buffers. By letter dated September 26, 2019, SHPO concurred with the USACE that sand placement activities will have no effect on historic properties contingent upon avoidance of the three targets with buffers. A copy of this letter is provided in **Appendix 2**. By email dated September 25, 2019, the Seminole Tribe of Florida-Tribal Historic Preservation Office (STOF-THPO) also concurred with the USACE that avoidance of the three targets with buffers would avoid impacts to possible archaeological, historical, or burial resources of the Seminole Tribe (**Appendix 2)**.

On October 18, 2019, Tidewater Atlantic Research completed a remote sensing survey of the four pipeline corridors for the Local project (Tidewater Atlantic Research, 2019). The survey revealed 12 magnetic anomalies; all were determined to be small ferrous objects such as fish and crab traps, pipes, small diameter rods, cable, wire rope, chain, or small boat anchors. Based on the results of this study, there are no culturally significant resources in the pipeline corridor locations. Borrow Area 3A and the pipeline corridors have been approved for use by SHPO for the Local project with a no effect determination for historic properties by letter dated March 13, 2020. A copy of this letter is provided in **Appendix 2**.

4 ENVIRONMENTAL EFFECTS

4.1 GENERAL ENVIRONMENTAL EFFECTS

The proposed project is expected to have a net beneficial impact to the coastal system through the restoration of the highly eroded beach and dune system. The proposed project lies along sections of Critically Eroded Beach as defined by the FDEP and will enhance the shoreline from both a physical and environmental standpoint. The proposed activity will mitigate the effects of long-term chronic beach erosion and severe storm damage that has depleted the level of storm protection to upland infrastructure and available recreational beach and beach habitat. This beneficial impact to the coastal system is a tradeoff for short-term recoverable impacts associated with dredging in the offshore borrow area.

Sand placement may also increase sea turtle nesting habitat since the fill sand is highly compatible with existing beach sediments and compaction and escarpment remediation measures will be incorporated into the project (USACE, 2015). Possible negative effects on sea turtles if the project is constructed during a portion of sea turtle nesting include:

• destruction of nests deposited within the boundaries of the proposed project
• harassment due to disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches
• disorientation of emerging hatchlings on beaches adjacent to the construction area as a result of project lighting, and
• escarpment formation within the project area during a nesting season causing behavioral modification of nesting females, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs (USACE, 2015).

Armoring and revetments have disrupted sea turtle nesting and reduced the quality of the nesting habitat along the project area shoreline. Upon completion of the proposed beach nourishment project, these areas may become more desirable nesting locations. Minor effects on sea turtle nesting may occur as a result of the project; quality and color of the sand could affect the ability of female turtles to nest, suitability of the nest incubation environment, and ability of hatchlings to emerge from the nest. Geotechnical evaluation of the borrow area sand has demonstrated compatibility with existing beach sediments such that the nourished beach will provide suitable nesting substrate for sea turtles.

In order to minimize potential impacts to nesting females and sea turtle hatchlings, the proposed beach fill design incorporates a dipping 1:50 slope over the seaward 100 feet of the berm, effectively lowering the seaward edge of the berm by 2.0 ft. over a nearly 100 ft. distance. The seaward-dipping seaward slope should minimize the potential for escarpment formations, prevent ponding on the new beach berm, and assist in directing hatchlings seaward to the ocean.

Construction of the beach fill project is expected to last approximately 3 to 5 months and is scheduled for construction outside of sea turtle nesting. Protective measures such as nest monitoring and relocation can alleviate the potential for some of the negative impacts to nesting sea turtles and will be implemented if construction occurs or overlaps a portion of the nesting season. Compaction monitoring and tilling activities, leveling escarpments prior to nesting season, daily nests surveys and avoiding nests during construction will alleviate the negative impacts of beach nourishment on nesting and hatchling sea turtles (USACE, 2015).

The presence of construction equipment and personnel will temporarily weaken the aesthetics of the beach and limit recreational beach activity by the public temporarily within areas of construction activity. Best management practices will be executed to minimize the extended presence of equipment and personnel in the project area and related habitats (USACE, 2015). The additional beach width and elevation from project construction (1.3 Mcy placement volume) will significantly improve the level of storm protection offered to the upland and shall likewise widen the beach, increasing its recreational amenity value.

4.2 OCEANOGRAPHIC SETTING AND GEOMORPHOLOGY

4.2.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not alter tides, waves, currents or the impact of storm events. The project area shoreline would be more susceptible to storm damage due to continuing natural and anthropogenic sources of beach erosion. Like most Florida east coast beaches, the Flagler County beach experiences seasonal changes associated with the cross-shore movement of sand. The “summer” profile typically has a wider upper beach berm and is absent a lower profile bar. This profile configuration is generally a product of smaller waves with longer periods that occur during summer months and typically move sand from offshore to onshore. The “winter” profile typically has a narrow upper beach berm and a significant lower profile bar. This profile configuration is generated by shorter period waves with higher wave heights that tend to move sand from the upper to lower profile in the onshore to offshore direction.

4.2.2 PREFERRED ALTERNATIVE: DUNE AND BEACH RESTORATION

The sand ridges in the FCBA are elongated shoals comprised of mostly unconsolidated sandy sediments. These ridges are bathymetric peaks on the seascape rather than level sea bottom. They tend to be semi-permanent features that have slowly formed into linear mounds by currents over time. Hopper dredging will create relatively straight, shallow cuts to remove the upper sediment layer from this peak, avoiding creation of a deep depression which could accumulate fine materials. Sand will be excavated to an average thickness of approximately 6 ft (2 m) along relatively straight and adjacent runs along the ridges (see **Figure 5**). The shallow dredge cut depths for FCBA follow guidance from the South Carolina Department of Natural Resources that dredge cuts should not exceed 10 ft (3 m) to promote recovery of the sediment (SCDNR, 2008) and avoid creation of deep pits which have been shown to accumulate fine, muddy material. Numerous studies have shown a decrease in mean grain size and increases in silt and clay content within offshore following dredging when a relatively steep bathymetric depression is created by dredging.

The dredge volume and cut depth are designed to minimize long term impacts to sand ridges within the borrow area. The elongated shoals will be dredged in such a way that sediment sources will be left adjacent to and interspersed throughout the dredged cuts, which may lead to a more uniform infilling process by adjacent sediment (CSA et al., 2009).

Excavation of sand from the FCBA would not alter the current patterns or tidal flow, and removal of the upper portion of the ridge would have a minimal impact on these features. The primary environmental effects of dredging offshore ridges appear to be mostly limited to the immediate dredging area (CSA et al, 2009). Studies on changes in waves and currents relative to dredging offshore ridges have not found significant changes in regional sand transport patterns (Hayes and Nairn, 2004; Kelly et al., 2004). Therefore, no long term impacts on the geomorphology of the offshore borrow area are anticipated.

Beach sand placement represent an injection of “new” sand into the littoral system. Impacts to coastal processes are principally related to storm protection benefits and diffusion losses from the renourishment project.

4.3 GEOLOGY

4.3.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not alter sediment characteristics of the existing beach or the offshore borrow area.

4.3.2 PREFERRED ALTERNATIVE: DUNE AND BEACH RESTORATION

The proposed beach renourishment project would have no long-lasting adverse impacts on sediment characteristics of the existing beach. The quality of sediment placed on the beach will be visually monitored during project construction by the dredging contractor to ensure that rocky or clay material are not deposited on the beach. Corrective measures will be implemented if any unsuitable areas are encountered, including redirection to a new location and depth within the borrow area. Any unsuitable areas will be recorded and avoided in future passes of the dredge during excavation operations.

The overfill ratio is commonly used to estimate the amount of borrow area material, if any, that should be added to a beach fill project to achieve the same stability/ performance characteristics as the native beach material. The composite, or weighted average, grain size information for the native beach and borrow area are used for the overfill ratio analysis. As shown in **Table 4**, using both the James and Dean methods, the overfill ratio for the FCBA is 1.00, meaning that no additional borrow area sand is required to approximate the physical performance of the native beach sand.

The borrow area sand for the proposed nourishment project compares favorably with existing beach sediments in terms of grain size distribution. Refer to **Section 3.2.2** for a more detailed description of borrow area sediment. Visual shell content between the native beach and borrow area are very similar (see **Table 4**). The native beach contains about 19.2% visual shell while the borrow area sediments contain about 21.0% shell. The native beach sediments have a wider range of sediment sizes than the proposed borrow area material. The borrow area material is slightly coarser, on average, than the native beach and appears to have a more uniform population of sediment sizes. All sampled borrow area material fall well within the range of material sizes that occur on the project beach.

The native sand contains orange-tinted shell that can be found only by weathering of the Anastasia Formation, which is a beach rock found nearshore and offshore of Flagler County. Flagler County redesigned the borrow area during permitting to exclude as much of the darker material by raising the maximum dredge depth. Flagler County demonstrated that there are sand ridges within FCBA that a majority of the vibracores had missed. The upper material within these ridges tended to have a lighter color adding to the overall composite color of the borrow area. The borrow area sand appears to be 1 to 2 Munsell color values darker than the lighter color beach sand, and has a grey hue compared to the orange or amber hue of the beach sand. The material is expected to be homogenized through the dredging process. Dredging within the subareas FCBA-A, FCBA-B, and FCBA-C, will facilitate intermixing of material with colors of Munsell values of 5 and 6. Accordingly, as is typical with most beach fill projects where borrow materials are darker when moist and first placed on the beach, the materials will lighten through weathering and mixing with the native beach materials.

A Sediment Quality Control/Quality Assurance Plan for the project has been approved by the FDEP (**Appendix 3**). The FDEP has determined that use of the sediment from the borrow area(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. The QA/QC plan and borrow area design provide reasonable assurance that the mean grain size and carbonate content of the sediment from the borrow area will meet the requirements of Fla. Administrative Code 62B-41.007(2)(j).

4.4 VEGETATION

4.4.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would be continuation of the existing shoreline condition. Loss of frontal dune vegetation and escarpment formation would be expected during storm events, resulting in the loss of foredune areas along the project area. The storm-protection value of existing dunes within the project area would be reduced by major storm events.

4.4.2 PREFERRED ALTERNATIVE: DUNE AND BEACH RESTORATION

The proposed beach renourishment project will establish a large dry beach area for protection of existing dune habitat within the project area. The project template includes both dune and beach berm features. The dune will be constructed along the landward limits of beach berm and seaward of existing bulkheads, revetments, and/or established dune vegetation. The dune will have a crest elevation of +12.0 ft, on average. The beach berm will have a crest elevation of +10.0 feet and slope gently from onshore to offshore at a slope of 1:50 V:H before transitioning to the seaward berm slope of 1:15 V:H. Dune vegetation and sand fencing will be installed along the restored dune, as necessary. Sand fencing may encourage dune development and natural colonization by sea oats. The renourishment sand will provide a source of material for wind-blown accretion of the existing dune system within the project area.

4.5 THREATENED AND ENDANGERED SPECIES

4.5.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would maintain the current shoreline condition. Continued shoreline erosion and beach profile deflation may reduce the amount of nesting and foraging habitat available for sea turtles and shorebirds. The level of protection from incident storms would be reduced. Sea turtle nesting and hatching success and shorebird nesting success may be adversely affected due to a higher likelihood of nest inundation during storms. Dredging and beach placement impacts to listed species and critical habitat would be avoided. The no-action alternative would not adversely affect the North Atlantic right whale or other protected marine mammal species (USACE, 2015).

4.5.2 PREFERRED ALTERNATIVE: DUNE AND BEACH RESTORATION

Appendix 1 contains the BA for the proposed project. This project is covered by and Flagler County will adhere to the Terms and Conditions and Reasonable and Prudent Measures of the 2020 NMFS SARBO and the USFWS SPBO dated March 13, 2015, and USFWS P^3BO dated May 22, 2013.

4.5.2.1 Sea turtles

Flagler County and the PAA are included under both terrestrial and neritic critical habitat areas for the loggerhead sea turtle: Terrestrial Critical Habitat Unit LOGG-T-FL-03 and Neritic Critical Habitat Unit LOGG-N-15. Loggerhead and green sea turtles regularly nest and leatherback sea turtles occasionally nest within the PAA. The proposed project has the potential to adversely affect nesting loggerhead, green, and leatherback sea turtles and their hatchlings. Although Kemp's ridley sea turtles may be found offshore of the beach fill areas, it is highly unlikely that these species would deposit nests on the project area beach or be found in the vicinity of the offshore borrow area.

The initial proposed beach project is scheduled for the fall of 2020. Construction of the beach fill project is expected to last approximately 3 to 5 months and may be completed outside of sea turtle nesting season. Beach nourishment activities during sea turtle nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings through disruption of adult nesting activity and increased mortality via burial, crushing of nests and/or hatchlings. Nest monitoring and egg relocation programs reduce these impacts, but nests may be inadvertently missed or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed.

Incidental take of nesting sea turtles may occur on up to 22,000 ft. of nesting beach in the project area if the construction schedule overlaps sea turtle nesting season. Loggerhead, green, and leatherback sea turtles regularly nest on the project area beach. If the proposed project overlaps sea turtle nesting season, the project may affect nesting and hatchling loggerhead, leatherback and green sea turtles. The proposed project may also affect terrestrial critical nesting habitat for the loggerhead sea turtle within Critical Habitat Until LOGG-T-FL-03

Incidental take for nesting sea turtles and their nests/hatchlings has been authorized by the SPBO. The Applicants agree to implement the Terms and Conditions and Reasonable and Prudent Measures of the USFWS SPBO for shore protection activities along the Florida east coast. Extensive armoring and revetment have disrupted sea turtle nesting due to disturbance to the habitat quality. These areas are anticipated to become more desirable nesting habit once the dune and beach are reconstructed as the quality of habitat will be substantially increased by the placement of compatible fill material.

The project is anticipated to be constructed using a hopper dredge. Dredged sand will travel through the dragheads into the dredge's open hopper, putting sea turtles at risk of draghead entrainment. Most of the effluent will drain out the overflow structures. The vessel(s) will transport the dredged material to pump-outs positioned approximately 0.5 mile from shore, where the material will be pumped directly from the hopper via pipeline to the beach. The pipeline will be placed perpendicular to shore and therefore not disrupt ingress and egress of nesting sea turtles and their critical habitat.

Pump-out buoys will be relocated several times to facilitate pump-out along the nourishment template. Pipeline will be rafted, floated into place, flooded, and submerged to the sea floor. Placement and relocation of the nearshore mooring buoys may involve the use of tender tugboats and a barged pipeline hauler or crane. Pump-out buoys may be anchored using multi-ton point anchors and/or clump weights. Support vessels and tugs may support the hopper dredge in other activities, such as crew rotations and pump-out connection.

Based on project construction with a hopper dredge, the proposed project may affect the swimming sea turtles species mentioned above as well as swimming Kemp's ridley and Hawksbill sea turtles. The County will adhere to all turtle safety precautions outlined in the NMFS SARBO (2020). This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment in 2015 (USACE, 2015).

The project area is also located within neritic nearshore reproductive critical habitat, Unit LOGG-N-15 for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle. Neritic habitat "consists of the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 m (656 ft), including inshore bays and estuaries" (NMFS, 2014). Given the large size of designated critical habitat and temporary nature of short-term turbidity elevations during dredging within the offshore borrow area, the proposed project may affect, but is not likely to adversely affect neritic nearshore reproductive critical habitat within Unit LOGG-N-15. Flagler County shall comply with the *NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (*Appendix 1 of the BA) and NOAA Vessel Strike Avoidance Measures (Appendix 2 of the BA). Should a collision with and/or injury to a sea turtle occur, NMFS shall be notified immediately, and Florida Sea Turtle Stranding and Salvage Network Contact 888-404-FWCC (3922).

4.5.2.2 North Atlantic right whale

The coastal area of Flagler County is located in Critical Habitat Unit 2 for the North Atlantic right whale (NMFS, 2016). It is possible that right whales could travel in close proximity to the PAA. The offshore borrow area is located just east of the limits of Critical Habitat Unit 2. Transporting sand from the borrow area to the pipeline corridor will entail crossing critical habitat. Collision with the hopper dredge vessel poses a moderate risk to the whales. The timing of project construction will likely overlap the months when rights whales are most likely to be present offshore of Flagler County. Flagler County will adhere to the terms of the March 27, 2020 NMFS SARBO which requires aerial surveys in critical habitat from December 1 through March 31, and one daytime observer from December 1 to March 31. The 2020 SARBO also requires the hopper dredge to not get closer than 750 yards to a right whale.

The Contractor will be required to implement the NOAA Vessel Strike Avoidance Measures (Appendix 2 of the BA). The Environmental Protection Specifications shall require the Contractor to receive and provide updates of right whale sightings during the period between December 1 and March 31. In order to best ensure that adverse impacts to whales are avoided during construction activities, the requirements and recommendations in the NMFS 2020 SARBO will be followed.

4.5.2.3 Piping Plover

The proposed project is not located within designated critical habitat for wintering piping plover and will therefore have no direct effects on critical habitat. Piping plover have not been reported within the PPA to eBird since 2015 (See **Section 3.4.3**). Because the migratory and wintering period for piping plover in Florida is July 15 through May 15, the construction window for the proposed nourishment project will overlap a portion of the migratory and overwintering season for piping plovers. Heavy machinery and equipment operating within the PAA (e.g., trucks and bulldozers, placement of pipeline, and sand placement) may adversely affect migrating piping plovers by disturbing and disrupting normal activities such as roosting and foraging and possibly forcing birds to expend valuable energy reserves to seek habitats in less disturbed adjacent areas along the shoreline. These impacts would be temporary and limited to 3 to 5-month construction period.

Direct placement of sand will result in high mortality of benthic infauna at the beach fill areas. Project activities will affect up to 4.1 miles of shoreline at the beach fill site during initial fill placement and subsequent nourishment events. The majority of infaunal loss will be in the shallow waters of the surf zone. Due to direct burial of the intertidal food base, short-term impacts to preferred prey for piping plover may occur following beach nourishment (Peterson et al., 2006). A softbottom macroinvertebrate monitoring program for the 2011 South Amelia Island Beach Nourishment Project evaluated impacts to beach macrofauna and recovery time following beach fill placement. *Donax* spp. populations in the high-density area had not recovered at the 8-month post-construction sampling; but at approximately two years after nourishment in the spring of 2013, populations had recovered and exceeded pre-construction abundances. The monitoring program did not document any adverse impacts to mole crab populations following beach nourishment (CEG, 2014).

Temporary depletion of the food base for shorebirds will occur immediately following sand placement. Given the compatibility of the borrow area sediments with the existing beach and expected recolonization rate of prey species, it is anticipated that impacts to the benthic communities at the proposed beach fill site would be minimal and short term (less than two years). The borrow area sediments have a very low fraction of fine material averaging 1.3%. Repopulation of benthic macrofauna is likely during the first wintering season following project construction; however, the quality of foraging habitat may be less than optimal for one to two years due to temporary reductions in species diversity and abundance/ richness of preferred prey taxa.

Beach nourishment may increase recreational usage within the project area immediately after project construction. Recreational activities, including increased pedestrian use, have the potential to adversely affect piping plovers through disturbance and increased presence of predators, including domestic and feral animals attracted by the presence of people and their trash. Disturbance levels following project construction are not expected to exceed current levels from existing recreational uses in the PAA.

The Federal nourishment project area is located between the two County (Local) project area reaches. It is likely that the Federal project will be constructed prior to the proposed County (Local) project; therefore, this stretch of shoreline would provide little to no alternative foraging habitat during construction of the proposed Local project. Adjacent foraging habitat will be available immediately north of the north County reach and immediately south of the south County reach.

Projects adjacent to the PAA include Florida Intracoastal Waterway (ICW) maintenance dredging; no material is disposed in Flagler County during these dredging events. The ICW near Matanzas Inlet north of Flagler County is subject to shoaling and must regularly be dredged. This material is pumped onto the beach at Summer Haven directly adjacent to the northern border of Flagler County. The fine-grained sand placed at Summer Haven tends to migrate south rapidly after placement and may reach beaches north of the PAA near Marineland.

The expected renourishment interval for the County (Local) project is 11 years. The proposed project is a one-time nourishment event with one future emergency event if needed. The renourishment interval will provide sufficient time for benthic populations to re-establish to pre-nourishment densities and diversity.

The project is proposed for construction as early as Fall 2020. Flagler County agrees to the Terms and Conditions of the USFWS P^{3}BO for non-optimal habitat to minimize the potential for incidental take of wintering piping plovers and their foraging habitat and, should construction occur during wintering season, will adhere to the appropriate seasonal windows to the maximum extent practicable to minimize the potential for direct disturbance of wintering piping plovers. Flagler County will also adhere to shorebird monitoring and protection conditions provided in JCP Permit No. 0379716-00-JC for the Local project.

There is alternative foraging and roosting habitat immediately north and south of the two County (Local) project reaches that will not be disturbed by project construction or other authorized nourishment activities. Based on compliance with the Terms and Conditions for non-optimal habitat in the P^{3}BO, the proposed project may affect but is not likely to adversely affect the piping plover. This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment for this project area in 2015 (USACE, 2015).

4.5.2.4 Rufa red knot

The proposed project is expected to be constructed as early as the fall of 2020 and will last 3 to 4 months. Red knots are rarely observed in the vicinity of the PAA (see **Section 3.4.4**). If project construction occurs when red knots are present in the PAA, direct effects would include harassment in the form of disturbing or interfering with birds foraging and/or roosting within the construction area and on adjacent beaches as a consequence of heavy machinery and operational equipment (*e.g.,* trucks and bulldozers and pipeline) utilized to dispose and place fill. Critical habitat has not been designated for the rufa red knot.

The majority of infaunal loss will be in the shallow waters of the surf zone. Reported red knot prey items in wintering and stopover areas along the Gulf coast of Florida include dwarf surf clams (*Mulinia lateralis*), coquina clams (*Donax* spp.) and amphipod crustaceans (*Emerita* spp.) found in the intertidal zone (USFWS, 2014). See **Section 4.5.2.3** for a discussion on the direct effects to the prey base for red knots.

As described in **Section 4.5.2.3,** the quality of foraging habitat along the project fill shoreline is expected to be less than optimal for one to two years following project construction due to beach fill placement. Long-term adverse effects to foraging habitat are not anticipated based upon the expected re-colonization of *Donax* spp. within two years following nourishment

Potential interdependent and cumulative effects on wintering red knot are similar to the effects described for wintering piping plover in **Section 4.5.2.3**.

The monitoring requirements in the Terms and Conditions of the P^3BO will be expanded to include surveys for wintering red knot in the PAA. Based on compliance with the Terms and Conditions in the P^3BO for piping plovers and infrequent sightings of red knots in the PAA, the proposed project may affect but is not likely to affect the rufa red knot. This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment for this project area in 2015 (USACE, 2015).

4.5.2.6 Other Protected Marine Mammals

Construction activities are not likely to result in any negative effects on other protected marine mammals. The Contractor will be required to implement NOAA's Vessel Strike Avoidance Measures (Appendix 2 of the BA) to avoid potential encounters with whales.

4.6 FISH AND WILDLIFE RESOURCES

4.6.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would maintain the current shoreline condition and would not impact nearshore softbottom communities, offshore softbottom communities, and epifauna and demersal fishes. Continued shoreline erosion and beach profile deflation may reduce the amount of shorebird foraging habitat.

4.6.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

4.6.2.1 Shorebirds

The disposal of sand on the beach may temporarily interrupt foraging and resting activities of shorebirds on the project area beach. This impact would be limited to the immediate area of beach fill disposal and duration of construction activities. The prey base for many shorebirds will be temporarily reduced in the beach fill placement area for up to two years following fill placement. Continual impacts are expected to be minor and foraging habitat would be available on adjacent beaches. If changes in infaunal community structure persist for a period of years, short-term impacts to the quality of foraging habitat could occur due to loss of specific prey species for shorebirds. Adjacent beaches would provide alternative feeding habitat for birds during infaunal recolonization of the beach fill area and will provide a source of adult infauna for horizontal migration into the beach fill site. Changes in macroinfaunal community assemblages should result in a minimal loss of productivity.

4.6.2.2 Nearshore Soft Bottom Communities

Direct impacts to the surf zone are expected as a result of sand placement on the beach. Continued erosion in the project area has resulted in the reduction in the area of dry beach and expansion of intertidal flats. Restoration of this area through placement of beach compatible-sand will result in the temporary loss of intertidal habitat as the placed beach fill equilibrates. Intertidal flats are an important nursery and refuge area for numerous fishes and invertebrates which contributes to the quality of foraging habitat provided by intertidal areas, particularly for shorebirds during low tide and fish during high tide.

Direct placement of sand on the project area shoreline will result in the burial and nearly complete mortality of benthic infauna along the 4.1 miles of project shoreline; the majority of infaunal loss will be in the shallow waters of the surf zone. Several studies have indicated that the loss of benthic infauna at the beach fill site is temporary, lasting for no longer than two years (Van Dolah, 1984; Peterson et al., 2006; CEG, 2014, 2014a). Burlas et al., (2001) projected between six months and two years for re-establishment of beach macrofauna following sand placement depending on sediment grain size and fill compatibility with the existing beach profile morphology. Several other studies have also investigated the recolonization of intertidal surf zone infauna following nourishment projects and found that nourished beaches exhibit short-term declines in infaunal abundance, biomass, and taxa richness following beach nourishment, recovering to pre-nourishment levels within one year after sand placement (Reilly and Bellis 1983; Gorzelany and Nelson 1987; Hurme and Pullen 1988; Dodge et al., 1991; 1995).

Several factors appear to influence recolonization of infauna populations at the beach fill site. These factors include the size and type of the fill sediment and the compatibility of the fill to the existing beach. Coarser grains allow for more efficient burrowing and low content of fines minimizes the effects on feeding efficiency. Some studies have suggested that changes in the geomorphology and sediment characteristics may have a greater influence on the recovery rate of invertebrates than direct burial or mortality (USFWS, 2000). Donoghue (1999) found that the timing of beach fill placement episodes, the size and type of fill, and the compatibility of the fill material to the native sediments is critical to the short-term and long-term impacts to beach invertebrate populations. Peterson et al., (2000) documented a reduction of 86 to 99% in invertebrate populations, five to ten weeks following beach nourishment on Bogue Banks, NC. This extreme decrease in the population of beach infauna following nourishment was attributed to the poor match in grain size between the placed sand and natural beach. The sand source utilized in the Bogue Banks project contained a very high shell content that was not comparable to the natural beach (Peterson et al., 2000).

Shorebird use of beaches can be an indication of the presence of intertidal surf zone benthic infauna. Peterson et al. (2006) observed significant reductions in the use of nourished beaches by shorebirds during the six months following completion of beach nourishment (March through September 2002) on Bogue Banks, NC. The dramatic depression of abundance of feeding shorebirds persisted from March through September, but by November 2002, 7 to 12 months after the completion of nourishment, the difference between counts on filled and controlled beaches was no longer statistically significant. Abundances of *Donax* spp., the biomass dominant and key prey for higher trophic levels, and haustoriid amphipods averaged less than 10% of control levels following construction during the winter of 2001-2002. Recovery on nourished beaches was not initiated by either taxon during the March to November sampling.

Post-construction changes in infaunal community structure are possibly based upon differences in generation time and reproductive strategies of infaunal organisms. For example, failure of haustoriid amphipods to initiate recovery during the first warm season on Bogue Banks was attributed to their lack of pelagic larvae combined with the low long-shore transport rate on Bogue Banks. No significant adverse effects were observed on polychaetes, dominated by *Scolelepsis squamata*, which experienced a warm-season bloom of equal magnitude on filled and control beaches. Mole crabs (*Emerita talpoida*) exhibited a pattern of initial depression on nourished beaches but recovered by mid-summer. Summertime recruitment of predatory ghost crabs appeared inhibited on filled beaches, perhaps by persistent shell hash. Intertidal shell cover on nourished beaches averaged 25% to 50% in mid-summer as compared to 6% to 8% on control beaches (Peterson et al. 2006).

Benthic invertebrate studies of two beach nourishment projects in Florida, one project along the west coast in Pinellas County and the second project along the central east coast in Indian River County, found that abundances of mole crabs (*E. talpoida*) and coquina clams (*Donax* spp.) were highly spatially and temporally variable; no measurable impacts to these species from beach nourishment projects were observed during the study (Irlandi and Arnold, 2008).

A soft bottom macroinvertebrate monitoring program was required by the NMFS for the 2011 South Amelia Island Beach Nourishment Project to evaluate impacts to beach macrofauna and recovery time following beach fill placement. The study focused on the effects of fill placement on three macroinvertebrate indicator species for beach habitat in Florida's Comprehensive Wildlife Conservation Strategy: mole crab (*E. talpoida*), ghost crab (*Ocypode quadrata*), and coquina clams (*Donax* spp.). Several areas within the project fill shoreline contained high densities of coquina clams (*Donax* spp.) prior to beach nourishment. Ghost crabs forage and burrow along the upper portion of the beach while the mole crab and coquina clams are suspension feeders that burrow within the swash zone of the beach. All three indicator species are preyed upon by shorebirds and surf zone fishes and are fundamentally important to the functions of the beach biological community (Peterson et al., 2000).

Results from the 2011 monitoring program study showed there was a clear signal from the beach nourishment project in the ghost crab population. Near complete loss of burrows was documented immediately following beach nourishment in the summer of 2011. Repopulation was observed one year later in the fall of 2012. *Donax* spp. populations in the high-density areas of the beach nourishment project had not recovered at the 8-month post-construction sampling; but at approximately two years after nourishment in Spring 2013, populations had recovered and exceeded pre-construction abundances. The monitoring program did not document any adverse impacts to mole crab populations following beach nourishment; abundances were higher at both the impact and control stations during the immediate and 8-month post-construction surveys in comparison to pre-construction surveys (CEG, 2014).

Given the compatibility of the borrow site sediments with the existing beach and the expected recolonization rate of prey species, it is anticipated that the impacts to the benthic communities at the project fill site will be minimal and short term (less than two years). The borrow area sediments have a very low fraction of fine material ranging from 1.58% to 1.70% and a mean grain size ranging from 0.26 mm to 0.27 mm. Repopulation of benthic macrofauna at the beach fill placement sites is likely during the first wintering season following project construction; however, the quality of foraging habitat may be less than optimal due to a temporary reduction in species diversity and abundance/richness of preferred prey taxa.

Additional impacts include a temporary reduction in water quality through suspension of sediments during dredging or sand placement. Increased turbidity may prevent certain fish and invertebrate species from entering the area, causing them to seek alternative habitat as well as altering the diversity of available prey items. Elevated turbidity levels will be limited to the turbidity mixing zone during the 3 to 5-month construction period.

The 150-m turbidity mixing zone at the beach fill site encompasses an overall total of approximately 67 acres of intertidal habitat and 303 acres of shallow subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 370-acre turbidity mixing zone should be affected by elevated turbidity at any one time, and the effects of elevated turbidity will lessen with distance from the disposal location. The 150-m mixing zone around the 345-acre offshore borrow area encompasses 568 acres of unvegetated, unconsolidated sandy seabed of the Atlantic Ocean.

4.7 ESSENTIAL FISH HABITAT ASSESSMENT

4.7.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not impact Essential Fish Habitat within the proposed project area.

4.7.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

The proposed project includes activities which have the potential to temporarily impact EFH. Temporary impacts to EFH include displacement of fishes from nearshore areas during fill placement; temporary reduction of water quality due to turbidity; temporary reduction in phytoplankton primary productivity; short-term disruption and reduction in foraging habitat for fishes and macroinvertebrates; temporary disruption of migration patterns of fishes; potential loss of larval fishes in the water column during dredging operations; and mortality of demersal fishes and epifauna within the proposed FCBA.

Categories of affected marine EFH adjacent to the turbidity mixing zone at the beach fill site include the marine water column and soft bottom habitat. There are no categories of HAPC in the vicinity of the proposed beach and borrow areas and no hardbottom or seagrasses in the PAA. Borrow Area 3A is located within Snapper-Grouper EFH and Spiny Lobster EFH (see **Figure 14**). Impacts to these species would be minor and short-term due to mobility of these species and temporary timeframe of project construction.

The borrow area includes part of the Flagler Sand Wave geomorphologic unit and would be affected by material excavation. Removal of the upper portion of these ridges would have minimal impact as the removal of material is conservatively estimated over the expanse of the shoal's upper portion (USACE, 2015) within Borrow Area 3A. FCBA occupies roughly 345 acres of seabed, which represents approximately 14% of the overall Borrow Area 3A (2,466 acres). The larger shoal area identified by the USACE as Area 3 in the 2015 Feasibility Study, which contains Borrow Area 3A, spans about 12,000 acres (USACE, 2015).

Basic biological research that strongly suggests that sediment conditions generally dictate softbottom benthic community composition (Gray, 1974). The degree and duration of change in sediment composition has significant implications for recovery of benthic fauna (Dankers and Beukema 1981; Salzwedel et al. 1985; Kunitzer et al. 1992; Seiderer and Newell 1999; Van Dalfsen 2000). Most studies have documented initial colonization within months of cessation of dredging, but restoration of species richness and biomass can take several years (Kenny and Rees, 1994; 1996; Newell et al., 2004). Recovery of the benthic community does not necessarily lead to a community similar to that which existed before the disturbance (e.g. Seiderer and Newell 1999) and is dependent on the severity of the impact and supply of macrofauna from adjacent habitats. In dredged areas with prolonged effects to the benthic community, traditionally opportunistic species persist (Wilber and Stern, 1992), and later successional stages may not fully recover for two to three years. In unstable environments, benthic recovery does not always follow a successional sequence due to frequent physical disturbances which influence benthic assemblages; a low number of opportunistic species can cyclically dominate the benthic community (Diaz, 1994).

The dredge volume and cut depth are designed to minimize long term impacts to sand ridges within the borrow area. FCBA represents bathymetric peaks or ridges on the seascape rather than level sea bottom. The elongated shoals will be dredged in such a way that sediment sources and associated benthic macroinvertebrate will be left adjacent to and interspersed throughout the dredged cuts, which may lead to a more uniform infilling process by adjacent sediment and recovery of the benthic macroinvertebrate populations (CSA et al., 2009). Recovery of the benthic populations is expected within 1 to 2 years based on the borrow area design and shallow dredge cuts.

4.7.2.1 Impacts to the Water Column

Project construction is expected to start in early Fall 2020 (at the earliest) and last approximately 3 to 5 months. Dredging and beach fill placement along the project shoreline will cause temporary impacts in the water column in the turbidity mixing zones around the borrow areas and beach fill site. These impacts include temporary increases in turbidity and sediment loads in the water column as well as release of trace constituents from the sediment into the water column. Increased turbidity levels can deter certain fish species (e.g. bluefish) from utilizing the area while some fish species (e.g. kingfish) are attracted to higher turbidity waters (Wilber et al., 2003). The study suggests that fish have the ability to select sites based on preferences to environmental conditions, allowing them to avoid areas that are experiencing elevated turbidity as a result of beach nourishment. The study also found that a temporary reduction in benthos did not detrimentally affect prey consumption of foraging fish within the beach nourishment area (Wilber et al., 2003). Ward (1992) found that increased turbidity can cause changes in feeding behavior of fishes because prey are less visible. In some instances, there may be beneficial effects of turbidity for specific sizes and feeding guilds of fishes (e.g. fish larvae and planktivores) due to protection of larvae from large visual predators (Utne-Palm, 2002).

Increases in turbidity as a result of beach nourishment were assessed by Van Dolah et al., (1994) at Folly Beach along the Atlantic Ocean shoreline of Hilton Head Island, South Carolina. The study concluded that although dredge effluent increased turbidity in the immediate vicinity of the disposal, the effects were not considerably different from increased turbidity levels associated with local weather and wave energy.

The water column is a habitat used for foraging, spawning, and migration. Temporary impacts on the water column may have localized effects on marine species. Injury or entrainment due to dredging would most likely affect demersal or less mobile species, such as shellfish. Dredging may temporarily affect feeding success of EFH species due to turbidity and loss of benthic organisms; however, adjacent similar habitat is available for feeding. Benthic organisms are expected to recover and inhabit the substrate within the borrow areas over time. Other potential adverse effects include: vessel strikes; behavioral alterations due to sound, light, and structures; increased turbidity and sedimentation; changes to soft bottom bathymetry in the borrow area during dredging; and temporary loss of prey items and foraging habitat (USACE, 2015).

Water quality concerns are of particular importance in the maintenance of this habitat. During dredging, suspended materials may interfere with the diversity and concentration of phytoplankton and zooplankton, and therefore could affect foraging success and patterns of schooling fishes and other grazers that comprise prey for managed species. Foraging patterns would be expected to return to normal at the end of dredging activities (USACE, 2015).

4.7.2.2 Impacts to Soft Bottom Habitat

Section 4.6.2 provides a detailed analysis of impacts to the soft bottom habitat and infaunal communities following beach nourishment projects.

4.7.2.3 Impacts to Managed Species

Managed species that are known to utilize the marine water column habitats within the proposed project area include several species of the Snapper-Grouper complex. Impacts to the water column during dredging at the borrow area will be minimal based on the low level of expected turbidity from the low silt/fine content of the borrow site sand and relatively short duration of project construction (3 to 5 months).

Impacts to coastal migratory species would also be minor, and indirect impacts should be temporary. As highly mobile species, Coastal Migratory Pelagics and Dolphin-Wahoo should be able to avoid the areas of disturbance. Some of the prey associated with these species may be temporarily displaced but will likely return following project completion.

Coastal Migratory Pelagics

Sandy shoals, offshore sand bars, and the intertidal surf zone are EFH for coastal migratory pelagic species. Direct impacts to intertidal surf zone sand and soft bottom are expected within the project area and may include indirect impacts to the marine water column resulting from short-term turbidity caused by project dredging activities and beach fill equilibration. These impacts will be short term and minor. Direct impacts to coastal migratory species are expected to be minor and indirect impacts are expected to be short-term. As Coastal Migratory Pelagics are highly mobile, any species present in the PAA should be able to avoid the area of disturbance. Although some of the prey associated with these species may be temporarily displaced, they should quickly re-colonize the project area during the first one to two years after fill placement.

Atlantic Highly Migratory Species

The Coastal Highly Migratory Species listed in **Table 12** are unlikely to be affected by dredging and sand placement project activities. These species are highly mobile and able to avoid the area of disturbance. In proportion to the oceanic area utilized by these species, the project area is extremely small. Prey items associated with these species may be temporarily displaced, however, prey items will likely recolonize to pre-project levels within one to two years after fill placement.

The Pelagic Highly Migratory Species occur offshore and do not usually utilize the nearshore habitat within the project area, thus will not be affected by project activities. The pelagic species that do utilize the nearshore habitats are highly mobile and able to avoid the area of disturbance. Additionally, the project area is extremely small in relation to the oceanic area utilized by these species. It is unlikely that these species will be affected by project activities.

Snapper-Grouper Complex

The borrow area is located within EFH for the Snapper-Grouper complex but was determined by remote sensing surveys to be absent of hardbottom and other benthic resources (see **Figure 14**). Many of the species included in the Snapper-Grouper complex utilize habitat within the project area during different stages of their life cycle. The intertidal flats and subtidal soft bottom may provide important nursery habitat, as well as providing high-quality foraging habitat for predators and shorebirds in high-density areas of preferred prey items. Loss of intertidal softbottom habitat as a result of sand placement and expansion of the dry beach will temporarily impact important nursery habitat for managed species within this complex.

Increased turbidity levels may deter certain species of fish from utilizing the project area for foraging or refuge or require additional energy expenditure to locate preferred habitats. Limited visibility in the water column as a result of turbidity could affect foraging and predator avoidance, which depending on the species and life stage, could be detrimental or beneficial. Additionally, increased suspended solids in the water column can hinder growth as the fishes divert energy to continually clear their gills of the sediment. These effects will be limited to the 3 to 5 month construction period and will affect less than 10% of the turbidity mixing zone at the beach nourishment site at any one time.

Penaeid Shrimp

Inshore estuarine habitat, particularly tidal marshes and intertidal flats are important nursery areas for these shrimp species. Direct placement of sand and dredging of the borrow site will cause mortality of benthic infauna in the project footprint reducing the quality of foraging habitat on the intertidal flats and subtidal soft bottom. Impacts to intertidal surf zone infauna are expected to be temporary and short-term with recovery in approximately one to two year.

Spiny Lobster

The sand and soft bottom habitats of the project area are not areas where spiny lobster typically reside; therefore, no impacts to spiny lobster are anticipated.

Atlantic States Marine Fisheries Commission Managed Species

All species managed by the ASFCM have the potential for temporary impacts during project construction. Adult and juvenile life stages of Bluefish and the adult, juvenile and larval stages of the Summer Flounder and Red Drum are common in the coastal and estuarine waters of Florida. The intertidal flats and water column within and adjacent to the project area provide EFH for the two ASMFC fish species that occur in the area. This area is an important nursery habitat for juvenile Bluefish and Summer Flounder as well as providing habitat for larval Summer Flounder. These species are predatory feeders; common prey items for each of these species are typical in the habitats found within the project area. Loss of habitat and reduction in the availability of prey items will temporary impact all life stages of the Bluefish, Red Drum, and Summer Flounder.

4.8 HISTORIC AND CULTURAL RESOURCES

In 2005, the USACE consulted with the SHPO regarding initial project development and upon the recommendation of the SHPO and Miccosukee Tribe of Florida, the shoreline area was surveyed for cultural resources (DHR letter # 2005-3337, Miccosukee Tribe letter dated April 19, 2005 - see Appendix F in the USACE Feasibility Study). The survey conducted by USACE did not identify any historic properties within the immediate project footprint. USACE determined that the use of the shoreline area would have no effect on historic properties (DHR letter #2010-03935-C, THPO#0067452005 - see Appendix F in the USACE Feasibility Study).

The USACE Jacksonville District completed a remote sensing survey of Borrow Area 3A and the Federal project nearshore areas in July 2019 (Panamerican Consultants Inc., 2019). The Local project borrow area is located within Borrow Area 3A. No magnetic anomalies or sonar contacts were found within Borrow Area 3A. The results were coordinated with the Florida State Historic Preservation Office (SHPO). By letter dated

September 26, 2019, SHPO concurred that sand borrowing activities in Borrow Area 3A will have no effect on historic properties (DHR Project No. 2019-5234).

Panamerican Consultants identified three targets in the Federal nearshore placement area which have the potential to represent significant historic cultulral resources. By letter dated September 26, 2019, SHPO concurred with the USACE and BOEM that sand placement activities will have no effect on historic properties contingent upon avoidance of the three targets with buffers ranging between 100 ft and 150 ft. A copy of the SHPO concurrence letter is provided in **Appendix 2**. The STOF-THPO also concurred that avoidance of the three targets with buffers would avoid impacts to possible archaeological, historical, or burial resources of the Seminole Tribe (**Appendix 2)**.

Based on the results of October 2019 remote sensing survey of the four pipeline corridors for the Local project, there are no culturally significant resources in the pipeline corridor locations (Tidewater Atlantic Research, 2019). The pipeline corridors have been approved for use by SHPO for the Local project with a no effect determination for historic properties by letter dated March 13, 2020 (**Appendix 2**).

The Preferred Alternative will beneficially affect historic properties located immediately west of the project area. Placement of beach fill along the shoreline will serve as a protective buffer for historic resources in the immediate vicinity of the project area (USACE, 2015).

4.9 SOCIO-ECONOMIC

Construction equipment on the beach may have a minor effect on tourism interests at Flagler Beach for the duration of construction (3 to 5 months). Following project construction, the long-term result of dune restoration will have an overall increased value to properties abutting the beach. Construction of the dune will require removal or burial of existing publicly and privately-owned boardwalk crossovers from SR A1A to the beach. The loss of private access to the beach may pose an impact of hardship to affected property owners. The public crossovers will be replaced as part of the project.

4.10 AESTHETICS

Construction equipment on the beach will be aesthetically unappealing for the duration of construction. The duration of constructed is estimated to be 3-5 months. The project will result in a wider, more aesthetically pleasing beach. Also, reconstruction of the dune includes planting native upland dune species that will result in improved aesthetics.

4.11 RECREATION

The use of Flagler County beaches within the project limits is currently subject to erosion after significant storm events. The proposed Local project would cause a temporary impediment to recreational usage where beach fill placement and distribution of fill material occur within the project limits. This impediment will be slightly longer for the Local project compared to the Federal project but the extended beach width and stabilization of the project area beaches would provide greater long-term benefits to recreational opportunities than the current beach and dune systems provide such as beach access, surfing, shore fishing, and wildlife viewing. Preserving recreational opportunities benefits the local economy in Flagler County (USACE, 2015).

Recreational use of Borrow Area 3A is minimal. There is no documentation to suggest that Borrow Area 3A is utilized by commercial fisherman. Recreational fishermen may be required to alter their fishing locations during dredging; this impact would be short term and limited to the 3 to 5-month period of construction. The temporary interruption of access to the FCBA within Borrow Area 3A should not adversely impact recreational and commercial fishermen. The seabed in Borrow Area 3S is representative of the surrounding Flagler Sand Wave geomorphologic unit (USACE, 2015), and the bottom topography extends into surrounding waters, providing similar benthic habitat functions and fishing opportunities.

Dredging of Borrow Area 3A may result in increased complexity of bottom topography with higher relief/rugosity of ridges within dredged areas and possible remobilization of carbon-rich substrate to the sediment surface (Michel et al., 2013). This could potentially create preferred microhabitats for foraging and shelter for many fish species and macroinvertebrates. In turn, this could create new opportunities for recreational fishermen following project completion.

4.12 COASTAL BARRIER RESOURCES

The proposed project does not include construction of structures that would require Federal Flood Insurance. Federal expenditures for the proposed project are not restricted in the Gamble Rodgers Memorial SRA OPA (USACE, 2015). The FCBA is located approximately 12 miles seaward of OPA Unit P07P (see **Figure 16**); therefore, there is no federal action related to BOEM’s decision to authorize OCS sand resources.

4.13 WATER QUALITY

Temporary increases in turbidity in the immediate vicinity of construction may occur. This will cause short-term impacts to water quality in the PAA. The State of Florida water quality regulations require that water quality standards not be violated during construction. The standards state that turbidity shall not exceed 29 NTU's above background. Should turbidity exceed these standards as determined by monitoring, the contractor will be required to cease work until conditions return to normal. The borrow area sand has a low percentage of fine-grained material such that the increased turbidity at the borrow area during excavation should be minimal and less than the turbidity increase along the shore during renourishment (USACE, 2015).

During beach construction, Flagler County will employ best management practices (BMPs) to minimize turbidity, including construction of a shore-parallel sand dike and a minimum setback between pipeline discharge and open water. The sand with the FCBA has a similar mean grain size as the native beach and is expected to maintain the general environmental character and functionality of the material on the native beach.

4.14 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

No known hazardous, toxic, or radioactive wastes occur in the project area. There is a potential for hydrocarbon spills with dredging and construction equipment. Accident and spill prevention plans will be specified in the contract and should prevent the release of any hazardous or toxic waste during dredging activities.

4.15 AIR QUALITY

The short-term impact of emissions by the dredge and other construction equipment associated with the project will not significantly reduce air quality. Flagler County is an attainment area. FDEP does not regulate marine or mobile emission sources (construction equipment) in attainment areas. No air quality permits will be required for this project (USACE, 2015).

4.16 NOISE

Marine mammals, sea turtles, and fisheries can all be affected by dredge noise. Effects can vary depending on a variety of internal and external factors and can be divided into masking (obscuring of sounds of interest by interfering sounds, generally at similar frequencies), response, discomfort, hearing loss, and injury (MALSF, 2009). Deeper water operations may propagate sound over greater distances than those in confined nearshore areas (Hildebrand, 2004; USACE, 2015).

Broadband and continuous sound, mainly at lower frequencies is produced by dredging to extract marine aggregates. The small amount of data available indicates that dredging is not as noisy as seismic surveys, pile driving, and sonar; however, it is louder than most shipping, operating, offshore wind turbines, and drilling (MALSF, 2009). Noise associated with dredging activities can be placed into five categories:

1. Collection noise - The noise generated from the collection of material from the sea floor; for example, the scraping of the buckets on a bucket ladder dredge or the operation of the drag head. This noise is dependent on the structure of the sea floor and the type of dredge used.
2. Pump noise - The noise from the pump driving the suction through the pipe.
3. Transport noise - The noise of the material being lifted from the sea floor to the dredge. For trailing suction hopper and cutter suction dredges, this would be the noise of the material as it passes up the suction pipe. For clamshell dredges, it would be the sound of the crane dropping/lifting the bucket.
4. Deposition noise - This noise is associated with the placement of the material within the barge or hopper.
5. Ship/machinery noise - The noise associated with the dredging ship itself. For stationary dredges, the primary source will be the onboard machinery. Mobile dredges will also have propeller and thruster noise (MALSF, 2009) (USACE, 2015).

Field investigations to characterize underwater sounds typical of bucket, hydraulic cutterhead, and hopper dredging operations have been performed (Dickerson et al., 2001). Preliminary findings indicate that cutterhead dredging operations are relatively quiet compared to other sound sources in aquatic environments. Hopper dredges produce slightly more intense sounds similar to those generated by vessels of comparable size. Bucket dredges create very different sounds and are a more complex spectrum of sounds. Hopper dredges produce engine and propeller noise similar to that of large commercial vessels and create sounds of dragheads moving in contact with the substrate (USACE, 2015).

Source levels reported for dredging operations range from 160 to 180 dB re 1 uPa @ 1 m for 1/3 octave bands (equivalent to the sound wave energy of a killer whale whistle) with peak intensity between 50 and 500 Hz (JASCO, 2011; Greene and Moore, 1995). Dredge types differ greatly in the intensity, periodicity, and spectra of emitted sounds. Underwater sound components produced by each type are influenced by a host of factors including substrate type, geomorphology of the waterway, site-specific hydrodynamic conditions, equipment maintenance status, and skill of the dredge plant operator (Dickerson et al., 2001; USACE, 2015).

Dredge-generated noise will be offshore and will not impact the project area shoreline. The noise from equipment at the beach fill site will be relatively low level and will be of a short duration. Equipment such as booster pumps will be properly maintained to minimize effects of noise. Noise levels will drop back to normal levels for the dune and beach area once dredging and material placement have concluded. Noise may temporarily impact some underwater biota but is not anticipated to have an adverse effect since increases to the current noise level from the proposed project will be localized and minor. Construction-related increases in noise are not expected to cause adverse effects to the environment (USACE, 2015).

4.17 PUBLIC SAFETY

Nourishment of the beach and dune will enhance beach recreation. The presence of construction equipment on the beach will create public safety risks at the beach site. Adverse impacts to swimming and surfing are not anticipated due to the narrow scale of beach fill to be placed immediately along the beach face, landward of locations where swimming and surfing occur (USACE, 2015).

4.18 ENERGY REQUIREMENTS AND CONSERVATION

Energy requirements are confined to fuel for the dredge, labor transportation, and other construction equipment.

4.19 NATURAL OR DEPLETABLE RESOURCES

Sand is a natural and depleting resource. Using sand from the offshore borrow area will deplete the sand source in the FCBA over the project life. The sand will be depleted from the FCBA but will enter the nearshore sand transport system. Sand will eventually return to offshore areas and be redistributed over nearshore areas downdrift of the project. It is unlikely that the redistributed sand will be sufficient to refill the Local borrow area to the point where sand resources can be mined from the previously dredged area, resulting in localized depletion of mineable sand resources in the offshore borrow area. The borrow area has been divided between the Federal and

Local project and both borrow areas have been divided into subareas that are prioritized in terms of dredging order (See **Section 1.2.2** of this EA and FDEP Permit No. 0378136-001-JC for the Federal Flagler Beach Shore Protection Project). Contractors will be required to stay within the limits outlined in Contract Specification and project permits.

4.20 URBAN QUALITY

Urban quality would be indirectly positively affected by restoration of lost land due to shoreline recession and an increase in the capacity for recreational beach activity. County Parks, businesses, and residential properties along the project area shoreline will benefit from storm protection afforded by the nourished beach and will be a lower for property damage. Construction equipment on the beach would temporarily detract from the aesthetics of the environment, thereby possibly temporarily affecting the visual aesthetics associated with urban quality in Flagler County (USACE, 2015).

4.21 SOLID WASTE

No impacts related to solid waste are expected as a result of the proposed project. Precautionary measures will be included in the contract specifications for proper disposal of solid wastes. These precautionary measures included proper containment and avoidance of overflow conditions by emptying containers on a regular schedule. Disposal of any solid waste material into Atlantic waters will not be permitted.

4.22 DRINKING WATER

No municipal or private water supplies are located in or near the project site; drinking water supplies will not be impacted by implementation of the Preferred Alternative.

4.23 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7). This cumulative impact analysis summarizes the impact of such cumulative action by identifying the impacts of the proposed project in terms of related past, present and reasonably foreseeable future actions that are related to the proposed project either geographically or otherwise impacting the same resources.

Cumulative impacts are summarized in **Table 14** as actions by identifying the past, present, and reasonably foreseeable future condition (50 years) of the various resources which are directly or indirectly impacted by the proposed action and its alternatives. This table illustrates the with-project and without-project condition (the difference being the incremental impact of the project) and the future condition with any reasonable alternatives (or range of alternatives) (USACE, 2015).

Other actions affecting similar resources or ecosystem were considered as part of the evaluation of cumulative impacts pursuant to CEQ 1997 *Considering Cumulative Effects under the National Environmental Policy Act*. No other projects exist in the region that share a similar ecosystem that could have cumulative impacts on similar resources. There are active beach nourishment projects in Northeast Florida in Nassau, Duval, and St. Johns Counties. These projects have separate sufficient sand resources identified, which will not be impacted by the proposed project. South of Cape Canaveral, in the southeast region of Florida, beach nourishments projects will not impact the borrow areas identified for the proposed project. The proposed project will not impact or be impacted by any inlet maintenance project within the region. The closest maintained inlets to the proposed project are the St. Augustine Inlet located approximately 33 miles north of the project area and Ponce inlet locate approximately 29 miles south of the project area (USACE, 2015).

Table 14. Summary of Cumulative Effects (USACE, 2015).

	Boundary (time and space)	Past (baseline condition)	Present (existing condition)	Future without project (No Action)	Future with Proposed Action
Sand Resources	Pre- development to 2062, Flagler County	Offshore sand resources identified for this project have never been used for beach nourishment or other purposes	Sufficient offshore sand resources exist for all beach nourishment projects in northeast Florida including the proposed project	Offshore sand resources identified for this project will not likely be utilized for other shore protection activities in other areas of Florida	Offshore sand resources identified for this project will be reduced, but not depleted over the life of this project
Protected Species	Pre- development to 2062, Flagler County	More abundant and widespread	Individuals becoming increasingly rare; habitat shrinking	Individuals are not acutely affected by dredging; however, beach habitat continues to shrink	Individuals may be affected by dredging and placement activities; habitat is sustained for life of project. Loss of private access cross-overs may impact dune from foot traffic through vegetation, and nesting areas for sea turtles and shorebirds.
Dune Vegetation	Pre- development to 2062, Flagler County	Abundant vegetative cover of appropriate dune species with moderate diversity	Areas of the shoreline have lost dune and associated vegetation from armoring. Existing dunes are subject to erosion resulting in loss vegetation.	Areas containing vegetated dunes will continue to erode causing stress to plant species and lessen diversity	Reconstruction of dunes will stabilize the coastal ecosystem. Replanting with appropriate native species will increase diversity and improve overall dune habitat.
Water quality	Pre- development to 2062, Flagler County	Pristine	Increasingly degraded due to anthropogenic actions	No change to present condition	Temporary increases in local turbidity; no long-term change to degraded state
Socio-Economic	Pre- development to 2062, Flagler County	More abundant tourism and property values, fluctuating with national economy	Increasingly degraded beach has negative impact on tourism industry and property values.	Loss of revenue from decreased tourism. Property values decline. Boardwalk structures will become undermined and unstable.	Privately owned boardwalk cross-overs will be removed or buried. Easements will compensate property owners for replacement cost for private access to the beach

4.24 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.24.1 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. The use of sand from the proposed borrow areas would, for all practical purposes, irreversibly deplete the suitable sand reserves. The sands would not replenish fast enough to be of much value to future nourishment projects.

4.24.2 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 armoring. Environmental impacts caused by use of the borrow sites for placement on the dune and beach would be small since only a featureless, sandy bottom would be impacted.

4.25 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Relatively non-motile infaunal invertebrate species that inhabit the softbottom habitats at the borrow area and beach fill site will unavoidably be lost during dredging and direct burial during beach sand placement. Species that are not able to escape the construction area are expected to re-colonize after project completion (USACE, 2015).

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

Motile epifaunal invertebrate species (benthic animals that live on the substrate surface) may inhabit the borrow areas and placement site. Motile organisms such as fish, crabs, and sand dwelling organisms should be able to escape the area during construction. Many species that are not able to escape the construction area are expected to re-colonize after project completion (USACE, 2015).

4.27 INDIRECT EFFECTS

A study for the U.S. Army Corps of Engineers Institute for Water Resources in 1995 found no evidence that beach nourishment projects induce development along the protected shoreline (Cordes and Yezer, 1995). Pilkey and Dixon (1996) stated 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 noted that beach nourishment projects can encourage more development in coastal areas. Investment in new and updated facilities substantially increased tourism following a beach nourishment project in Miami in 1982 (National Research Council, 1995). Building density increased adjacent to the beach as older buildings were replaced by much larger buildings to accommodate additional beach users (USACE, 2015).

Increased shoreline development may increase human disturbance to nesting shorebirds by increased recreational pressure on the beach. Shoreline development may support larger populations of mammalian predators, such as foxes and raccoons, and increase the potential for adverse effects to sea turtle nesting habitat due to artificial lighting. Development along the Flagler County project area shoreline is nearly at its maximum capacity. The proposed Flagler County Beach and Dune Nourishment Project is not expected to increase the potential for new shoreline development along the project area shoreline (USACE, 2015).

4.28 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The Preferred Alternative is compatible with Federal, State, and Local objectives of protecting upland properties while maintaining a natural beach. It also provides the most cost-effective option for meeting these objectives. The No-Action Alternative does not meet the Federal, State, and Local objectives (USACE, 2015).

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EA-Appendix 1

Biological Assessment

FINAL BIOLOGICAL ASSESSMENT
FLAGLER COUNTY
BEACH AND DUNE RESTORATION PROJECT

FLAGLER COUNTY, FL

USACE FILE NO. SAJ-2019-02065
FDEP PERMIT NO. 0379716-00-JC

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MARCH 2020

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1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT- CFR 402.12(a)

This Biological Assessment (BA) has been prepared to fulfill the U.S. Army Corps of Engineer (USACE) and Bureau of Ocean Energy Management (BOEM) requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. This BA evaluates the potential impacts of the proposed beach/dune restoration project on federally listed endangered and threatened species, and describes the avoidance, minimization and conservation measures proposed by the Applicant, Flagler County.

This BA is offered to assist the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) personnel in fulfilling their obligations under the ESA [50 CFR 402.12(c)(f)]. The BA specifically requests concurrence that the Reasonable and Prudent Measures and Terms and Conditions of the USFWS Statewide Programmatic Biological Opinion for Shore Protection Activities along the coast of Florida for nesting sea turtles issued on March 13, 2015, as well as the Terms and Conditions of the USFWS Programmatic Biological Opinion for piping plover (P^3BO) issued on May 22, 2013, are applicable to the project. Flagler County also requests concurrence that the Terms and Conditions and Reasonable and Prudent Measures of the NMFS South Atlantic Regional Biological Opinion (2020) are applicable to the proposed project since it will be constructed with a hopper dredge.

1.2 FEDERAL PROJECT

Flagler County has 18 miles of Atlantic Ocean shorefront. The USACE Hurricane and Storm Damage Reduction Project (Federal Project) will place approximately 550,000 cubic yards (cy) of sand along 2.6 miles of shoreline between FDEP control monuments R-80 and R-94 in the City of Flagler Beach (**Figure 1**). The proposed Flagler County Beach/Dune Restoration Project (Local Project) will extend the limits of the Federal beach fill construction north and south of the Federal project limits, adding about 3.7 miles of restored shoreline following project construction (R-64.5 to R-80 and R-94 to R-101). Depending on the timeline for permit issuance, the two projects may be constructed in conjunction with one another, thereby utilizing the Federal project dredge mobilization for the local project.

The Federal project was evaluated by the USACE with BOEM acting as a cooperating agency in an integrated Feasibility Study and Environmental Assessment in 2014 (revised in 2015). The Federal project evaluation included the reaches of the local County project; however, these reaches will now be constructed by Flagler County because the benefit to cost ratio for those areas was too low to justify the use of Federal funds for construction. The Finding of No Significant Impact (FONSI) for the Federal project was signed on January 22, 2016. Both the Federal and Local projects will utilize portions of the same offshore borrow area (Borrow Area 3A). Because the sand borrow area is located in Federal waters (more than 3 nautical miles offshore) on the Outer Continental Shelf (OCS), BOEM has the authority to authorize excavation of sand from Federal waters. Portions of Borrow Area 3A have been divided between the USACE and County projects (**Figures 1** and **2**). The Local project portion of the borrow area is referred to as Flagler County Borrow Area (FCBA). Excerpts from the 2015 USACE Integrated Study are referenced in this BA where applicable and appropriate.

Beach erosion and dune loss exposed large areas of upland development and infrastructure, including State Road A-1-A, to increased threats from future coastal storms. The proposed County project will restore two reaches of eroded beach along approximately 4.1 miles (6.6 km) of Atlantic Ocean shoreline in Flagler County that were severely impacted by Hurricanes Matthew and Irma. The project reaches are located between FDEP control monuments R-64.5 and R-80 at 6th Street South and between R-94 and R-101 (Flagler/Volusia County line). The Federal beach project is located between these two reach areas from R-80 to R-94 (**Figures 1** and **3**).

The Local project fill areas include both private and public properties. Public parcels are controlled by the Town of Beverly Beach (one parcel), the City of Flagler Beach, and the State of Florida [Gamble Rogers Memorial State Recreation Area (SRA)]. Sections of the project shoreline are designated as critically eroded by FDEP. The beach/dune fill template will require up to 1.4 million cubic yards (Mcy) of sand (approximately 60 cy/ft) for the initial restoration with an expected renourishment interval of 11 years. The scope of future renourishment volumes will be based upon project performance. The borrow area, roughly 345 acres (140 hectares) in size, lies approximately 10.5 nautical miles (NM) offshore of the City of Flagler Beach within a larger sand source area, Borrow Area 3A, identified by the USACE in 2015.

The project will be constructed using a hopper dredge. Four pipeline corridors (three in the northern portion and one in the southern portion of the project) are required for project construction (**Figure 3**). Construction is expected to begin in the fall of 2020 and will last approximately 3 to 5 months.

1.3 PROPOSED ACTION- CFR 402.14(c)(1)

Flagler County beaches were severely impacted by storm surge and waves from Hurricane Matthew in October 2016 and Hurricane Irma in September 2017. In many areas of the project shoreline, the entire primary frontal dune was completely lost.

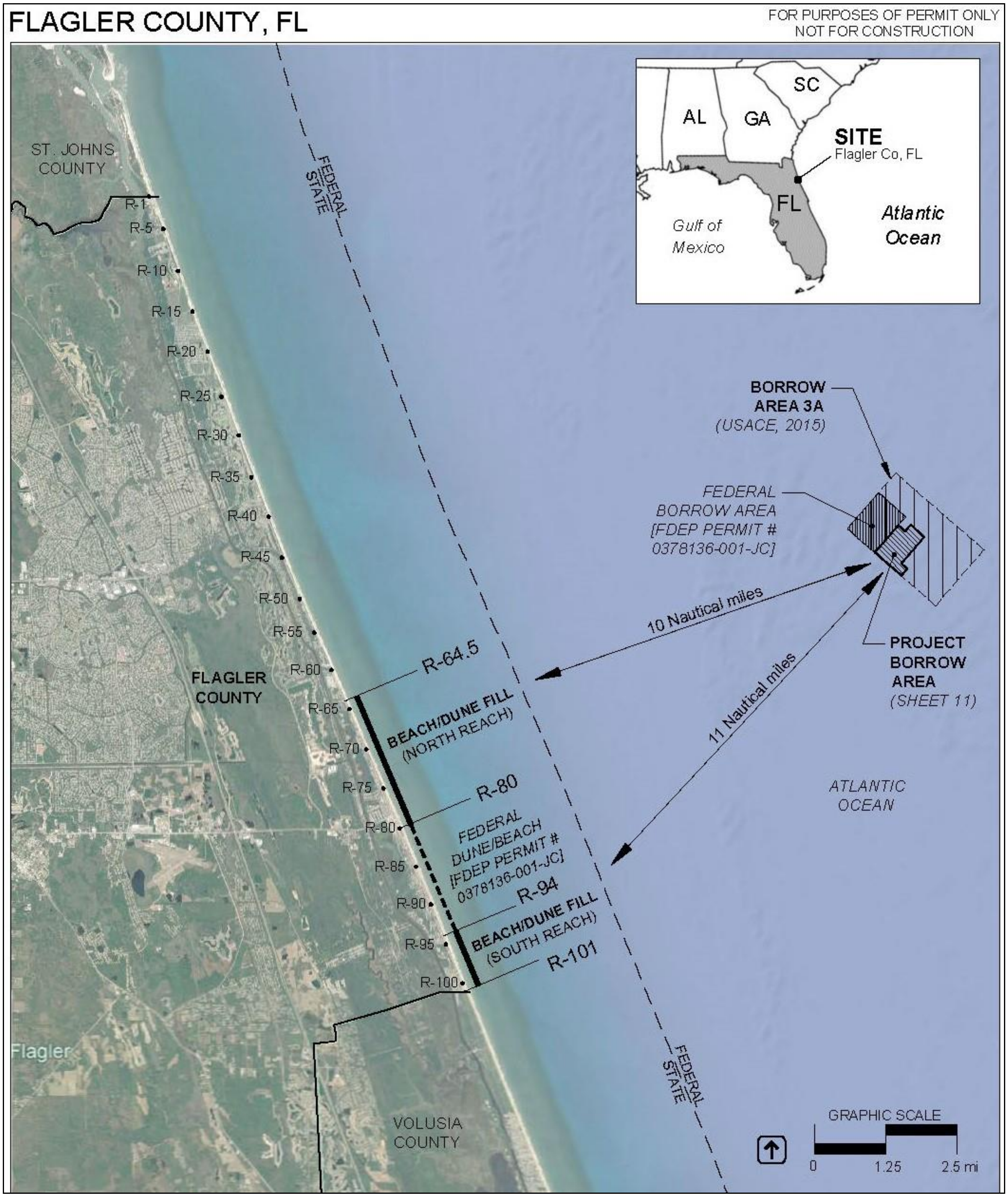


Figure 1. Project location map – Flagler County Dune/Beach Restoration Project.

1.4 ACTION AREA- CFR 402.14(c)(2)

For the purposes of this BA, the Project Action Area (PAA) is defined as all areas to be affected directly or indirectly by the action and not merely the immediate area involved in the action (50 CFR 402.02). The PAA includes the non-federal portion of Borrow area 3A (FCBA) (345 acres of 2,465 total acres available in Borrow Area 3A as defined by the USACE in 2015), the 4.1-mile (6.6 km) long beach fill placement area from R-64.5 to R-80 and R-94 to R-101, and unvegetated softbottom habitat within the 150-m turbidity mixing zone around the borrow area and beach fill placement areas. The borrow area is located approximately 10.5 NM from the shoreline.

The County project will consist of placement of up to 1.3 Mcy of sand during the initial restoration; this may require up to about 1.8 Mcy of dredged sand from FCBA. The FCBA will be dredged to a maximum allowable dredge depth of -62.5 ft NAVD88 plus a 2-foot disturbance buffer to -64.5 ft NAVD88. The expected renourishment interval is 11 years.

The County project will utilize the same staging and beach access areas to be used for the Federal project. One is near the beach access at Gamble Rogers SRA (**Photo 1a/b**). The second is located at the intersection of A-1-A and Highway 100, two blocks north of the Flagler Beach Pier (**Photo 2**). A third staging/access area will be needed at the north end of the project area, north of R-75. The County will locate the north staging area in previously disturbed upland and/or sparsely vegetated dunes to minimize impacts to existing dune vegetation.

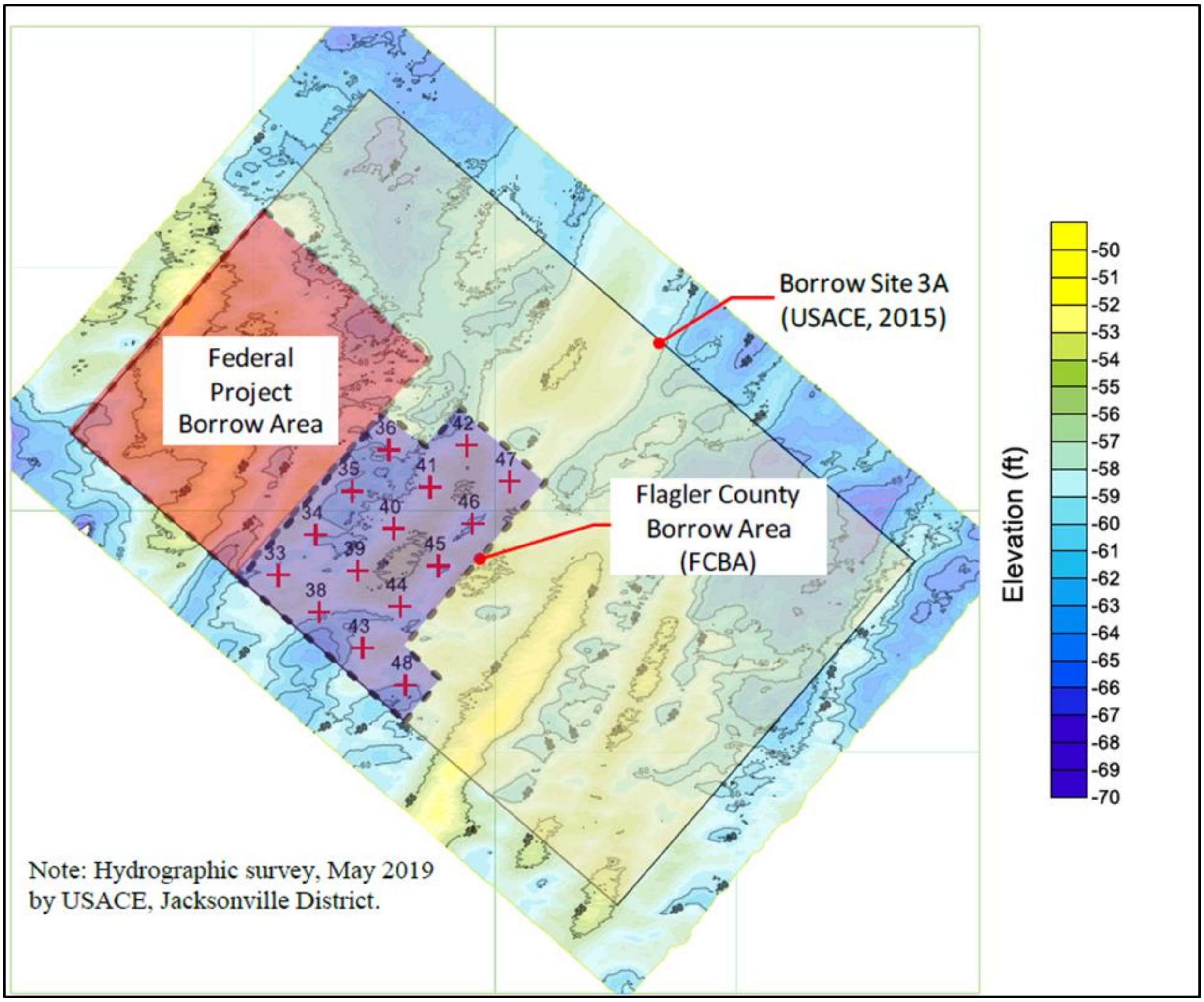


Figure 2. Borrow Area 3A plan view showing the location of the Flagler County Borrow Area (FCBA) with seafloor elevations and 2019 vibracore locations.

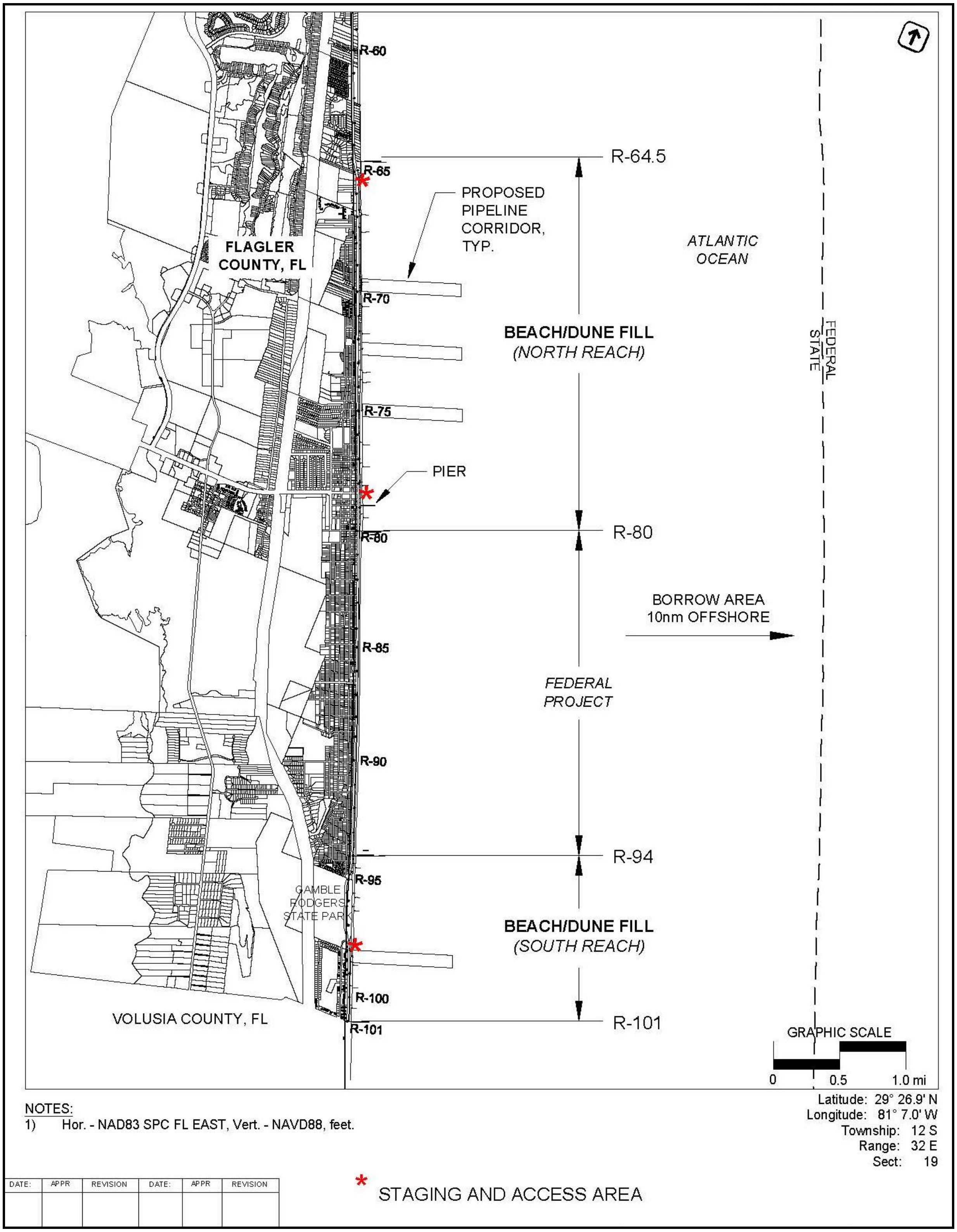


Figure 3. Beach fill placement areas for the Local and Federal projects in Flagler County with the proposed pipeline corridors and staging/access areas for the Local project.

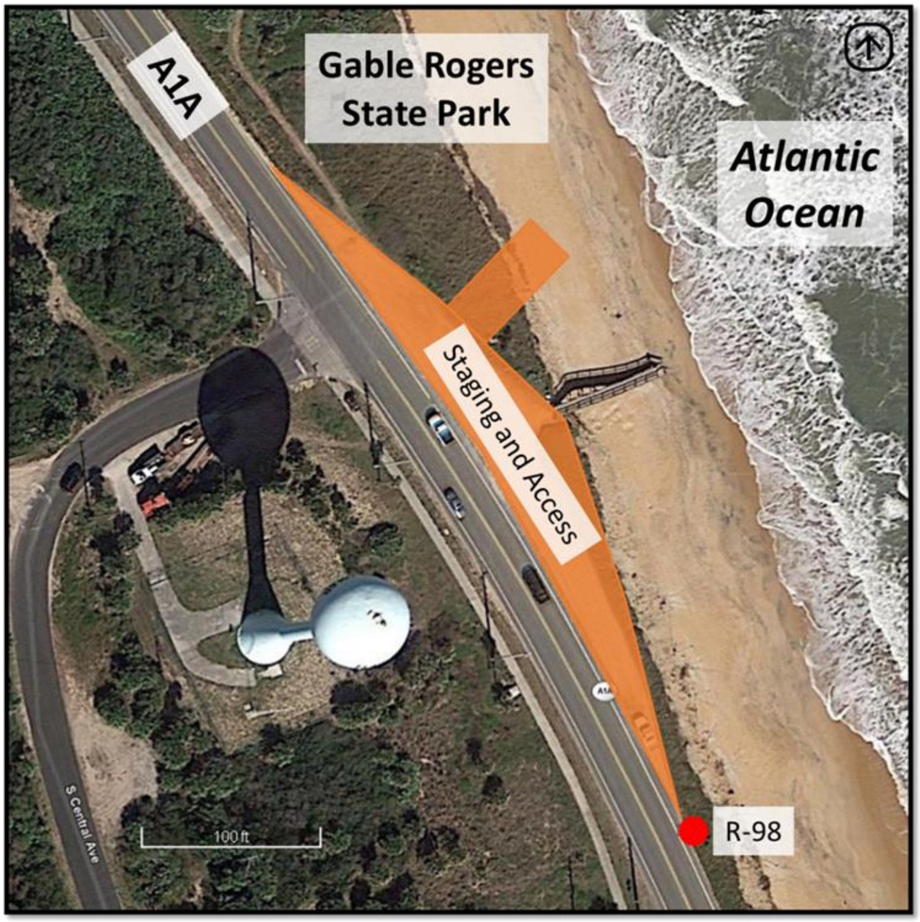


Photo 1a. Staging and access area near the beach access at Gamble Rogers SRA at R-98.

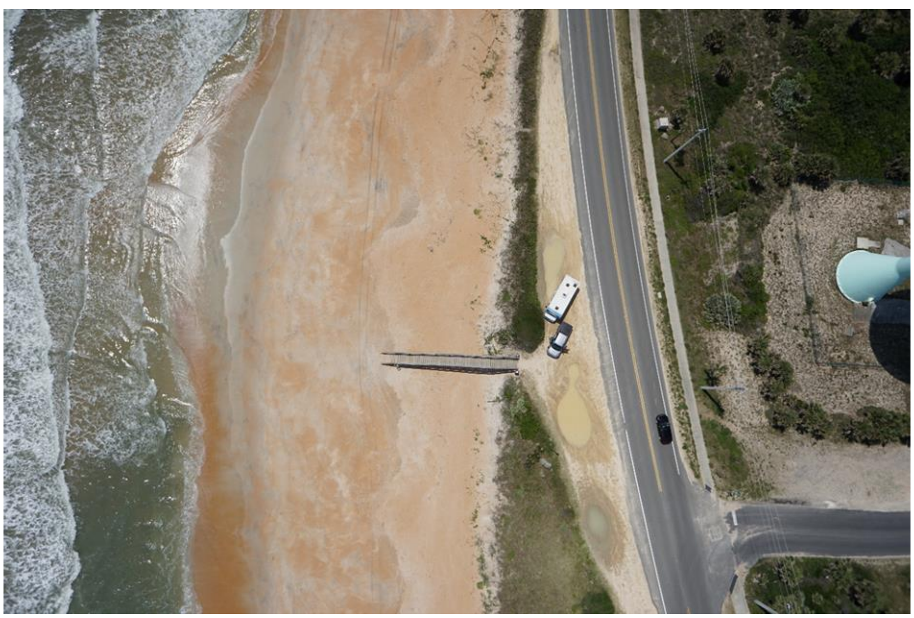


Photo 1b. Overhead view of access area at Gamble Rogers SRA taken on August 7, 2019 by Arc Surveying and Mapping Inc.

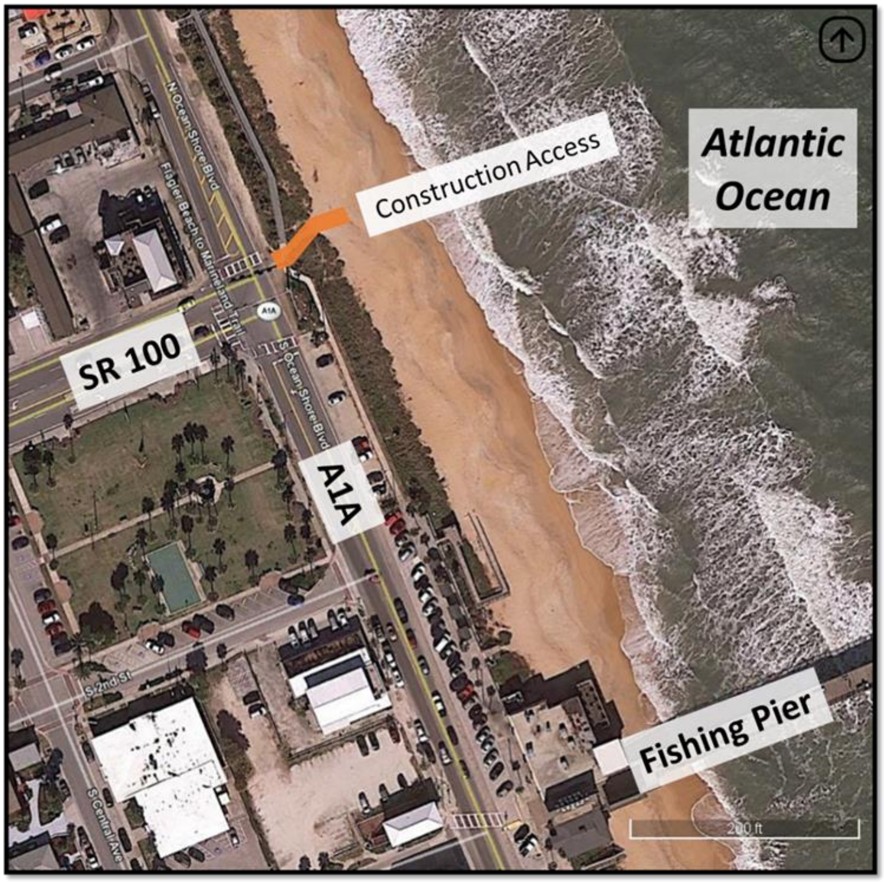


Photo 2. Construction access and staging area near the Flagler Beach Fishing Pier.

1.5 DESCRIPTION OF HABITATS

The shoreline in Flagler County is located on a coastal barrier island that varies in width from approximately 800 ft to 5,000 ft. The Flagler County coastline has no inlets or embayments and is part of a barrier island and mainland complex that extends uninterrupted for about 50 miles from Matanzas Inlet in the north to Ponce Inlet in the south. It is the longest barrier island in Florida. Matanzas Inlet is a non-navigable inlet located approximately 17 miles north of Flagler County in St. Johns County. Ponce Inlet is located approximately 27 miles south of Flagler County in Volusia County. Flagler County's coastal area is bordered by the Matanzas River to the north, Smith Creek and the Intracoastal Waterway (ICWW) to the west, and Volusia County beaches to the south.

Flagler County beaches are usually fronted by a line of dunes which range in height from 10 to 23 feet Mean Sea Level (MSL). The dunes have relatively steep faces composed primarily of coquina shell hash and fine quartz sand (USACE, 2015). There is no submerged aquatic vegetation or hardbottom/reef resources in the PAA. Background water quality will be maintained outside of the mixing zone so no permanent degradation will occur. No significant impacts to biological resources or recreational value are expected.

Intermittent exposure of beach outcrops had been reported north of R-50 along the Flagler County shoreline with possible unconfirmed outcrops within the project area (FDEP, 1999). A side scan sonar survey was conducted offshore of the project area in 2011 in support of the USACE Feasibility Study. The 2011 side-scan survey suggested the presence of “near surface” exposed rock features between the 10 ft and 15 ft contours. These signatures ran perpendicular to the shoreline as isolated features or clusters and were labeled as “presumed hardbottom” in the nearshore hardbottom study by Dial Cordy and Associates in 2011 (**Figure 4**). Ground-truthing of these signatures was not conducted. The USACE conducted follow up study in 2012 to characterize the features identified “presumed rock” in the 2011 DCA study. Georectified areas from the 2011 survey were re-surveyed with higher resolution side scan sonar. No hardbottom features were found during this survey but ground-truthing of signatures by divers was not performed (USACE, 2015).

A high-resolution aerial photography and nearshore side scan survey of the project area was conducted in June 2019. The side scan survey also included the four pipeline corridors. Divers from Coastal Eco Group Inc. (CEG) conducted 15 verification dives on July 16, 2019 on features that were similar in appearance to the “presumed hardbottom” in the 2011 survey (Dial Cordy and Associates, 2011) (**Figure 5**). These features did not appear to represent consolidated hardbottom; they were irregular in shape and occurred throughout the entire project area shoreline. The 15 dive sites included representative signatures within the pipeline corridors and nearshore environment, immediately offshore of the projected ETOF and landward of the ETOF. No hardbottom was found at these 15 sites. The bottom consisted of sand and/or shell hash in the nearshore areas (**Photo 3**) and sand and muck in the offshore areas in the pipeline corridors.

While FDOT and private interests have significantly armored sections of its shoreline to provide some level of erosion and storm damage protection to threatened areas, the Flagler County shoreline remains one of the least armored shores along Florida’s east coast (Bush et al, 2004). The USACE shoreline surveys in February 2009 revealed prominent sections of shoreline armor in Flagler County. There have been no significant beach nourishment efforts within this project area. The County recently completed a small dune project that placed approximately 6 cy/ft. of sand above the MHW line north of the PAA. Much of the shoreline in the PAA is unarmored (**Photo 4**).

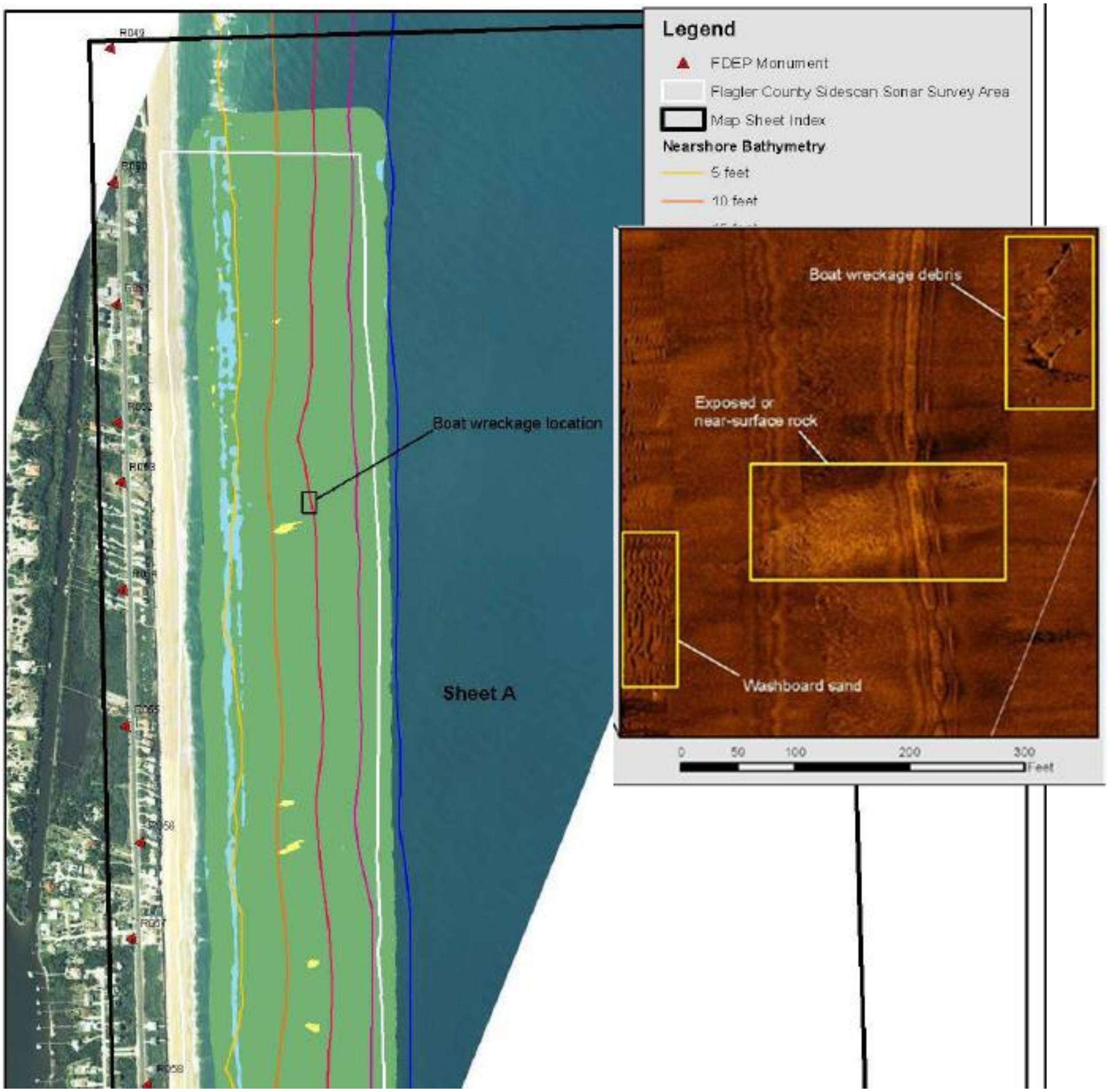


Figure 4. Left: Map of "presumed rock" features from 2011 side scan sonar (isolated, shore-perpendicular yellow features). Right: Close-up of 2011 side scan sonar showing boat wreckage and feature interpreted as "presumed exposed rock" (Source: Dial Cordy and Associates, 2011).

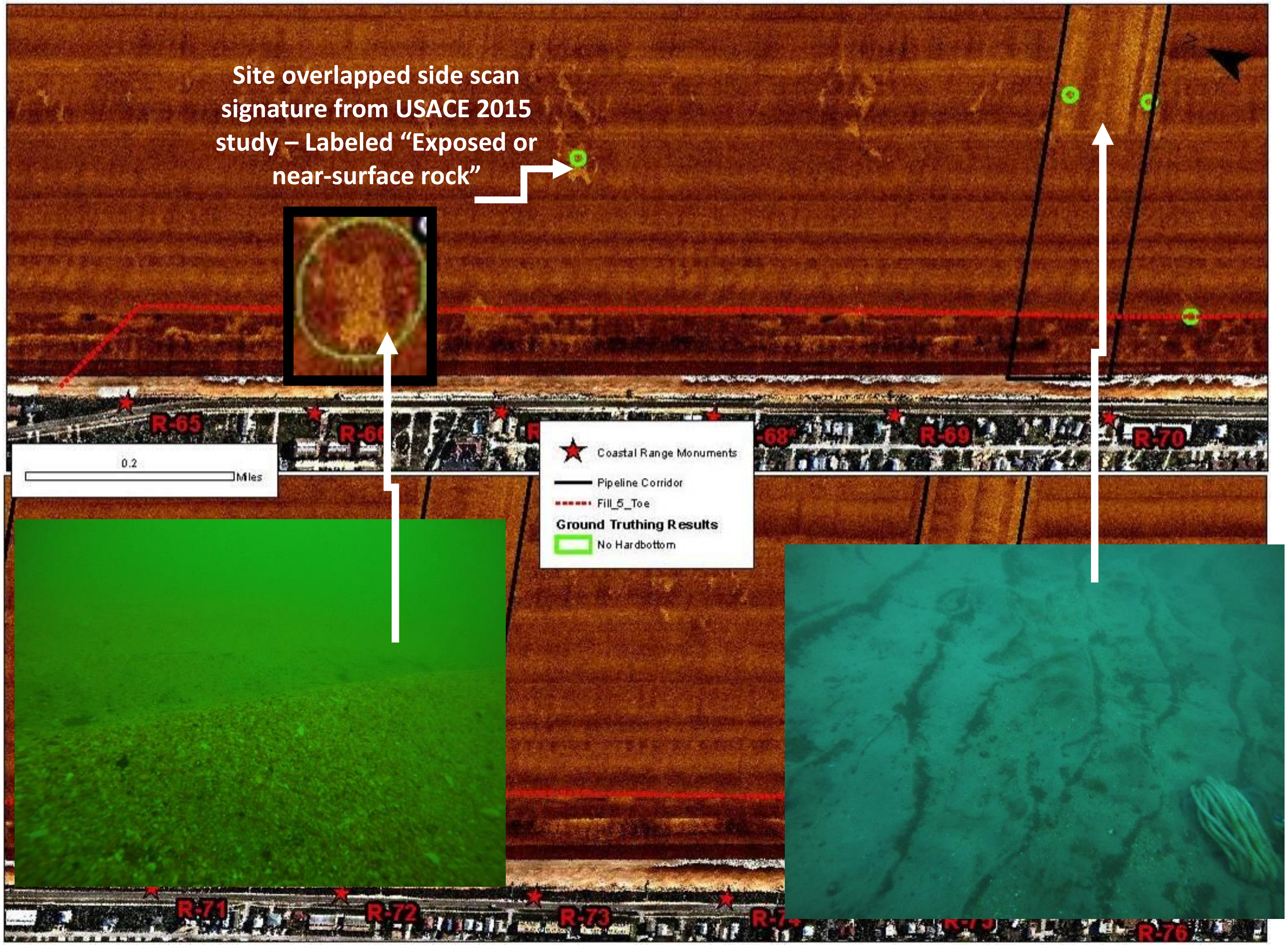


Figure 5. 2019 side scan sonar imagery in the project area showing one signature that overlapped with the 2011 survey (zoom of this feature show in black frame and green circle). No hardbottom was found in 2019.

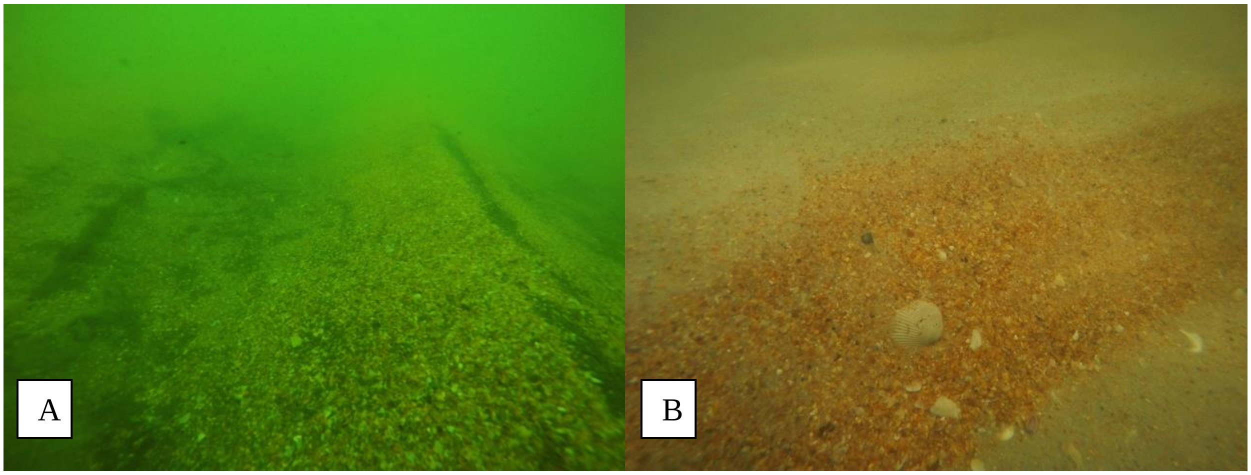


Photo 3. Representative images of ground-truthed side scan sonar signatures from verification dives on July 16, 2019. A) Southern pipeline corridor, B) Landward of the ETOF at R-95.

Photo 4. Beach conditions at R-65 on July 17, 2019.

The project fill area extends along 4.1 miles of Atlantic Ocean shoreline in southern Flagler County. Most of the project area lies along the portion of Flagler County where A-1-A is located immediately adjacent to the beach. Landward of A-1-A, the area is developed with light commercial, single-family residence, condominiums, hotels, and resort areas. Approximately 0.5 miles of the project shoreline lies within Gamble Rogers State Recreation Area (SRA). The beach dune vegetation is a predominantly herbaceous plant community consisting of wide-ranging coastal species on the upper beach and foredune. These areas are classified as coastal scrub (FLUCCS 322). This community is built by sea oats *(Uniola paniculata)* and grasses that can tolerate sand burial including bitter panic grass (*Panicum amarum*) and saltmeadow cordgrass (*Spartina patens*) (Myers and Ewel, 1990). Camphorweed *(Hetrotheca subaxillaris)* grows with sea oats often where sand burial is absent or moderate within a disturbed community. Seacoast marsh elder *(Iva imbricata),* a succulent shrub, is found at the seaward base of the foredune. These species may also occupy the face left from dune disturbance due to storm erosion where sand is not yet stabilized by vegetation (Myers and Ewel, 1990).

The upper beach area (seaward of the foredune) is less stable and frequently disturbed by high spring or storm tides, and is continually re-colonized by annual species such as sea rocket *(Cakile lanceolata.),* crested saltbush (*Atriplex cristata)*, and Dixie sandmat (*Chamaesyce bombensis);* or by trailing species like railroad vine *(Ipomoea pes-caprae),* beach morning glory *(Ipomoea imperati)*, and the salt-tolerant grasses seashore paspalum (*Paspalum vaginatum*) and seashore dropseed (*Sporobolus virginicus)* (Taylor, 1998). Other species found in the beach dune community include dune sunflower *(Helianthus debilis),* sand spur *(Cenchrus spp.)*, and shoreline seapurslane *(Sesuvium portulacastrum)* (USACE, 2015). **Photo 5** shows existing dune vegetation conditions between R-70 and R-71.

Seaward of the dune vegetation line, the beach fill area is classified as Marine – Unconsolidated Substrate (sand) from the supratidal to subtidal areas. Within this broad unvegetated zone, where the majority of the beach nourishment work will occur, there are several different sub-zones. The area is classified as swimming beach (FLUCCS 181). Seaward thereof is the nearshore open sand/benthic habitat at the shoreline (FLUCCS 652). The remainder of the renourishment project footprint falls into the FLUCCS Water Bodies classification for the sandy/muddy seabed of the Atlantic Ocean (FLUCCS 571).

Photo 5. Existing dune vegetation and beach face between R-70 and R-71.

The proposed Flagler County Beach and Dune Nourishment Project fill area encompasses approximately 50 acres of dry, sandy beach; 67 acres of intertidal flat/surf zone; and 68 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 66 acres of shallow, subtidal habitat that will be gradually affected by beach fill equilibration. Subtidal areas in the project area include unconsolidated bottom habitat which is defined by the USGS as all wetland and deep-water habitats with at least 25% cover of particles smaller than stones and vegetative cover less than 30%.

The 150-m turbidity mixing zone at the beach fill site encompasses an overall total of approximately 67 acres of intertidal habitat and 303 acres of shallow subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 370-acre turbidity mixing zone should be affected by elevated turbidity at any one time, and the effects of elevated turbidity will lessen with distance from the disposal location. The 150-m mixing zone around the 345-acre offshore borrow area encompasses 568 acres of unvegetated, unconsolidated sandy seabed of the Atlantic Ocean.

1.6 ALTERNATIVES CONSIDERED- CFR 402.12(f)(5)

An alternatives analysis was conducted by the USACE for the Federal project (USACE, 2015). The USACE analysis selected beach and dune extension between R-80 and R-94 (i.e., the Federal Project shoreline). The Federal and Local projects are similar in many ways, but the USACE approach towards project selection is different than the Local project. Ultimately, based on the results of the USACE analysis, consistency with the Federal project, and the desires of Flagler County and the FDOT (which provided funding for the Local project), beach and dune restoration is the preferred alternative for the Local project. Detailed description of various project alternatives can be reviewed in

Section 5.2.1 of the Flagler County Hurricane and Storm Damage Reduction Study (USACE, 2015).

1.7 CONSIDERATION OF DREDGING METHODS- CFR 402.12(f)(5)

The project will be constructed using a hopper dredge. Sand will be excavated to an average thickness of approximately 6 ft along relatively straight and adjacent runs along the seabed within the borrow area. Dredged depths will not exceed 8 ft to 10 ft. Relocation trawling is not currently proposed since the project will be constructed outside of sea turtle nesting season beginning in the fall of 2020. If relocation trawling is deemed necessary to minimize the potential for sea turtle take during hopper dredging operations, it would be conducted in compliance with the Terms and Conditions of the 2020 SARBO.

Dredged sand will travel through the dragheads into the dredge's open hopper; most of the effluent will drain out the overflow structures. The vessel(s) will transport the dredged material from the offshore borrow area, a distance of approximately 10 NM, to pump-out locations positioned approximately 0.5 mile from shore. The material will be pumped from the hopper via a submerged pipeline to the beach. The pipelines will only be deployed within the four approved pipeline corridors located perpendicular to the shoreline. Pump-out buoys and the submerged pipelines will be relocated several times to facilitate pump-out along the entire nourishment project area. Pipeline will be rafted, floated into place, flooded, and submerged to the sea floor. Placement and relocation of the nearshore mooring buoys may involve the use of tender tugboats and a barged pipeline hauler or crane. Pump-out buoys may be anchored using multi-ton point anchors and/or clump weights placed within previously cleared corridors. Support vessels and tugs may support the hopper dredge in other activities, such as crew rotations and pump-out connection.

Beach fill will be placed using a trailing suction hopper dredge and direct pump-out to the project shoreline. As sand is delivered to the beach, shore pipe will be added as necessary to advance the beach fill alongshore and move the discharge point along the beach. The sand/water slurry will be controlled with a continuously maintained sand dike that allows sediment to settle out of suspension before water flows back to the ocean. Earth-moving equipment will be used to continually maintain the dike and disposal area and shape the beach fill and dune to the required design template.

2.0 STATUS OF LISTED SPECIES AND HABITAT IN THE ACTION AREA– CFR 402.12(c)(f) & 402.14(c)(2)(3)

In the assessment of potential impacts of the proposed beach nourishment project on federal endangered and threatened species, CEG conducted a review of databases prepared by the Florida Fish and Wildlife Conservation Commission (FWCC), USFWS, and NMFS; and searched for scientific data, literature and unpublished reports to determine species distributions and habitat requirements; and interviewed recognized experts on listed species, including local authorities and Federal and State wildlife personnel. Literature sources consulted during preparation of this BA include federal status reports and recovery plans, peer-reviewed journals, and environmental documents.

Table 1 presents a list of federally threatened and endangered species with the potential to occur within the vicinity of the PAA. State imperiled shorebirds and the gopher tortoise (*Gopherus polyphemus*) are included in this section due to overlapping requirements of many shorebirds and to simplify project review for FDEP/FWCC. **Section 3.0** is limited to a review of effects on federally listed species in compliance with the ESA.

Table 1. Federally threatened and endangered and state imperiled species with the potential to occur within the vicinity of the PAA.

Common Name	Scientific Name	FWC	FWS/NMFS
Fish			
Smalltooth Sawfish	*Pristis pectinata*	E	E
Giant Manta Ray	*Mobula birostris*	T	T
Reptiles			
Atlantic Loggerhead Sea Turtle	*Caretta caretta*	T	T/CH
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
Atlantic Green Sea Turtle	*Chelonia mydas*	T	T
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	E
Gopher Tortoise	*Gopherus polyphemus*	T	NL
Birds			
Black Skimmer	*Rhynchops nigers*	T	NL
Piping Plover	*Charadrius melodus*	T	T
American Oystercatcher	*Haematopus palliatus*	T	NL
Least Tern	*Sterna antillarum*	T	NL*
Rufa Red Knot	*Calidris canutus rufa*	T	T
Mammals			
Fin Whale	*Balaenoptera physalus*	E	E
North Atlantic Right Whale	*Eubalaena glacialis*	E	E/CH
Humpback Whale	*Megaptera novaeangliae*	E	E
Sei Whale	*Balaenoptera borealis*	E	E
Sperm Whale	*Physeter macrocephalus*	E	E
West Indian manatee	*Trichechus manatus*	T	T

Notes: E=Endangered; T=Threatened NL=Not Listed; CH=Critical Habitat*Denotes other portions of population are Federally listed. FWS = U.S. Fish and Wildlife Service; NMFS=National Marine Fisheries Service (Federal listing) FWC=Florida Fish and Wildlife Conservation Commission (State listing)

American Oystercatcher (*Haematopus palliatus*)
The American Oystercatcher is listed as threatened by FWC (December 2016), and a Species of High Concern in the U.S. Shorebird Conservation Plan (Brown et al., 2001). This listing is based on its small overall population (11,000 individuals), widespread habitat loss, and disturbance from increased development, high recreational pressure, and elevated predation from predators associated with human activity along the eastern and Gulf of Mexico coastlines of the United States (Schulte et al., 2007). The species occurs only in the coastal zone in areas that support intertidal shellfish beds. On the east coast of Florida, American Oystercatchers winter from the northern border of the state south to Palm Beach County.

No American Oystercatchers were reported to the Florida Shorebird database between 2014 and 2019. Review of the eBird database records from 2014 through 2019 found two records of birds in the project area at the Flagler Beach Fishing Pier, both were in 2016. Three birds were recorded on January 18, 2016 and four (4) were documented on March 21, 2016. Due to its rarity in the PAA, this species is not expected to be impacted by project-related activities.

Wilson's plover (*Charadrius wilsonia*)
The Wilson's plover is currently not listed; however, this plover utilizes similar habitats as the piping plover in the southeastern United States. Wilson's plover has breeding populations along both Atlantic and Gulf coasts from southern New Jersey (rare) and Maryland to Florida and Texas, and winters chiefly along Gulf Coast and in Florida (Audubon, 2018). Between 2014 and 2019**,** the eBird database had a single record of one individual south of the Flagler Beach Fishing pier on December 28, 2018.

Whales
Five, federally protected, endangered whale species are of potential occurrence in the Atlantic Ocean along the east coast of Florida: North Atlantic right whale (*Eubalaena glacialis*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), sei whale (*Balaenoptera borealis*), and sperm whale (*Physeter macrocephalus*). Only the humpback whale and North Atlantic right whale are regularly sighted along coastal Flagler County due to their migration patterns from feeding grounds in New England to birthing grounds in the Caribbean Sea.

A humpback sighting off Flagler Beach was reported on January 1, 2020, and humpback whale sightings offshore of Flagler and Volusia County were reported daily to the Marine Resources Council during the first week of January 2020 (Daytona Beach News Journal, 2019). Daily sightings of humpback whales are common offshore in Flagler and Volusia County during the month of January as the whales migrate along the Gulf Stream. Humpbacks feed only in the summer; during winter and breeding, they live off their stored fat deposits.

While it is unlikely that humpback whales would be found in the vicinity of the borrow area during excavation operations, the Contractor will be required to implement NOAA's Vessel Strike Avoidance Measures to avoid potential encounters with whales.

Critical habitat for the North Atlantic right whale was re-designated in waters adjacent to Flagler County on February 26, 2016 (Southeastern U.S. Calving Area, Unit 2; (FR 2016-01633) (NMFS, 2016). Potential impacts to the North Atlantic right whale and Critical Habitat Unit 2 are evaluated in this document. The remaining whale species are not considered in this BA since these whales are unlikely to be found in the vicinity of the PAA.

Smalltooth Sawfish (*Pristis pectinata*)

The Smalltooth Sawfish (*Pristis pectinata*) has been protected in Florida since 1992, and since 1 April 2003, the species has been listed as endangered under the Endangered Species Act (68 FR 15680) (FWC, 2018a). Smalltooth sawfish were once prevalent along the Atlantic coastline and were commonly encountered from Texas to North Carolina. The present distribution in the United States is generally restricted to southwest Florida; all life stages are found primarily from Charlotte Harbor to the Florida Keys (Seitz and Poulakis 2002; Poulakis and Seitz 2004, International Sawfish Database). More recently, in 2014, two sawfish were spotted in aerial surveys of Broward County in Port Everglades Inlet in southeast Florida, and divers have occasionally reported sightings on reefs offshore of Jupiter and Fort Lauderdale.

Smalltooth sawfish are tropical marine and estuarine fish that reach up to 5.5 m (18.0 ft.) in length (FWC, 2019; NMFS, 2009). Sawfish less than 3.0 m (9.8 ft.) in length are mostly found in shallow coastal waters less than 10 m in depth. Larger adults generally occur at depths greater than 10 m (Poulakis and Seitz, 2004; Simpfendorfer and Wiley, 2005), but are occasionally found nearshore in the spring when most sawfish are born, and mating is believed to occur (FWC, 2019). Smalltooth Sawfish in Florida waters primarily give birth in April and May (FWC, 2019). Juveniles most often inhabit brackish water within one mile of land and are commonly found in sandy bottoms, mud bottoms, oyster bars, docks, seawall-lined canals and piers and utilize red mangrove root systems for predation avoidance (FWC, 2019; Simpfendorfer, 2003). However, due to habitat loss, commercial and recreational fisheries bycatch, and a vulnerable life history, the Smalltooth Sawfish is considered rare (Simpfendorfer, 2002).

Critical habitat for sawfish was designated on October 2, 2009. Critical habitat consists of two units located along the southwestern coast of Florida: the Charlotte Harbor Estuary Unit and the Ten Thousand Islands/Everglades Unit. There is no designated critical habitat for sawfish within the PAA. The Smalltooth Sawfish is not expected to be impacted by project-related activities; therefore, effects to the species are not reviewed in this BA. A determination of No effect is recommended.

West Indian Manatee (*Trichechus manatus*)

The Florida manatee (*Trichechus manatus latirostris*) is a distinct subspecies of the West Indian manatee (*Trichechus manatus*) and has been listed as a protected mammal in Florida since 1893. The manatee was listed as an endangered species throughout its range in 1967 (32 FR 4061) and received federal protection with the passage of the ESA in 1973. Due to habitat improvement and an increase in population, the USFWS reclassified the West Indian manatee (*Trichechus manatus*) from endangered to threatened on May 5, 2017. Critical habitat was designated in 1976 for the Florida subspecies (*Trichechus manatus latirostris*) [50 CFR 19.95(a)] and existing critical habitat designation remains in effect (USFWS, 2017). No critical habitat is located within the project action area.

The West Indian Manatee uses inlet estuaries and the nearby coastal waters to migrate and forage for food. No inlets are located in the project area; therefore, the manatee is not reviewed in this BA. A determination of No effect is recommended.

Giant Manta Ray (*Manta birostris*)
The giant manta ray (*Manta birostris*) was listed as threatened under the ESA throughout its range on January 22, 2018 with an effective date of February 21, 2018 (83 FR 291). Giant manta rays are slow-growing, migratory animals with small, fragmented populations that are sparsely distributed across the world. The giant manta ray is found worldwide in tropical, subtropical, and temperate waters and is commonly observed offshore, in oceanic waters, and near productive coastlines (NOAA, 2020). The species is highly mobile and is frequently observed along the southeast Florida coast.

The most significant threat to the giant manta ray is exploitation for commercial purposes. Giant manta rays are both targeted and caught as bycatch in several global fishes around the world and are most susceptible to industrial purse-seine and artisanal gillnet fisheries (NOAA, 2020).

On December 5, 2019, NOAA determined that designation of critical habitat for the giant manta ray is not supported at this time (84 FR 66652). There are no identifiable physical or biological features essential to the conservation of the species within waters under the jurisdiction of the United States that meet the definition of critical habitat for the giant manta ray.

Due to their highly mobile nature, the giant manta ray is not likely to be affected by hopper dredging operations. If relocation trawling is deemed necessary to minimize the potential for sea turtle take during hopper dredging operations, trawling activities may adversely affect the giant manta ray. Relocation trawling would be conducted in compliance with the Terms and Conditions of the 2020 SARBO.

Other Species
The oceanic whitetip shark (*Carcharhinus longimanus*) is eliminated from further consideration in this BA due to its highly mobile nature. The Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchu*) is also eliminated from further consideration due to the project's long distance from their typical inshore habitat and an inlet. A determination of no effect is recommended for these species.

Of the species and critical habitat listed in **Table 1**, the Applicants believe that the following federally protected species and critical habitat may be potentially affected by the proposed project [50 CFR 402.12(c)]:

- Piping plover *(Charadrius melodus)*
- Rufa red knot (*Calidris canuta rufa*)
- Atlantic loggerhead turtle *(Caretta caretta)*
- Green sea turtle *(Chelonia mydas)*
- Kemp's ridley turtle *(Lepidochelys kempii)*
- Leatherback sea turtle (*Dermochelys coriacea)*
- Hawksbill sea turtle (*Eretmochelys imbricata*)
- North Atlantic Right Whale (*Eubalaena glacialis)*
- Terrestrial Critical Habitat Unit LOGG-T-FL-03 for the loggerhead sea turtle
- Neritic Critical Habitat Unit LOGG-N-15 for the loggerhead sea turtle

The following species are not considered in this BA as the project is considered to have no effect on these species:

- Atlantic Sturgeon (*Acipenser oxyrinchus oxyrinchus)*
- Finback whale (*Balaenoptera physalis*)
- Humpback whale (*Megaptera novaeangliae*)
- Oceanic whitetip shark (*Carcharhinus longimanus)*
- Sei whale (*Balaenoptera borealis*)
- Sperm whale (*Physeter macrocephalus*)
- Smalltooth Sawfish (*Pristis pectinata*)
- West Indian manatee *(Trichechus manatus)*
- Giant Manta Ray (*Manta birostris*)

2.1 PIPING PLOVER

2.1.1 Status and Threats

The piping plover (*Charadrius melodus*) is a migratory shorebird endemic to North America. The adult has yellow-orange legs, a black band across the forehead from eye to eye, and a black ring around the base of the neck. It is one of the most imperiled shorebirds in the United States (Elliott-Smith, et al., 2009). On December 11, 1985 (50 FR 50726; effective January 10, 1986), the piping plover was listed as endangered in the Great Lakes watershed, and as threatened in the remainder of its range in the United States. A five-year review published in 2009 recommended retaining this level of protection for the species (USFWS, 2009). Three distinct breeding populations have been recognized by the USFWS: Atlantic coast (threatened); Great Lakes (endangered); and Northern Great Plains (threatened). Although this species does not breed in Florida, individuals from all three breeding populations winter in Florida.

The numbers and current range of the piping plover have been greatly reduced, especially in the Great Lakes Area. Uncontrolled hunting in the early 1900's drove them almost to extinction. The 2011 International Piping Plover Census, coordinated by the U.S. Geological Survey, estimated a total of 5,723 breeding birds (Elliott-Smith, et al., 2015). The 2011 census documented 306 birds in Florida, none were observed in Amelia Island State Park. The 2009 Five Year Status Review (USFWS, 2009) reported overwintering bird counts for 1991, 1996, 2001 and 2006. The 2006 census recorded 3,355 piping plovers; 133 were observed along the Florida Atlantic coast.

Much of the recent decline in the piping plover population has been attributed to habitat destruction, disturbance by humans and pets, and predation. Piping plovers on wintering and migration grounds respond to intruders (pedestrian, avian and mammalian) in their sites by squatting, running, and flushing; these responses all reduce fitness due to unnecessary expenditure of energy (USFWS, 2009). Flushing events may be prolonged by dogs off leash in comparison to those associated with pedestrians or pedestrians with leashed dogs. A study conducted on Cape Cod, Massachusetts, found that the average distance at which piping plovers were disturbed by pets was 150 ft., compared with 75 ft. for pedestrians. Furthermore, the birds reacted to the pets by moving an average of 187 ft., compared with 82 ft. when the birds were reacting to a pedestrian. The duration of disturbance behavior stimulated by pets was significantly greater than that caused by pedestrians (Hoopes, 1993). Disturbance also reduces the amount of time which migrating shorebirds spend foraging (Burger, 1991).

Increasing recreational demands in Florida have resulted in increased harassment of foraging and roosting birds (FNAI, 2010). Review of threats to piping plovers and their habitat indicates continuing habitat loss and degradation due to beach sand placement, inlet stabilization, sand mining, groins, seawalls and revetments, exotic and invasive vegetation, wrack removal, and potential for habitat loss from climate change and sea level rise in Florida.

2.1.2 Distribution and Range

Three distinct breeding populations of piping plovers are recognized in ESA actions. As stated above, these populations are found on the Atlantic Coast (threatened), Great Lakes (endangered), and Northern Great Plains (threatened). Piping plovers breed along the Atlantic Coast from maritime Canada to North Carolina, along the Great Lakes, and in the northern Great Plains of Canada and the United States (Johnsgard, 1981; Haig and Oring, 1985).

During winter months, piping plovers migrate through and winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Piping plovers generally depart their breeding grounds for their wintering grounds from July through late August and return in late March or early April.

In Florida, the distribution of piping plover is greatly affected by the presence of urban coastal development. There is a negative correlation between engineered beach nourishment activities and presence of piping plover, but it is unclear whether this correlation can be directly attributed to sand placement or if the tendency for beach nourishment to occur in areas of high population density limits the distribution of plovers due to higher human disturbance (Lott, 2009).

2.1.3 Habitat and Feeding

Piping plover populations are largely concentrated on public lands where natural coastal processes occur unimpeded (Lott, 2009). Piping plovers nest and feed along coastal sand and gravel beaches in North America. They spend most of their lives on open sandy beaches in the higher portions away from the water. Piping plovers use cryptic coloration as a primary defense mechanism; adults, chicks and nests all blend with the beach environment.

Piping plovers migrate over relatively short distances and spend up to 70% of their annual cycle in wintering grounds. While residing in winter grounds, the core area (where 95% of time is spent) for an individual bird averages 2.9 km^2 (1.8 mi^2; Drake et al., 2001). Wintering plovers spend an average of 76% of their time foraging (Johnson and Baldassarre, 1988), but foraging on exposed beaches is rare, and most foraging occurs on protected sand and mudflats at low tide (Drake et al., 2001). Beach habitats may be used more for roosting or preening (Johnson and Baldassarre, 1988, Cohen et al., 2008).

USFWS designated critical habitat for the piping plover in its wintering range on July 10, 2001 (66 FR 17; 36038-36143). Critical habitat includes the land from the seaward boundary of mean lower low water (MLLW) to where densely vegetated habitat, not used by the species, begins and where the primary constituent elements (PCEs) no longer occur. One hundred thirty-seven (137) areas along the coasts of North Carolina, South Carolina Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas were designated as critical habitat for the wintering piping plover. There is no federally designated piping plover critical habitat in the project area. Although this species does not breed in Florida, wintering habitat is present. The closest critical habitat is the Ponce de Leon Inlet Unit FL-34 which occurs approximately 26 miles south of the PAA (USFWS, 2001).

The PCEs for piping plover wintering habitat are found in geographically dynamic coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide. PCEs include sand or mud flats, or both, with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, particularly for roosting plovers (USFWS, 2001). Important components of the beach/dune ecosystem include surf-cast algae, sparsely vegetated back beach and salterns, spits and washovers areas (USFWS, 2013). Wintering habitat is a key factor in piping plover survival as they may spend approximately 7.5 months away from breeding areas (Nicholls and Baldassarre, 1990; USFWS, 2009).

Wintering plovers depend upon a mosaic of habitat patches and move among these patches depending on local weather and tidal conditions (Nicholls and Baldassarre, 1990). Drake (1999) monitored the movement of 48 piping plovers in south Texas for one season. Using 95% of the documented locations, this study recorded a mean home range of 3,117 acres. Mean linear distance moved per individual bird was 2 miles for the fall through the spring of 1997 through 1998 (Drake, 1999). Observations suggest that this species exhibits a high degree of wintering site fidelity (Drake et al., 2001; Stucker and Cuthbert, 2006).

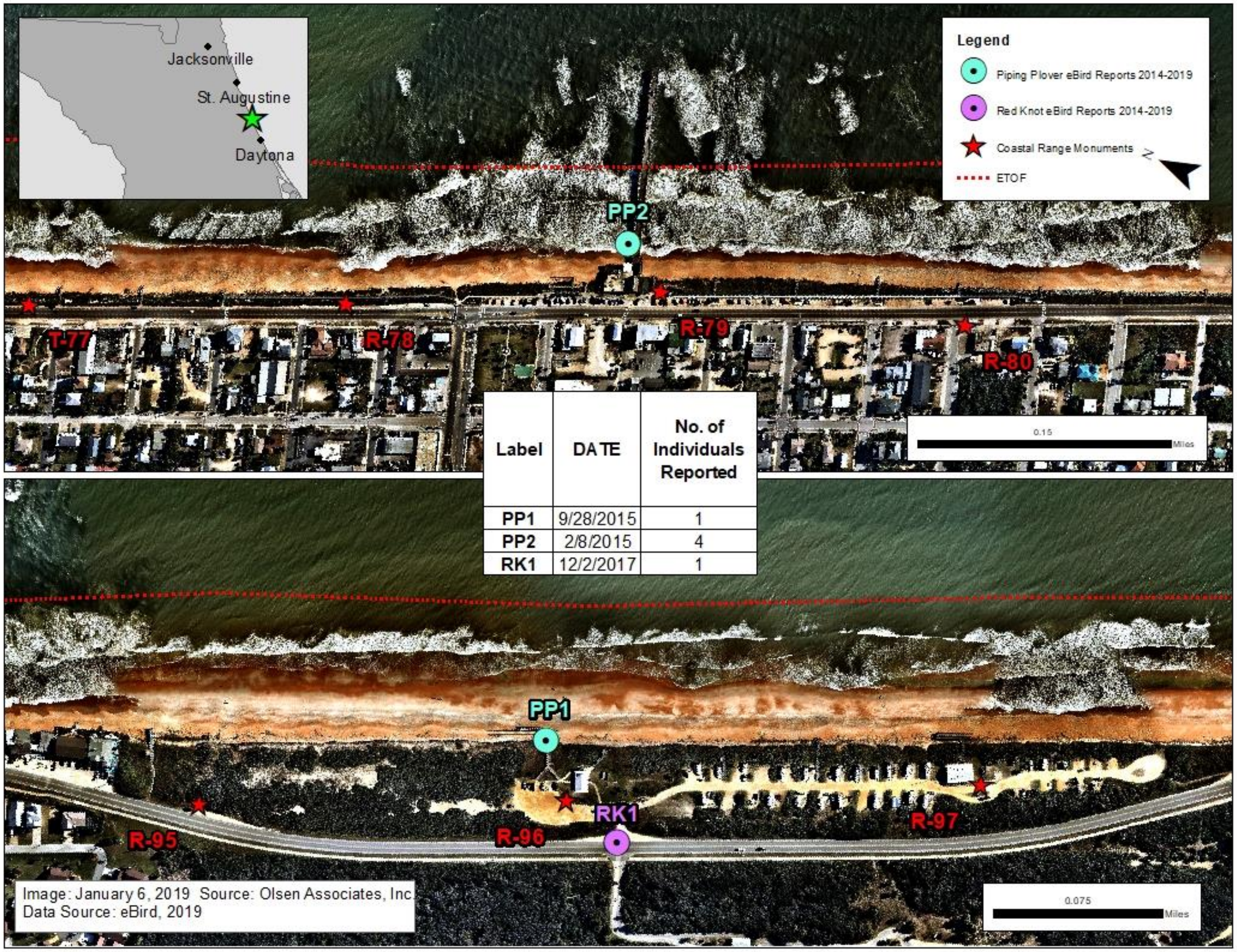
Behavioral observations of piping plovers on wintering grounds suggest that they spend the majority of their time foraging (Nicholls and Baldassarre, 1990; Drake, 1999; Drake et al., 2001). Feeding activities occur during all hours of the day and night (Staine and Burger, 1994; Zonick, 1997), and at all stages in the tidal cycle (Goldin, 1993; Hoopes, 1993). Plovers use the beaches adjacent to foraging areas for roosting and preening, and proximity of appropriate roosting sites to foraging areas is extremely important for conservation of energy for migration activities.

Adult piping plovers are known to forage on a variety of polychaetes and crustaceans at or just under the surface sediments (Cohen and Fraser, 2010). Preferred prey items of piping plovers consist of polychaetes [family Nereididae including *Nereis succinea,* Glyceridae, including *Glycinde solitaria*, *Glycinde americana*, and Oenonidae (formerly Arabellidae)], amphipods (family Haustoriidae, including *Acanthohaustorious millsi*) and mollusks (genus *Donax*) (Bergquist et al., 2011). A study of macroinvertebrate communities associated with piping plover foraging habitat showed that reductions in numbers of larger polychaetes (Nereididae, Glyceridae and Oenonidae) were correlated with site abandonment by piping plovers, suggesting that these food items may be particularly important to overwintering piping plover (Bergquist et al., 2011).

2.1.4 Presence in the Project Area

The USFWS Programmatic Piping Plover Biological Opinion (P^3BO) for wintering piping plover and its designated critical habitat, dated May 22, 2013, identified all Federal, State and County publicly owned land within one mile of an inlet as Optimal Piping Plover Areas. The definition of an Optimal Piping Plover Area includes the statement that coastal processes are allowed to function mostly unimpeded within these areas. The Matanzas Inlet is approximately 17 miles north of the project area and the Ponce de Leon inlet is approximately 26 miles south of the project area and therefore are outside of the definition of Optimal Piping Plover Areas (USFWS, 2013).

Piping plover were not documented in the February USFWS wintering shorebird surveys in Flagler County from 2014 through 2019. The beach sand in Flagler County may not provide the foraging habitat needed by this species (per. comm. with Billy Brooks, USFWS, 2019). Three individuals were observed by USACE biologists in August 2011 on the upper beach in Gamble Rogers SRA at R-95 (USACE, 2015). **Figure 6** shows eBird records of piping plovers from January 1, 2014 through May 21, 2019 between R-65 and R-100 (this range includes the Federal nourishment project area being pursued under a separate permit by the USACE). There were only two days, both in 2015, where piping plovers were recorded. On September 28, one bird was reported, and on February 8, 2015, 4 birds were reported. The typical wintering stopover for piping plover lasts from October to March (Doonan et. al, 2006).



Label	DATE	No. of Individuals Reported
PP1	9/28/2015	1
PP2	2/8/2015	4
RK1	12/2/2017	1

Figure 6. Wintering Piping Plover and Red Knot Sightings in the Flagler Beach Project Action Area - January 1, 2014 through May 21, 2019. (Source: eBird)

2.2 RUFA RED KNOT

2.2.1 Status and Threats

The rufa red knot (*Calidris canutus rufa*) is the largest of the small sandpipers. Red knots are approximately 9 inches long when full grown and are named for the rusty-red color of their breeding plumage. The rufa red knot was listed as threatened throughout its range by the U.S. Fish and Wildlife Service on December 11, 2014 (79 FR 73705); the final rule became effective on January 12, 2015 (USFWS, 2014a).

The overall population of red knots has declined approximately 85% during the last 15 years, decreasing from an estimated 150,000 individuals to approximately 25,000 (Schwarzer, 2011; Schwarzer et al., 2012; Thibault and Levisen, 2013). The final rule identified the loss of breeding and non-breeding habitats as a result of climate change, shoreline stabilization, reduced prey availability, increased predation in breeding habitat, and increased frequency and severity of asynchronies in the timing of annual migrations as the basis for the proposed listing of threatened.

In Florida, the most immediate and tangible threat to migrating and wintering red knots is apparently chronic disturbance (Niles et al., 2008), which may be affecting the ability of birds to maintain adequate weights in some areas. Beach replenishment and beach-raking activities alter natural characteristics of the beach zone, causing significant disturbance to the red knot and other shorebird species. Niles et al. (2008) suggested that frequent beach replenishment in areas such as Fort Myers and Estero Island may reduce invertebrate prey populations and displace wintering red knots to more productive foraging areas elsewhere in Florida and Georgia. Wintering habitat for the piping plover overlaps considerably with red knot habitats as the two species utilize similar habitats in the southeast United States. Both species are adversely affected by human disturbance.

2.2.2 Distribution and Range

There are at least six subspecies of red knots (*Calidris canutus*) world-wide. These subspecies include both long-distance and short-distance migrants. The rufa subspecies is one of three subspecies that exists in the Americas. Three distinct over-wintering populations exist for the rufa red knot: southern South America (Tierra del Fuego), Brazil, and the southeastern United States, all of which breed in the Canadian Arctic.

Migrations occur in the spring (northbound) and fall (southbound) with stopover locations along the way. During the spring migration, primary stopover locations include Patagonia, Argentina; eastern and northern Brazil; southeast United States; the barrier islands of Virginia; and Delaware Bay. During the fall, Hudson Bay, James Bay, St. Lawrence River, Mingan Archipelago, and Bay of Fundy in Canada; the coasts of Massachusetts and New Jersey; the Altamaha River in Georgia; the Caribbean; and the northern coast of South America from Brazil to Guyana have been identified as key stopover locations. In the southeast United States, South Carolina is a known wintering location for red knots (Thibault and Levisen, 2013). Within this range, birds are commonly observed in intertidal, marine habitats, typically near inlets, estuaries and bays.

2.2.3 Habitat and Feeding

Red knots are considered marine shorebirds in the non-breeding season, and nest in the Canadian tundra on sparsely vegetated gravel ridges during the breeding season. During the non-breeding season, they are found primarily in intertidal marine habitats including coastal estuaries, inlets, and bays, feeding primarily on dwarf surf clams (*Mulinia lateralis*) and coquina clams (*Donax variablis*) in the nearshore zone. They are known for their extraordinarily long migrations, moving from arctic temperatures through hot equatorial temperatures in a range of geographic locations.

There is no designated or proposed critical habitat for the rufa red knot at this time.

2.2.4 Presence in the Project Area

Red knots were not documented in the February USFWS wintering shorebird surveys in Flagler County from 2014 through 2019, and the beach sand in Flagler County may not support the foraging habitat needed by this species (per. comm. with Billy Brooks, USFWS, 2019). **Figure 6** shows eBird records of red knots from January 1, 2014 through May 21, 2019 between R-65 and R-1 in the project fill areas (this range includes a previously permitted federal project not a part of this project). The only report to the eBird database occurred on December 2, 2017; a single red knot was observed. The USACE Integrated Study (2015) reported the most recent sighting in 2007 in Gamble Rogers SRA. The likelihood of red knots occurring on the beaches throughout Flagler County is very low (USACE, 2015).

2.3 LEAST TERN

2.3.1 Status and Threats

Least terns are the smallest members of the subfamily Sternidae. The least tern (*Sterna antillarum*) is listed as threatened in Florida (FWC, 2011a) and is protected federally under the Migratory Bird Treaty Act. The interior portion of the population was listed as endangered by USFWS in 1985. Populations in Florida are considered part of the coastal/estuarine subspecies and are not federally listed.

Least terns utilize their colony sites year after year; however, colony sites are occasionally abandoned by terns due to a variety of factors. Although some vegetation is beneficial as cover for chicks, colonies will abandon sites that become too vegetated. Other factors that are correlated with abandonment are human disturbance; presence of mammalian predators such as raccoon, fox, coyotes and feral cats; and flooding. Of these, human disturbance is probably most responsible for recent declines. Human intrusion along beaches, lakes, and streams reduces the available nesting habitat for these birds. Human-caused disturbances can increase the rate of turnover and decrease the reproductive success of colonies. In addition to mechanical destruction by trampling, eggs and chicks are at risk when parent birds are flushed from nests by humans, which can expose eggs to the hot sun or predators. Repeated flushing can cause an entire colony to permanently desert their eggs.

The Florida population of breeding least terns is estimated at 12,562 pairs based on surveys from 1998 through 2000 (Gore et al., 2007). Although least tern numbers are reported to be relatively stable throughout Florida, most least terns nest on roofs and not in natural habitat. Several studies have shown that roof colonies have higher reproductive success than nearby beach colonies. This finding may reflect the degradation of existing ground colonies. With the loss and degradation of natural colony sites, the least tern adapted to nesting on gravel rooftops. Gore et al. (2007) found 84% of all least tern nesting pairs in Florida were on gravel roofs. Zambrano and Warraich (2010) found the least tern had the most breeding pairs (3,156) nesting on roofs. An emerging threat to least terns is the phase-out of gravel rooftops on both new construction and reroofing projects. In 2010, least terns were found nesting on two non-gravel roofs, one in Pensacola Beach and the other on Islamorada in the Florida Keys. The effects of decreasing availability of gravel roofs on least tern populations are currently unclear.

2.3.2 Distribution and Range

The least tern has an extremely large range throughout the western hemisphere and is divided into three subspecies. The eastern least tern (*S. a. antillarum)* breeds along the Atlantic coast from Massachusetts to Florida, along the Gulf coast from Florida to Texas, and in the Bahamas and Caribbean Islands. Least terns arrive in Florida from their Central and South American wintering grounds each year from mid-March through April and nest through early September.

2.3.3 Habitat and Feeding

The least tern is a colonial nesting species, and typically nests on barren beaches of sand, gravel or shells, on dry mudflats and salt-encrusted soils (salt flats), and on sand and gravel pits along rivers. Least terns have also been known to nest on dredge spoil mounds. Nesting success depends on the presence of bare or nearly barren sandbars, favorable water levels during nesting, and abundant food. Nests are inconspicuous scrapes usually containing 2 to 3 eggs. Egg laying and incubation occur from late May through early August. Eggs hatch in about 20 days and chicks are fledged in about another 20 days. Least terns feed on small fish and crustaceans taken by diving from the air into shallow water. During the breeding season, these birds usually feed within a few hundred meters of the nesting colony. Least terns will often nest in large colonies with black skimmers (*Rhynchops niger).*

2.3.4 Presence in the Project Area

The least tern is not present in Florida between November and February (FWC, 2011a). Least tern nesting begins mid-April and continues through August (FNAI, 2010). A small number of rooftop nests were reported to the Florida Shorebird Database (FSD) from 2014 through May 2019 (**Table 2**). No colonial or solitary nests were reported to the FSD in Flagler County during this period. Least tern locations in the PAA from January 1, 2014 through May 21, 2019 are shown in **Figure 7**. Since these birds appear to nest only on rooftops in the PAA, and the proposed construction window is outside of shorebird nesting season, the least tern will not be impacted by project construction.

Table 2. Least tern rooftop nests and maximum number of adults in Flagler County, 2014 through 2019.

Year	Number of Rooftop Nests	Max. No. of Adults Counted at All Nests
2014	2	5
2015	4	26
2016	1	12
2017	2	12
2018	2	26
2019	1	5

Source: Florida Shorebird Database (FSD)

2.4 BLACK SKIMMER

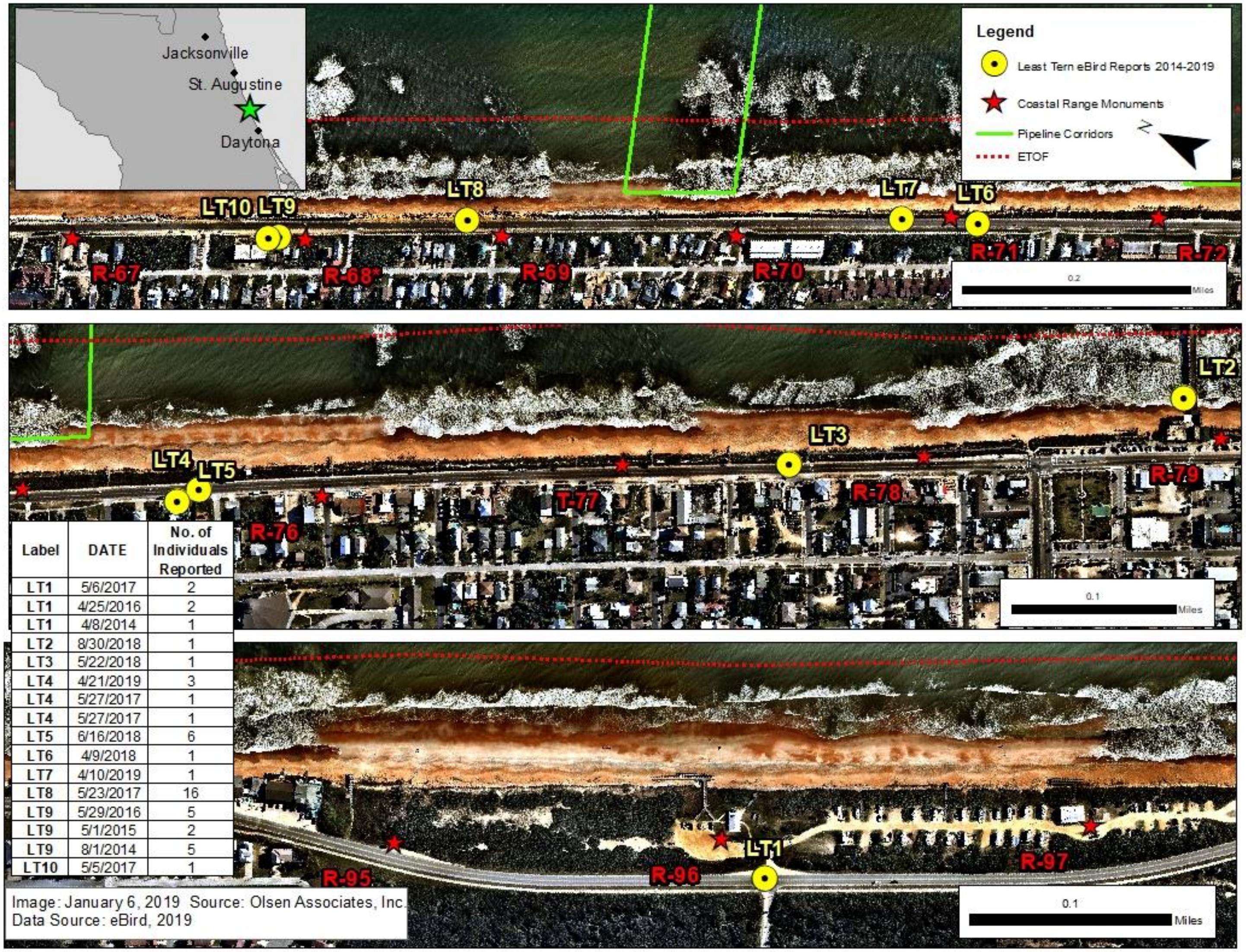
2.4.1 Status and Threats

The black skimmer (*Rynchops niger*) is listed as threatened in Florida and is also protected federally under the Migratory Bird Treaty Act. Reports indicate a decline in the Florida black skimmer population from over 4,500 birds in 1983 (Clapp et al., 1983) to less than 3,400 birds in 2007 (Gore et al., 2007). In addition, the largest recorded colony size had decreased from over 2,000 birds to less than 450 and was limited to only 36 sites in Florida in 2000.

Habitat loss due to coastal development and associated human disturbances are the main threats to black skimmers. Black skimmers nest in large colonies, and disturbance causes fragmentation into smaller sub-colonies. Like many other beach nesting birds, black skimmers will frequently abandon nesting attempts in disturbed areas. Disturbance results in lower nest density, hatchling success, and fledging success (Safina and Burger 1983, Gochfeld and Burger, 1994). Nesting success is reported to be higher in larger, well-established colonies (Gochfeld and Burger, 1994).

Raccoons, coyotes, feral cats, opossums and other mammals are known predators of black skimmers. Growing numbers of gulls also pose a threat, as nesting sites with gull predation are more likely to be abandoned and not returned to the following year (Burger, 1982). Additional predators include ghost crabs and invasive species such as fire ants and Nile monitor lizards. Other natural threats include habitat destruction and flooding from storms and sea level rise.

As a result of decreasing natural nesting habitat, black skimmers have been documented nesting on causeways and are the second most common species of beach-nesting birds on roofs in Florida (Zambrano and Smith, 2003, Gore et al., 2007). Approximately 9% of all black skimmer breeding pairs in Florida were on roofs (Gore et al., 2007). Zambrano and Warraich (2010) reported 103 black skimmer rooftop breeding pairs in six different counties with the highest number of pairs (49) in Pinellas County. Black skimmer eggs are prone to cracking under the birds' own weight if roof gravel depths are less than 4 cm (Coburn et al., 1997).



Label	DATE	No. of Individuals Reported
LT1	5/6/2017	2
LT1	4/25/2016	2
LT1	4/8/2014	1
LT2	8/30/2018	1
LT3	5/22/2018	1
LT4	4/21/2019	3
LT4	5/27/2017	1
LT4	5/27/2017	1
LT5	6/16/2018	6
LT6	4/9/2018	1
LT7	4/10/2019	1
LT8	5/23/2017	16
LT9	5/29/2016	5
LT9	5/1/2015	2
LT9	8/1/2014	5
LT10	5/5/2017	1

Figure 7. Least tern reported locations in the Flagler County PAA, January 1, 2014 through May 21, 2019 (Source: eBird)

Mechanical raking, a common activity on Florida's public and privately-owned beaches, can result in direct take of nests or prevent skimmers from nesting (FWC, 2011b).

2.4.2 Distribution and Range

The black skimmer is primarily a colonial coastal species. The breeding range extends from Massachusetts south along the Atlantic and Gulf coasts, and into Mexico, with isolated colonies in the Yucatan (Gochfeld and Burger, 1994). Black skimmers are present in Florida year-round; some additional birds may migrate into the area from northern locations for the winter. Most of the black skimmer nesting in Florida occurs on the Gulf coast; nesting on the Atlantic coast is limited to only a few small colonies.

2.4.3 Habitat and Feeding

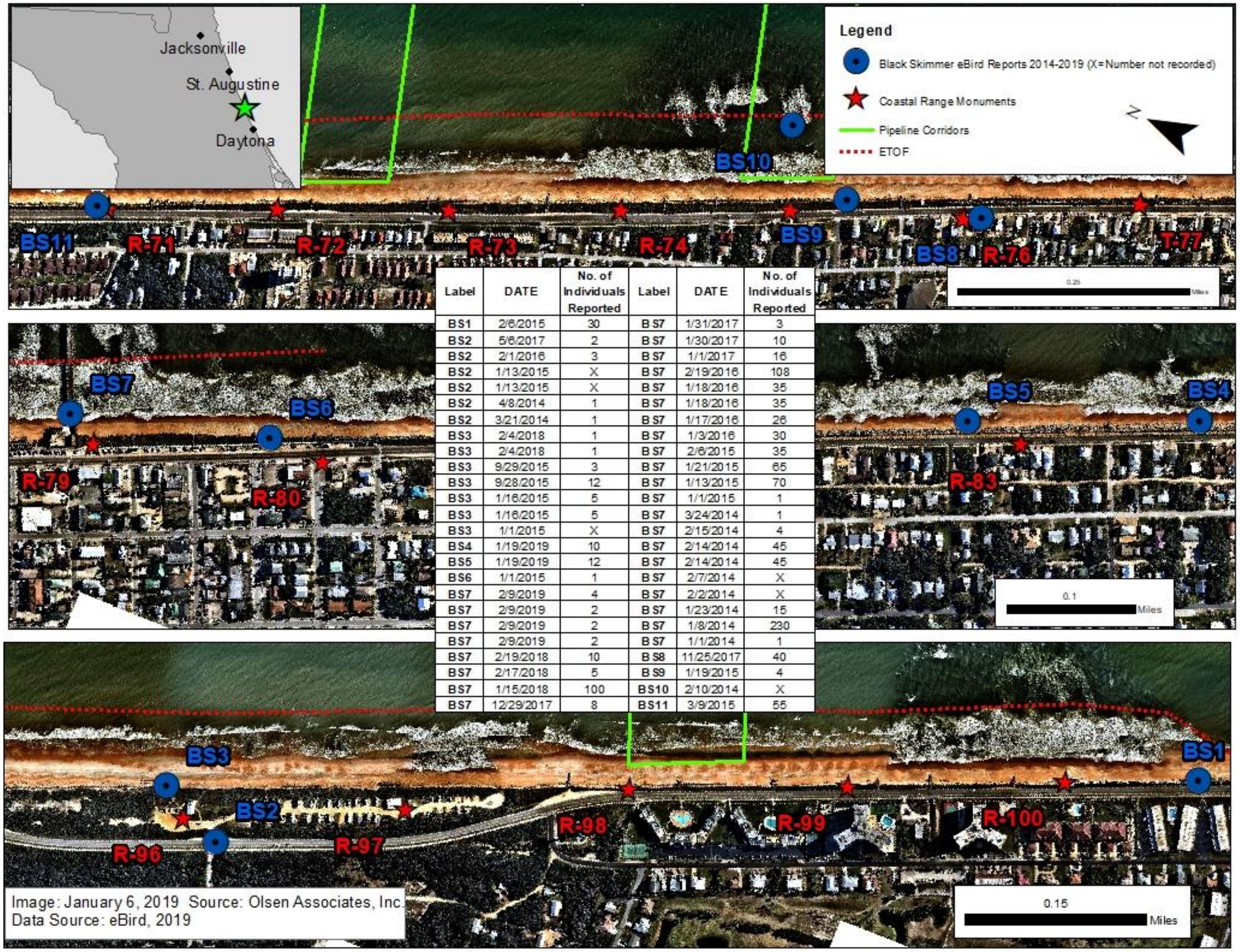
In Florida, skimmers usually nest on open sand beaches, dredged material islands, and berms along highways (Schreiber and Schreiber, 1978). They are also reported at inland sites in Florida, near lakes and rivers in the central and southern regions of the state. Although black skimmers prefer to nest in open unvegetated sites, they have been found in a wide range of habitats, often nesting along with terns (*Sterna* spp.) (Gochfeld, 1978).

Black skimmers feed mainly on fish and aquatic invertebrates. Their bill is laterally compressed and scissor-like with a long lower mandible that extends beyond the upper maxilla. Skimmers were named as a result of distinct feeding behavior, flying low above water with their lower mandible below the surface. On contact with food, the upper bill snaps down immediately to catch their prey. Skimmers often forage in water less than 20 cm deep and very close to the shoreline.

Eggs are laid in a scrape in the substrate that is approximately 3.5 cm deep and 10 to 15 cm in diameter (Coburn et al., 1997). Clutch size is 1 to 5 eggs and they are incubated by both sexes for 21 to 26 days.

2.4.4 Presence in the Project Area

The black skimmer is present in Florida year-round and may be present in the PAA during project construction. No black skimmer nests were reported to the FSD from 2014 through May 2019. Black skimmer sightings from January 1, 2014 through May 21, 2019 are shown in **Figure 8**. Most sightings have occurred from January through March, outside of nesting season.



Label	DATE	No. of Individuals Reported	Label	DATE	No. of Individuals Reported
BS1	2/6/2015	30	BS7	1/31/2017	3
BS2	5/6/2017	2	BS7	1/30/2017	10
BS2	2/1/2016	3	BS7	1/1/2017	16
BS2	1/13/2015	X	BS7	2/19/2016	108
BS2	1/13/2015	X	BS7	1/18/2016	35
BS2	4/8/2014	1	BS7	1/18/2016	35
BS2	3/21/2014	1	BS7	1/17/2016	26
BS3	2/4/2018	1	BS7	1/3/2016	30
BS3	2/4/2018	1	BS7	2/6/2015	35
BS3	9/29/2015	3	BS7	1/21/2015	65
BS3	9/28/2015	12	BS7	1/13/2015	70
BS3	1/16/2015	5	BS7	1/1/2015	1
BS3	1/16/2015	5	BS7	3/24/2014	1
BS3	1/1/2015	X	BS7	2/15/2014	4
BS4	1/19/2019	10	BS7	2/14/2014	45
BS5	1/19/2019	12	BS7	2/14/2014	45
BS6	1/1/2015	1	BS7	2/7/2014	X
BS7	2/9/2019	4	BS7	2/2/2014	X
BS7	2/9/2019	2	BS7	1/23/2014	15
BS7	2/9/2019	2	BS7	1/8/2014	230
BS7	2/9/2019	2	BS7	1/1/2014	1
BS7	2/19/2018	10	BS8	11/25/2017	40
BS7	2/17/2018	5	BS9	1/19/2015	4
BS7	1/15/2018	100	BS10	2/10/2014	X
BS7	12/29/2017	8	BS11	3/9/2015	55

Figure 8. Black skimmer reported locations in the Flagler County PAA, January 1, 2014 through May 21, 2019 (Source: eBird).

SEA TURTLES

There are five species of sea turtles that occur in the coastal waters off Flagler County. The loggerhead sea turtle (*Caretta caretta*) constitutes the majority of the turtle nests in this region. Low numbers of green sea turtle (*Chelonia mydas*) and leatherback sea turtle (*Dermochelys coriacea)* nests are deposited on Flagler County beaches. One Kemp's Ridley (*Lepidochelys kempii*) nest was reported in 2012. Hawksbill sea turtle (*Eretmochelys imbricata*) nests have not been documented in Flagler County, but Flagler County is within their range and individuals may be found offshore. The nesting season for all species of sea turtles is May 1 through October 31, inclusive of the hatching season. Nesting generally ends by September in the region.

Sea turtle nesting data for Flagler County is available from the Volusia/Flagler Turtle Patrol and FWCC. **Table 3** presents nesting data from 2014 through 2018 for beaches within and adjacent to the PAA. There is a statewide surveyed beach in the PAA which encompasses most of the proposed County (Local) project fill areas and Federal project area between the two Local project reaches. It excludes approximately 0.45 miles at the northern end of the project area. Within the project area, the FWC index beach identified as Flagler Beach starts at 23rd St. N at Beverly Beach and continues to 1.8 km north of the Flagler/Volusia County Line. The FWC index beach identified as Gamble Rogers Memorial SRA starts 1.8 km north of the Flagler/Volusia County Line and continues to south of the county line. Daily patrols are performed by the Volusia/Flagler Turtle Patrol. **Table 4** and **Figure 9** present nesting data for the entire Flagler County shoreline.

Table 3. Loggerhead, green, and leatherback sea turtle nests and false crawls within the County (Local) and Federal Project Areas, 2009 through 2018.

Year	Beach	Length (km)	Loggerhead Nest	Loggerhead False Crawl	Loggerhead Nesting Success	Green Turtle Nest	Green Turtle False Crawl	Leatherback Nest	Leatherback False Crawl
2009	Flagler Beach	9.6	42	55	43%	3	4	2	0
2009	Gamble Rogers Memorial SRA	1.8	29	7	81%	2	0	0	0
2010	Flagler Beach	9.6	95	89	52%	5	6	0	0
2010	Gamble Rogers Memorial SRA	1.8	28	9	76%	3	0	0	0
2011	Flagler Beach	9.6	72	57	56%	9	2	3	0
2011	Gamble Rogers Memorial SRA	1.8	27	4	87%	2	1	0	0
2012	Flagler Beach	9.6	121	178	40%	11	0	3	0
2012	Gamble Rogers Memorial SRA	1.8	51	25	67%	3	1	0	0
2013	Flagler Beach	9.6	111	77	59%	20	8	0	0
2013	Gamble Rogers Memorial SRA	1.8	39	9	81%	8	4	1	0
2014	Flagler Beach	9.6	83	77	52%	3	8	0	0
2014	Gamble Rogers Memorial SRA	1.8	30	3	91%	0	0	0	0
2015	Flagler Beach	9.6	116	64	64%	12	1	1	0
2015	Gamble Rogers Memorial SRA	1.8	26	19	58%	5	0	1	0
2016	Flagler Beach	9.6	188	115	62%	3	0	1	0
2016	Gamble Rogers Memorial SRA	1.8	46	30	61%	0	0	0	0
2017	Flagler Beach	9.6	122	53	70%	45	15	1	0
2017	Gamble Rogers Memorial SRA	1.8	54	10	84%	9	3	0	0
2018	Flagler Beach	9.6	88	92	49%	3	3	1	0
2018	Gamble Rogers Memorial SRA	1.8	30	19	61%	0	1	0	0

Notes: Nesting data were provided by FWCC, Statewide Beach Survey Program. Flagler Beach is 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) to 1.8 km N of Flagler/Volusia Co Line (29.44168, -81.10897). Gamble Rogers Memorial SRA is 1.8 km N of Flagler/Volusia Co Line (29.44168, -81.10897) to Flagler/Volusia Co Line (29.42718, -81.10236).

Table 4. Loggerhead, green, and leatherback sea turtle nests and false crawls in Flagler County, 2009 through 2018.

Year	Beach	Loggerhead Nest	Loggerhead False Crawl	Loggerhead Nesting Success	Green Turtle Nest	Green Turtle False Crawl	Leatherback Nest	Leatherback False Crawl
2009	Flagler County	135	46	75%	38	22	6	1
2010	Flagler County	319	93	77%	38	22	0	0
2011	Flagler County	248	20	93%	39	6	9	1
2012	Flagler County	363	207	64%	39	10	4	1
2013	Flagler County	291	97	75%	109	35	5	0
2014	Flagler County	269	106	72%	27	8	3	0
2015	Flagler County	270	88	75%	83	10	1	0
2016	Flagler County	420	152	73%	16	11	3	0
2017	Flagler County	307	n/a	n/a	162	n/a	2	n/a
2018	Flagler County	226	n/a	n/a	11	n/a	5	n/a

Source: Volusia/Flagler Turtle Patrol, http://www.turtlepatrol.com/nest-counts.html

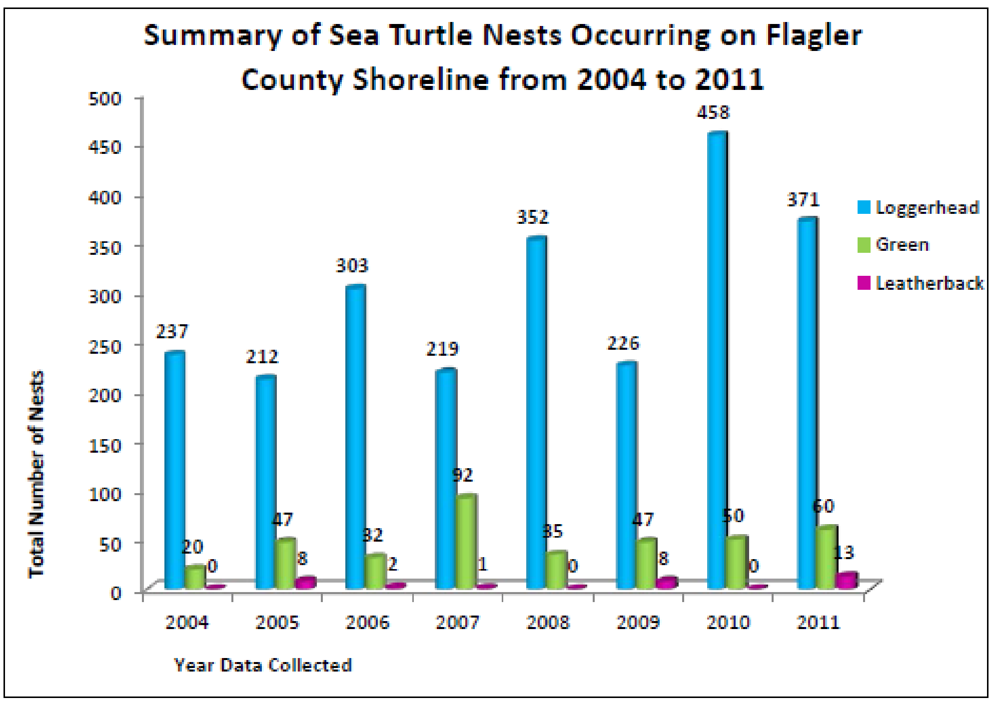


Figure 9. Historic sea turtle nesting data for the entire Flagler County shoreline, 2004 through 2011 (Source: USACE, 2015).

2.5 LOGGERHEAD SEA TURTLE

2.5.1 Status and Threats

Adults and sub-adults have a large, reddish-brown carapace. Scales on the top and sides of the head and on top of the flippers are also reddish-brown with yellow borders. The neck, shoulders, and limb bases are dull brown on top and medium yellow on the sides and bottom. The plastron is also medium yellow. Adult average size is 91 cm (36 in) straight carapace length; average weight is 115 kg (253 lbs). The relative size of a loggerhead's head, when compared to the rest of its body, is substantially larger than other sea turtle species.

The loggerhead sea turtle (*Caretta caretta*) was listed by the USFWS as threatened throughout its range on July 28, 1978 (43 FR 32808) (NMFS and USFWS, 2008). The species is composed of nine distinct population segments (DPS), two of which occur in the United States: the North Pacific Ocean DPS and the Northwest Atlantic Ocean DPS (76 FR 58868; September 22, 2011).

The Recovery Plan for the Northwest Atlantic DPS identified five recovery units for the Northwest Atlantic population (NMFS and USFWS 2008): (1) Northern Recovery Unit (NRU) ranging from southern Virginia to the Florida-Georgia border; (2) Peninsular Florida Recovery Unit (PFRU) from the Florida-Georgia border through Pinellas County on the west coast of Florida, excluding the islands west of Key West, Florida; (3) Dry Tortugas Recovery Unit (DTRU) defined as loggerheads originating from nesting beaches throughout the islands located west of Key West, Florida. (4) Northern Gulf of Mexico Recovery Unit (NGMRU) defined as loggerheads originating from nesting beaches from Franklin County on the northwest Gulf coast of Florida through Texas; and (5) Greater Caribbean Recovery Unit (GCRU) composed of loggerheads originating from all other nesting assemblages within the Greater Caribbean (Mexico through French Guiana, Bahamas, Lesser Antilles, and Greater Antilles). There is limited exchange of females among recovery units. Due to the high site fidelity of nesting females to their natal region and low gene flow among nesting assemblages, most western North Atlantic loggerhead nesting assemblages are vulnerable to extirpation (Souza, 2010).

The PFRU is the largest loggerhead recovery unit within the Northwest Atlantic Ocean DPS, representing approximately 87% of nesting efforts (Ehrhart et al., 2003). A nesting census conducted between 1989 and 2007 estimated that an annual average of 64,513 loggerhead nests occurred in the PFRU with approximately 15,735 females nesting per year (4.1 nests per female).

The most significant threats to the loggerhead sea turtle population are coastal development and beach armoring, incidental take from channel dredging, commercial longline and gillnet fisheries, nest predation, disorientation of hatchlings by artificial lighting, degradation of foraging habitat, watercraft strikes, disease, and marine debris and pollution (NMFS, 2018). The 2009 status review for the loggerhead sea turtle stated that high mortality of juvenile and adult loggerheads from fishery bycatch in the North Atlantic places the Northwest Atlantic DPS at risk of extinction (Conant et al., 2009).

Loggerhead nesting habitat is threatened with beach erosion and nourishment activities; increased human activity associated with coastal development, including poaching activities; natural predation by fire ants, raccoons, armadillos, and opossums; and storm activity (USFWS, 2015). Sea turtle nesting season overlaps hurricane season in the Gulf of Mexico and northwest Atlantic Ocean (June to November). Hurricanes can have a devastating effect on sea turtle reproductive success due to direct or indirect loss of nests by erosion, washing away of nests by wave action, inundation of eggs or hatchlings within nests, or indirect loss of nesting habitat due to erosion. Depending on the frequency of storms, sea turtles may be affected on a short-term basis (one season and/or temporary loss of nesting habitat) or long term (storms are more frequent and nesting habitat is unable to recover) (USFWS, 2011).

2.5.2 Distribution and Range

Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Gulf of Mexico, Pacific and Indian Oceans. The loggerhead sea turtle occurs in open water as far as 500 miles (804.7 km) from shore, but is mainly found over the continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers. The loggerhead favors warm temperate and subtropical regions in relatively close proximity to shorelines. Similar to other sea turtle species, water temperature influences the movements of loggerheads, and they do not usually appear at summer foraging grounds until June, although some individuals can be found in Virginia as early as April. Immature stages of loggerheads (i.e. juveniles/sub-adults), which forage in the northeastern U.S., migrate south in the fall as water temperatures drop and north in the spring.

2.5.3 Habitat and Feeding

Loggerheads are primarily carnivorous, feeding on sponges, squid, sea urchins, crabs, horseshoe crabs, shrimp, basket starfish, and a variety of mollusks, which they crush with their beak-like jaws prior to swallowing. Loggerhead sea turtles are primarily bottom feeders; however, they also feed on jellyfish while swimming in the water column or resting/basking near the surface of the water. Under certain conditions, loggerheads may prey upon slow-moving, demersal fish species. Hatchlings and juveniles feed on prey concentrated at the surface such as gastropods and *Sargassum*.

Adult loggerheads occupy various habitats from turbid bays to clear waters of reefs. After emergence from the nest, hatchlings move out to sea, and spend approximately 3 to 5 years in the pelagic immature stage, generally associated with floating *Sargassum* mats (NMFS, 2018). The pelagic life stage may span as long as 7 to 12 years. Juveniles/subadults occur mainly in nearshore and estuarine waters and use these habitats for feeding. As loggerheads mature, they travel and forage through nearshore waters until breeding season, when they return to the nesting beach. The estimated age at maturity is approximately 21 to 35 years (Frazer and Ehrhart, 1985; Frazer et al., 1994).

Loggerhead turtles in the Flagler County area are members of the Northwest Atlantic DPS PFRU. The USFWS designated specific areas in the terrestrial environment as critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle on July 10, 2014 with an effective date of August 11, 2014 (79 FR 39755). The designation includes occupied critical habitat along 685 miles of shoreline in Florida, encompassing approximately 87% of the documented nesting within the recovery unit (USFWS, 2014b).

NMFS also designated specific areas in the neritic environment as critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle (79 FR 39855). Specific areas for designation included 38 occupied marine areas within the range of the Northwest Atlantic Ocean DPS with Physical or Biological Features (PBFs) and Primary Constituent Elements (PCEs) identified for loggerhead neritic habitat. Neritic habitat designated by NMFS "*consists of the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 m (656 ft.), including inshore bays and estuaries*" (NMFS, 2014). The PBFs and PCEs of neritic habitat occur in five habitat categories: nearshore reproductive, foraging, winter, breeding, and constricted migratory corridors. The nearshore reproductive habitats designated by NMFS are located directly offshore (to 1.6 km) of the terrestrial nesting beaches designated by USFWS. There is no critical wintering habitat in the state of Florida. Breeding habitat is defined as an area with high densities of both male and female adult individuals during the breeding season. Constricted migratory corridors are high use migratory corridors that are limited in width by land on one side and the edge of the continental shelf and Gulf Stream on the other side.

The beach and nearshore areas in the PPA are located within Terrestrial Critical Habitat Unit LOGG-T-FL-03 and Neritic Critical Habitat Unit LOGG-N-15. The offshore borrow area is not located within critical habitat (**Figure 10**).

2.5.4 Presence in the Project Area

Swimming loggerhead sea turtles are present in the nearshore waters of the PAA and utilize nearshore reproductive habitat and constricted migratory corridor in Neritic Critical Habitat Unit LOGG-N-15 within the PAA. Loggerhead sea turtles may also be present within waters of the offshore borrow area although no survey data have been collected to evaluate this usage.

The loggerhead sea turtle is responsible for the majority of nesting in Flagler County with an annual average of approximately 140 nests/year (~12.0 nests/km) (~19.3 nests/mile) along approximately 6.1 miles (9.8 km) of study area (23rd St. N at Beverly Beach to the Flagler/Volusia County line). Between 2011 and 2018, the earliest *C. caretta* nest recorded by the Volusia/Flagler turtle patrol was May 2, and the latest recorded nest was August 26. Mature loggerheads appear to nest on a two- or three-year cycle.

One nest was completely washed out in 2011 by Hurricane Irene, and a second nest was completely washed out by high tide. One nest was found completely encased in roots in 2015. In 2016, one nest was completely washed out by Hurricane Matthew, and in 2017, a major storm washed away one nest in June. Loggerhead sea turtle nesting success [ratio of nesting emergences to non-nesting emergences (i.e. false crawls)] within the FWC index beaches (Flagler Beach and Gamble Rogers SRA) is variable over the 10-year period (**Table 3**). However, the 10-year average (65% nesting success) is slightly higher than the typical 1:1 ratio of nests to false crawls for loggerhead sea turtles. Nesting success is higher in Gamble Rogers SRA than in Flagler Beach. Of the 10-year monitoring period shown in **Table 3**, Gamble Rogers

SRA had the highest nesting success in 2014 (91%) and the lowest in 2015 (58%). Flagler Beach had the highest nesting success in 2017 (70%) and lowest in 2012 (40%).

Hatchling success data in Flagler County are shown in **Table 5**. Between 2011 and 2018, hatchling success ranged from 82% (2016) to 87% (2014 and 2017).

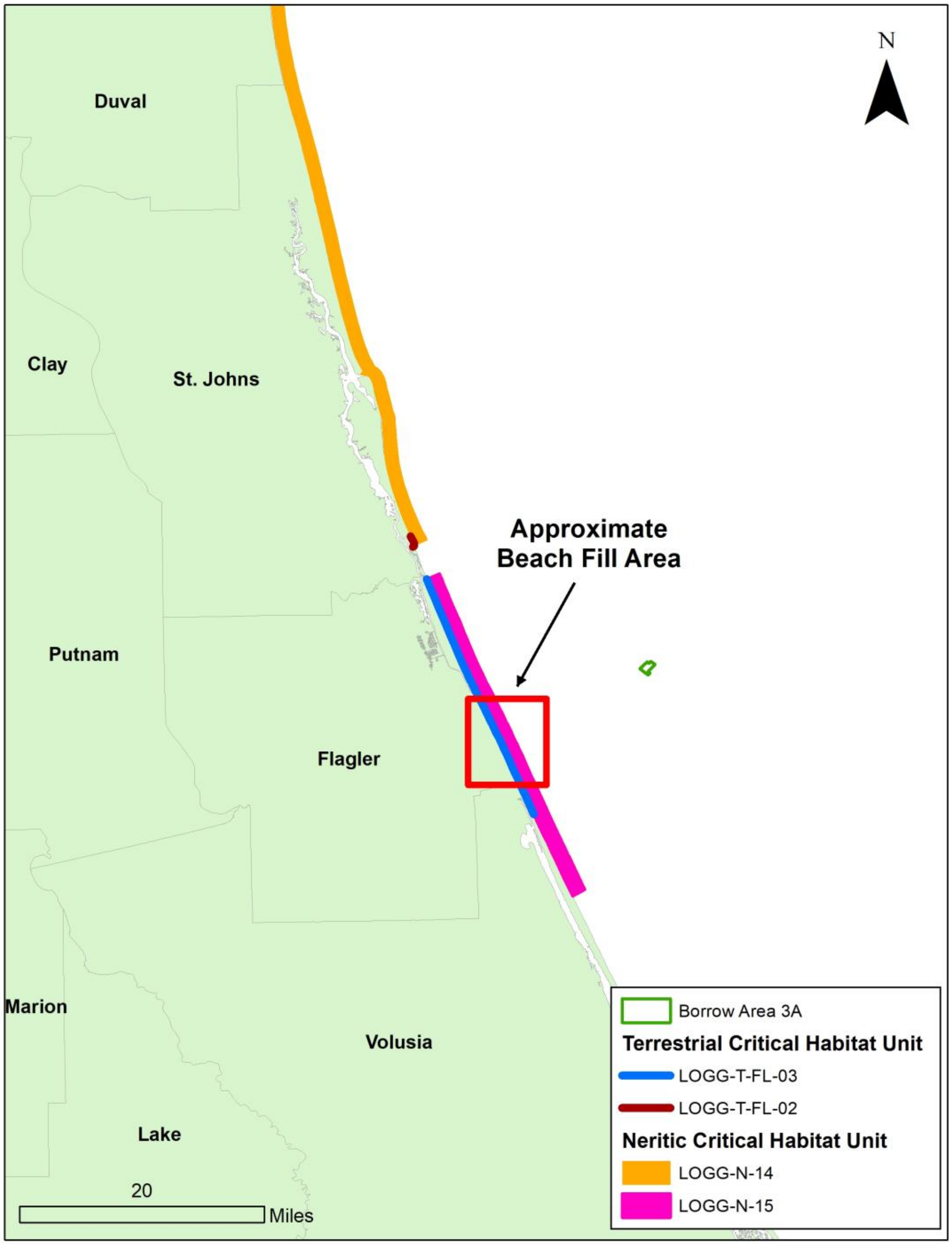


Figure 10. Loggerhead sea turtle critical habitat in the PAA for the Flagler County Beach and Dune Restoration Project.

Table 5. Loggerhead sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	94	10409	8295	304	83%
2012	141	14928	12226	387	85%
2013	138	14690	11877	490	84%
2014	93	9987	8237	494	87%
2015	125	13904	11122	372	83%
2016	188	19935	15748	607	82%
2017	126	13447	11249	413	87%
2018	111	11483	9141	477	84%

Source: Volusia/Flagler Turtle Patrol

2.6 GREEN SEA TURTLE

2.6.1 Status and Threats

The green sea turtle (*Chelonia mydas*) is named for the greenish color of its body fat. The green sea turtle has a small head, single-clawed flippers, a heart-shaped olive-brown shell with dark streaks and spots and grows to a maximum size of about 4 feet and average weight of 300 to 350 pounds.

The green sea turtle was listed on July 28, 1978 as threatened, except for Florida and the Pacific Coast of Mexico (including the Gulf of California), where it was listed as endangered (43 FR 32808). On April 6, 2016, NMFS and USFWS issued a final rule to list eleven (11) DPSs under the ESA, three were listed as endangered (Central South Pacific, Central West Pacific, and Mediterranean) and eight were listed as threatened. This rule supersedes the 1978 final listing rule for green sea turtles (NMFS and USFWS, 2016). Green sea turtles in Florida belong to North Atlantic DPS.

In recent years, the number of green turtle nests in Florida has fluctuated extensively from 9,617 nests in 2012 to 36,195 nests in 2013; 5,895 in 2014 to 37,341 in 2015; and 5,393 in 2016. In 2017, green sea turtle nests were at a record high in Florida with 53,102 nests [FWC/Florida Wildlife Research Institute (FWRI), 2018]. Although nesting activity occurs in almost every coastal county in Florida, the majority of green sea turtle nesting is concentrated along the southeast Florida coast.

The greatest cause of the worldwide decline in green turtle populations is the commercial harvest for eggs and meat. In Florida, the nesting population was nearly extirpated within 100 years of the initiation of commercial exploitation.

Green sea turtle populations in Florida, Hawaii, and other parts of the world have experienced significant mortality from the disease, fibropapillomatosis, which is a disease characterized by the development of multiple tumors on the skin and internal organs. The tumors interfere with swimming, eating, breathing, vision and reproduction.

Turtles with large tumor overgrowths may become severely debilitated and die. Although fibropapillomatosis is primarily found on green sea turtles, it has been found on all species of sea turtles (Aguirre and Lutz, 2004).

Other threats to green sea turtles include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by fire ants, raccoons, and opossums; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from commercial fishing operations such as shrimp trawling (NMFS and USFWS, 1991).

Due to their main dietary component of seagrass, Caribbean green sea turtles are considered to be nutrient-limited, resulting in low growth rates, delayed sexual maturity, and low annual reproductive effort. This low reproductive effort makes recovery of the species slow once the adult population numbers have been severely reduced (Bjorndal 1981). Estimates of age at sexual maturity range from 20 to 50 years (Balazs 1982; Frazer and Ehrhart 1985) and the lifespan may be over 100 years.

2.6.2 Distribution and Range

The green sea turtle is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, it occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Relatively small numbers nest in Florida with even smaller numbers in Georgia, North Carolina, and Texas (NMFS and USFWS 1991; Hirth 1997). Green turtles are distributed more widely in the summer when warmer temperatures allow them to migrate north along the Atlantic coast. Juvenile and sub-adult green sea turtles can be found in estuarine and coastal waters from Long Island Sound, Chesapeake Bay, and North Carolina sounds south throughout the tropics (Musick and Limpus 1997). As the water temperatures decline during the winter months, green sea turtles that are found north of Florida migrate south into subtropical and tropical water.

Major nesting areas for green sea turtles in the Atlantic include US Virgin Islands, Surinam, Guyana, French Guyana, Costa Rica, the Leeward Islands, and Ascension Island in the mid-Atlantic. Green turtles have historically nested in the Florida Keys and Dry Tortugas, but primarily nest on selected beaches along the coast of eastern Florida from Brevard County south through Broward County. Most nesting occurs during the months of June, July, and August in the southeastern United States.

2.6.3 Habitat and Feeding

The green turtle primarily utilizes shallow habitats such as lagoons, bays, inlets, shoals, estuaries and other areas with an abundance of marine algae and seagrasses. Individuals observed in the open ocean are believed to be migrating to feeding grounds or nesting beaches (Meylan, 1982). Hatchlings often float in masses of algae (*Sargassum* spp.) in convergence zones. Coral reefs and rock outcrops are often used as resting areas.

Green sea turtle hatchlings are believed to feed mainly on jellyfish and other invertebrates. Adult green sea turtles prefer an herbivorous diet frequenting shallow water flats for feeding (Fritts et al., 1983). Adult turtles feed primarily on seagrasses such as *Thalassia testudinum*.

Green turtles migrate long distances between feeding and nesting areas (Carr and Hirth, 1962). Nocturnal resting sites may be considerable distances from feeding areas, and distribution of the species is generally correlated with seagrass bed distribution, location of resting beaches, and possibly ocean currents (Hirth, 1971). Green sea turtle incubation ranges from about 42 to 88 days. Nesting occurs nocturnally at 2, 3, or 4-year intervals, and females occasionally produce clutches in successive years (Hirth, 1980). The turtles move to neritic habitats after 3 to 6 years offshore (Williams et al., 2014).

Critical habitat for the green sea turtle was designated in 1998 for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys (63 FR 46693). There is no critical habitat for the green sea turtle in Florida.

2.6.4 Presence in the Project Area

According to Volusia/Flagler County turtle patrol data, between 2011 and 2018, the earliest green sea turtle nest in Flagler County was June 7, and the latest recorded nest was September 27. The annual nesting average for the two index beaches, combined from 2009 through 2018, is approximately 14.6 nests/year (~2.4 nests/mile) along the approximately 6.1 miles (9.8 km) of study area (23rd St. N at Beverly Beach to the Flagler/Volusia County line). Nesting success was not calculated for *C. mydas* as annual nest numbers are low for the 10-year period (**Table 3**). Hatchling success from 2011 through 2018 ranged from 72% in 2011 to 95% in 2018 (**Table 6**).

Swimming green sea turtles may be present within nearshore waters of the PAA during their approach to the nesting beach or in the vicinity of the borrow area when migrating between nesting beaches and feeding grounds in offshore waters (Meylan, 1982). Upon returning to nearshore waters from a pelagic existence, juvenile green sea turtles move through several developmental habitats before reaching adult foraging grounds at or near maturity (CCC and Sea Turtle Survival League, 2015). Adult female green sea turtles migrate from feeding areas in the Florida Keys to the northeast coast of Florida to nest. There are no survey data to evaluate usage of the offshore borrow area by swimming sea turtles.

Table 6. Green sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	6	683	478	15	72%
2012	12	1412	1077	58	80%
2013	23	2788	2416	122	91%
2014	1	115	86	5	79%
2015	11	1378	1212	9	89%
2016	3	362	316	7	89%
2017	19	2371	2112	26	90%
2018	2	243	225	5	95%

Source: Volusia/Flagler Turtle Patrol

2.7 KEMP'S RIDLEY SEA TURTLE

2.7.1 Status and Threats

The adult Kemp's ridley sea turtle (*Lepidochelys kempii*) is considered to be the smallest of the seven extant sea turtles, weighing an average of 100 pounds with an average carapace length of 24 to 28 inches.

The Kemp's ridley sea turtle was listed as endangered throughout its range on December 2, 1970 (35 FR 18320) and is the most endangered of the sea turtles; its population level has declined to the lowest of the seven species. Recent studies suggest increased nesting activities and an overall increase in population size due to increased hatchling production and survival rates of immature turtles. In 2011, the Kemp's Ridley bi-national recovery plan was approved by NMFS, USFWS, and SEMARNAT (2011) for protection of all life stages in adjacent waters in Mexico and developmental habitat throughout the Gulf of Mexico and U.S. Atlantic to ensure the recovery of the species.

The Kemp's ridley turtle has been subject to high levels of incidental take by shrimp trawlers (NMFS, USFWS, and SEMARNAT, 2011). In 1990, the National Research Council's Committee on Sea Turtle Conservation estimated that 86% of human-caused deaths of juvenile and adult loggerheads and Kemp's ridleys resulted from shrimp trawling (Campbell, 1995). The recent improved survival of juvenile and subadult individuals is partly attributed to the use of turtle exclusion devices (TEDs) in commercial shrimping fleets.

The primary decline of Kemp's ridley due to human activities include collection of eggs, fishing for juveniles and adults, and direct take for indigenous use. Dredging operations affect Kemp's ridley turtles through incidental take and habitat degradation. Incidental take of Kemp's ridley has been documented with hopper dredging. Similar to other sea turtle species, future threats include interaction with fishery gear; marine pollution which results in ingestion of debris and garbage; destruction of foraging habitat; illegal poaching; and impacts to nesting beaches associated with rising sea level, development, artificial lighting, and tourism pressure (USFWS, 2015).

2.7.2 Distribution and Range

Adults are primarily restricted to the Gulf of Mexico (NMFS, USFWS, and SEMARNAT 2011), although juveniles may range throughout the Atlantic Ocean and have been observed as far north as Nova Scotia (Musick, 1979). Important foraging areas include Campeche Bay, Mexico, and Louisiana coastal waters. Nearly the entire population nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles (306 km) south of the Rio Grande. Additional nesting aggregations occur at Tuxpan, Veracruz and along the Texas coastline. Nesting occurs infrequently in Florida, Alabama, Georgia, and North Carolina.

Juveniles and sub-adults have been found along the eastern seaboard of the U.S. and in the Gulf of Mexico. Studies suggest that the benthic stage juvenile turtles stay in shallow, warm, nearshore waters in the northern Gulf until cooling waters force them offshore or south along the Florida coast (Renaud, 1995). Little is known about the movements of the post-hatchling pelagic stage within the Gulf. Research suggests most Kemp’s ridley post-hatchlings likely remain within the Gulf of Mexico, while others are transported into the northern Gulf of Mexico and then eastward, with some continuing southward in the Loop Current, then eastward on the Florida Current into the Gulf Stream (NMFS, USFWS, and SEMARNAT, 2011).

Studies have indicated that time spent in the oceanic zone varies from 1 to 4 or more years, and the immature stage lasts about 7 to 9 years. The maturity age of this species is estimated to be 7 to 15 years. Females return to their nesting beach approximately every other year with nesting from April into July and usually limited to the western Gulf of Mexico. Mean clutch size is about 100 eggs per nest and the average number of nests per female per season is 2.5 (NMFS, USFWS, and SEMARNAT, 2011).

2.7.3 Habitat and Feeding

Kemp’s ridley sea turtles inhabit shallow coastal and estuarine waters, usually over sand or mud bottoms. Adults are primarily shallow-water benthic feeders that specialize on crabs, especially portuniid crabs, while juveniles feed on *Sargassum* spp. and associated infauna, and other epipelagic species of the Gulf (NMFS, USFWS, and SEMARNAT, 2011). Other food items include shrimp, snails, bivalves, sea urchin, jellyfish, sea stars, fish and occasionally marine plants (Pritchard and Marquez, 1973; Shaver, 1991; Campbell, 1995). Juveniles utilize the nearshore waters of the central Gulf coast of Florida as developmental habitat (Schmid et al., 2003).

No critical habitat has been designated for the Kemp’s ridley sea turtle.

2.7.4 Presence in the Project Area

Between 2011 and 2018, only one (1) Kemp’s ridley sea turtle nest was laid in the PPA. The nest was documented by the Volusia/Flagler turtle patrol in 2012. The nest was laid on June 13, 2012 and emerged on August 5, 2012 with a 48% hatchling success rate.

The project area is within the known range of the Kemp's ridley sea turtle ridley. Swimming Kemp's ridley sea turtles be present within nearshore waters of the PAA during their approach to the nesting beach or in the vicinity of the borrow area when migrating along the east coast of Florida as juveniles and sub-adults. There are no survey data to evaluate usage of the offshore borrow area by swimming sea turtles.

2.8 LEATHERBACK SEA TURTLE

2.8.1 Status and Threats

The leatherback sea turtle (*Dermochelys coriacea*) is the largest of the living sea turtles; adults can reach 8 feet in length and weigh 500 to 2,000 lbs. The leatherback sea turtle was listed as endangered throughout its range on June 2, 1970 (35 FR 8495). Critical habitat was designated in the U.S. Virgin Islands on September 26, 1978 and March 23, 1979, respectively (43 FR 43688–43689 and 44 FR 17710–17712, respectively).

The general decline of the leatherback sea turtle is attributed to exploitation of eggs (Ross, 1981). The population has been threatened by egg-harvesting in countries such as Malaysia, Surinam, the Guianas, the west coast of Mexico, Costa Rica, and in several Caribbean islands. In the past, leatherbacks were killed for their abundant oil, which was used for oil lamps and for caulking wooden boats. Leatherbacks ingest plastic bags and other plastic debris, which are commonly generated by oil drilling rigs and production platforms in coastal Florida, Alabama, Mississippi, and Louisiana (Fritts et al., 1983). Ingestion of plastic bags and other plastic waste is a significant cause of mortality in leatherbacks turtles. Other factors threatening leatherbacks in Florida include loss or degradation of nesting habitat from coastal development, and disorientation of hatchlings by beachfront lighting.

The leatherback sea turtle is the only species which remains pelagic throughout its life. The lack of information on the movement patterns and habitat needs of this entirely pelagic species is an indirect threat to the species (NMFS and USFWS, 1998). Leatherbacks prefer open access beaches possibly to avoid damage to their soft plastron and flippers. Unfortunately, open beaches with little shoreline protection are vulnerable to beach erosion triggered by seasonal changes in wind and wave direction. Nests are more susceptible to inundation on open beaches during severe erosion events.

2.8.2 Distribution and Range

Leatherbacks seldom approach land except for nesting (Eckert, 1992). The leatherback is probably the most wide-ranging of all sea turtle species, occurring in the Atlantic, Pacific and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain and Norway; as far south as Australia, Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (FWC, 2018b; NFWL, 1980). Distribution of this species has been linked to thermal preference and seasonal fluctuations in the Gulf Stream and other warm water features (Fritts et al., 1983). Leatherback nesting locations are worldwide, with the Pacific Coast of Mexico supporting the world's largest known concentration of nesting leatherbacks (FWC, 2018b).

2.8.3 Habitat and Feeding

Leatherback sea turtles nest primarily in tropical regions. Major nesting beaches include Malaysia, Mexico, French Guiana, Surinam, Costa Rica, and Trinidad (Ross, 1981). Leatherback sea turtles nest only sporadically in some of the Atlantic and Gulf States of the continental U.S., with nesting reported as far north as North Carolina (Schwartz, 1976; Rabon et al., 2003). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS and USFWS, 2007). During the summer, leatherbacks tend to occur along the east coast of the U.S. from the Gulf of Maine south to Florida.

Leatherback nesting in Florida primarily occurs on the east coast of Florida. Female leatherback sea turtles typically nest at intervals of two to three years, depositing multiple nests per season. Leatherback sea turtles lay an average of 73 fertilized eggs with approximately 25 yolkless eggs per clutch (Stewart and Johnson, 2006). Females remain in the general vicinity of the nesting habitat for up to four months (Eckert et al., 1989; Keinath and Musick, 1993). The incubation period for leatherback sea turtles ranges from about 55 to 75 days.

Leatherback sea turtles are omnivorous. Leatherbacks feed mainly on pelagic soft-bodied invertebrates such as jellyfish and tunicates and may also eat squid, fish, crustaceans, algae, and floating seaweed. Highest concentrations of such prey organisms are often found in upwelling areas or where ocean currents converge.

Critical habitat for the leatherback sea turtle occurs in St. Croix, U.S. Virgin Islands. All other designated critical habitat for the species occurs along the Pacific coast.

2.8.4 Presence in the Project Area

Fourteen leatherback sea turtle nests were recorded by FWCC from 2009 through 2018 (**Table 3**). The earliest nest was on April 18 in 2011, and the latest nest on July 6, 2015 by Volusia/Flagler turtle patrol. Nesting success was not calculated for *D. coriacea* as nest numbers were very low during the 10-year period (**Table 3**). Hatchling success for the leatherback sea turtle between 2011 and 2018 is shown in **Table 7;** it ranges from 13% in 2013 to 93% in 2017.

Table 7. Leatherback sea turtle hatchling success in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Success Rate
2011	3	253	138	6	57%
2012	3	280	110	1	40%
2013	1	82	11	0	13%
2016	1	91	62	1	69%
2017	1	90	82	2	93%
2018	2	157	121	0	77%

Source: Volusia/Flagler Turtle Patrol

Since a small number of leatherback nests are regularly deposited on project area beaches each year, swimming females are present within nearshore waters of the PAA during their approach to the nesting beach. Adult leatherback sea turtles may also be present in the vicinity of the offshore borrow area since the leatherback is the only species to pelagic throughout its life. There are no survey data specific to the offshore borrow area to evaluate usage by swimming sea turtles.

2.9 HAWKSBILL SEA TURTLE

2.9.1 Status and Threats

The hawksbill sea turtle (*Eretmochelys imbricata*) was federally listed as endangered on June 2, 1970 (35 FR 8495) with critical habitat designated in Puerto Rico on May 24, 1978 (43 FR 22224). In 1998, NMFS designated critical habitat near Isla Mona and Isla Monito, Puerto Rico, seaward to 5.6 km (63 FR 46693-46701).

Of the approximately 15,000 females estimated to nest annually throughout the world, the Caribbean accounts for about 20 to 30 percent of the world's hawksbill population (USWFS, 2015). There are only five regional populations with more than 1,000 females nesting annually: Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly, 1999). Mexico is the most important region for hawksbills in the Caribbean with about 3,000 nests per year (Meylan, 1999). In the Pacific United States, the hawksbill sea turtle nests only on main island beaches in Hawaii, primarily along the east coast of the island of Hawaii (USFWS, 2015).

Historically, the greatest threat to this species has been the harvest of the hawksbill shell for jewelry. Between 1970 and 1989, Japanese imports of hawksbill shell totaled 1,573,769.9 lbs (713,850 kg), representing more than 670,000 turtles. While Japan agreed to stop importing shell in 1993, significant illegal trade continues. Attempts to down-list the hawksbill in support of the shell trade continues. The hawksbill is also used in the manufacture of leather, oil, perfume and cosmetics (NMFS and USFWS, 2013).

Other threats to the hawksbill sea turtle include destruction of nesting locations by beach development, incidental take in fishery operations, pollution by petroleum products, entanglement in marine debris, habitat loss of coral reef communities, predation on eggs and hatchlings, and increased recreational and commercial use of nesting beaches (NMFS and USFWS, 2013). In the southeast US, boat strikes are a concern in Florida. Of the 560 hawksbills stranded dead on coastal beaches in Florida from 1980 to 2007, approximately 9% had propeller wounds from collisions with a motorized boat (NMFS and USFWS, 2013).

2.9.2 Distribution and Range

The hawksbill turtle is circumtropical, occurring in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans (Witzell, 1983). This species is probably the most tropical of all marine turtles, although it does occur in temperate regions. The hawksbill sea turtle is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf (especially Texas), south to Brazil.

Hawksbills exhibit a wide tolerance for nesting substrate. The largest known nesting concentrations in the Caribbean are in the Yucatan Peninsula of Mexico, where approximately 800 to 1,000 nests are laid annually. Another major nesting beach exists on Mona Island, Puerto Rico, and a smaller, but substantial nesting beach (100 to 150 nests), is located on Buck Island Reef National Monument off St. Croix in the U.S. Virgin Islands (NMFS and USFWS, 2013). Elsewhere in the western Atlantic, hawksbills nest in small numbers along the Gulf coast of Mexico, the West Indies, and the Caribbean coasts of Central and South America (Musick, 1979).

Although Florida is not considered a concentrated nesting area (NMFS and USFWS, 2013), hawksbills are observed regularly in the Florida Keys and on reefs in Palm Beach County in southeast Florida. Nesting in Florida is generally restricted to southeast Florida (Broward, Miami-Dade, Martin, Monroe, and Palm Beach) with records of nests as far north as Volusia County on the central Atlantic coast of Florida.

2.9.3 Habitat and Feeding

The hawksbill sea turtle generally inhabits coastal reefs, bays, rocky areas, passes, estuaries, and lagoons in water depths of less than 70 ft. (21 m). Similar to green sea turtles, hatchlings are sometimes found floating in masses of pelagic marine algae (e.g., *Sargassum* spp.) (NMFS and USFWS, 2013; NFWL, 1980). When they reach a carapace length of approximately 20 to 25 cm, hawksbill juveniles reenter coastal waters. Coral reefs are widely recognized as the resident foraging habitat of juveniles, subadults, and adults. This habitat association is likely related to their diet of sponges, which need solid substrate for attachment. Hawksbill turtles are omnivorous and prefer invertebrates, especially encrusting organisms, and also feed on plant material such as algae, seagrasses, and mangroves (Carr, 1952; Rebel, 1974; Pritchard, 1977; Musick, 1979; Mortimer, 1982). Hawksbills also occur around rocky outcrops and high-energy shoals, which are optimum sites for sponge growth.

Critical habitat for the hawksbill sea turtle has been designated for selected beaches and/or waters of Mona, Monito, Culebrita, and Culebra Islands, Puerto Rico. There is no critical habitat in the state of Florida.

2.9.4 Presence in the Project Area

No hawksbill sea turtle nests have been recorded in Flagler County. Corals reefs and hardbottom are resident foraging habitats for adults, subadults and juveniles. Hardbottom habitats are not present in the vicinity of the PAA. Because the project area is within the known range of the hawksbill sea turtle, swimming hawksbill sea turtles may be encountered in the PAA.

2.10 NORTH ATLANTIC RIGHT WHALE

2.10.1 Status and Threats

The North Atlantic right whale (*Eubalaena glacialis*) is a federally listed endangered aquatic mammal protected under the Endangered Species Act. It was listed by NMFS on June 2,1970 (35 FR 8495). The North Atlantic right whale is considered the world's most endangered large whale with a total population of approximately 458 individuals in the western Atlantic in 2015 (Pace et al., 2017). The eastern Atlantic population is nearly extinct (NMFS, 2005). In August 2017, an Unusual Mortality Event (UME) was declared by NMFS with 12 mortalities occurring since June 7, 2017. Most occurred in Canada; none were off the coast of Florida.

Historically, commercial whaling depleted North Atlantic right whale populations. Populations are now mostly threatened by vessel collisions and entanglement in fishing gear. As reported by Kraus (1990), at least one third of the western Atlantic population mortalities are a result of human activities (NMFS, 2005). Other threats include habitat degradation, noise pollution, contaminants, underwater explosives, and climate change (NMFS, 2005). Between 2010 and 2014, the minimum rate of annual anthropogenic mortality and serious injury to right whales averaged 5.7 animals per year (Hayes et al., 2017).

2.10.2 Distribution and Range

North Atlantic right whales may be found in ocean waters along the east coast Atlantic from December through March as they gather on calving grounds along the coast of Georgia and Florida. Migrations south to the calving grounds occur by pregnant females during mid-November (Kraus and Rolland, 2007). The southeastern United States (Altamaha River, Georgia to Sebastian Inlet, Florida) was designated as Critical Habitat for the North Atlantic right whale in June 1994 because of these calving grounds (NMFS, 2005). In the late winter and early spring, right whales leave the southeast and travel north to a feeding and nursery areas in Cape Cod Bay, Massachusetts (Kraus and Rolland, 2007).

2.10.3 Habitat and Feeding

Wintering and calving grounds occur in the southeastern United States while feeding and nursery grounds occur in the north western Atlantic. North Atlantic right whales feed on zooplankton, primarily copepods. Physical oceanographic features and the topography of feeding areas play a major role in where right whales preferably skim waters to filter zooplankton. Cool water temperatures and deep-water depths (100-200 m) adjacent to steep sloping topography are preferable areas for feeding (NMFS, 2005; Winn et al., 1986; Clapham et al., 1999).

Effective February 26, 2016, critical habitat for the North Atlantic right whale was revised to include two new areas in the Gulf of Maine and Georges Bank region (Unit 1) and the Southeast U.S. coast (Unit 2) (50 CFR Part 226) which includes the beach fill areas in the PAA (**Figure 11**). The offshore borrow area for the project is not location within critical habitat for the North Atlantic right whale.

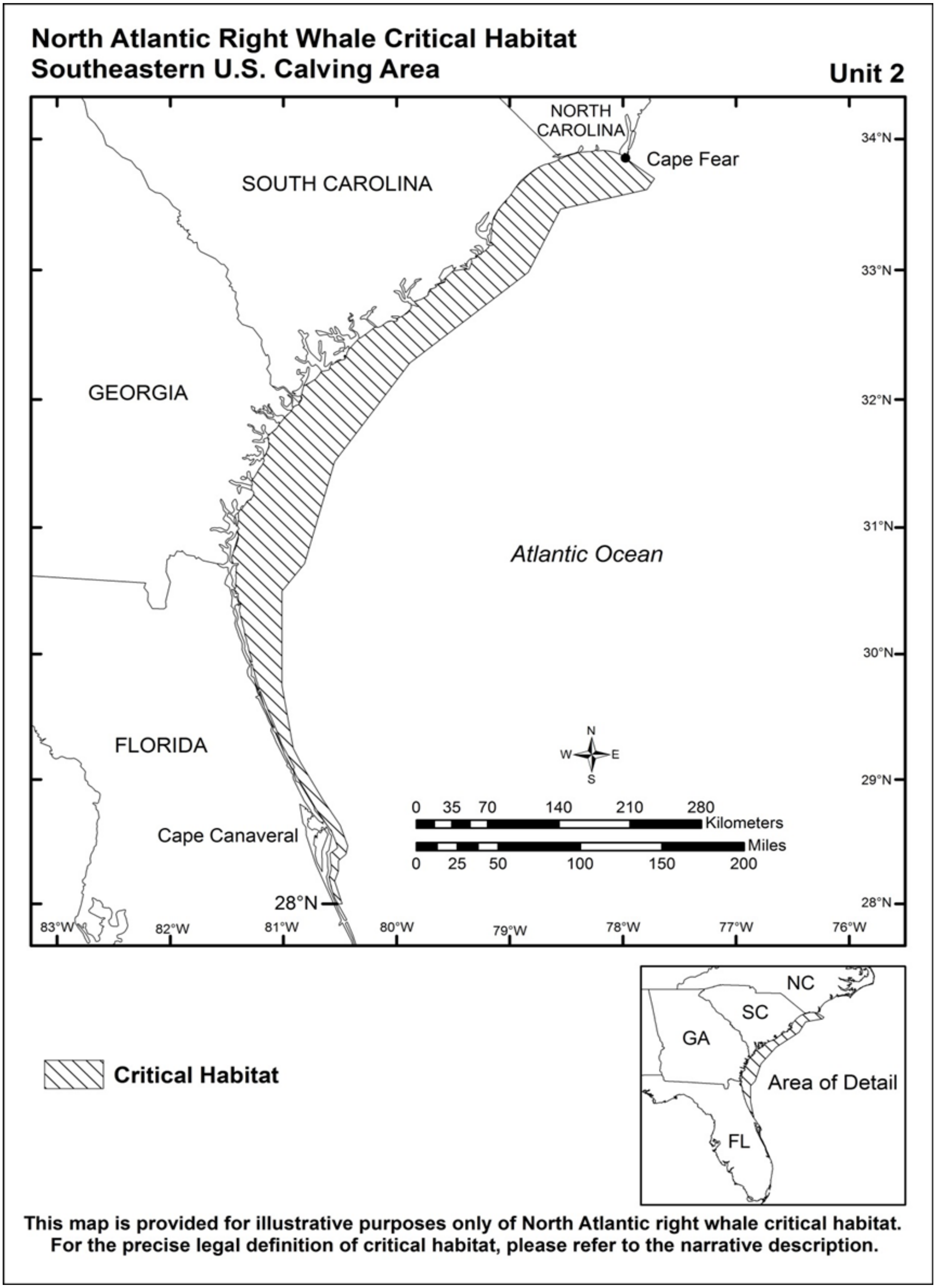


Figure 11. North Atlantic Right Whale Critical Habitat Unit 2. Source: NMFS, 2016.

2.10.4 Presence in the Project Area

North Atlantic right whales occur offshore of Flagler County. Right whale sightings by the Marineland Right Whale Project from 2001 through 2011 are shown in **Figure 12**. There are numerous reports of right whales immediately offshore of the beach fill areas of both mother and calf and individual and group sightings (**Figure 13**). The sightings span from November 29 through March 29 for the period of January 1, 2009 through June 10, 2019. Most sightings occur in January and February. The borrow area is located outside of critical habitat for the North Atlantic right whale. Fewer sightings are reported near the borrow area, likely due to its more remote location approximately 10 miles offshore.

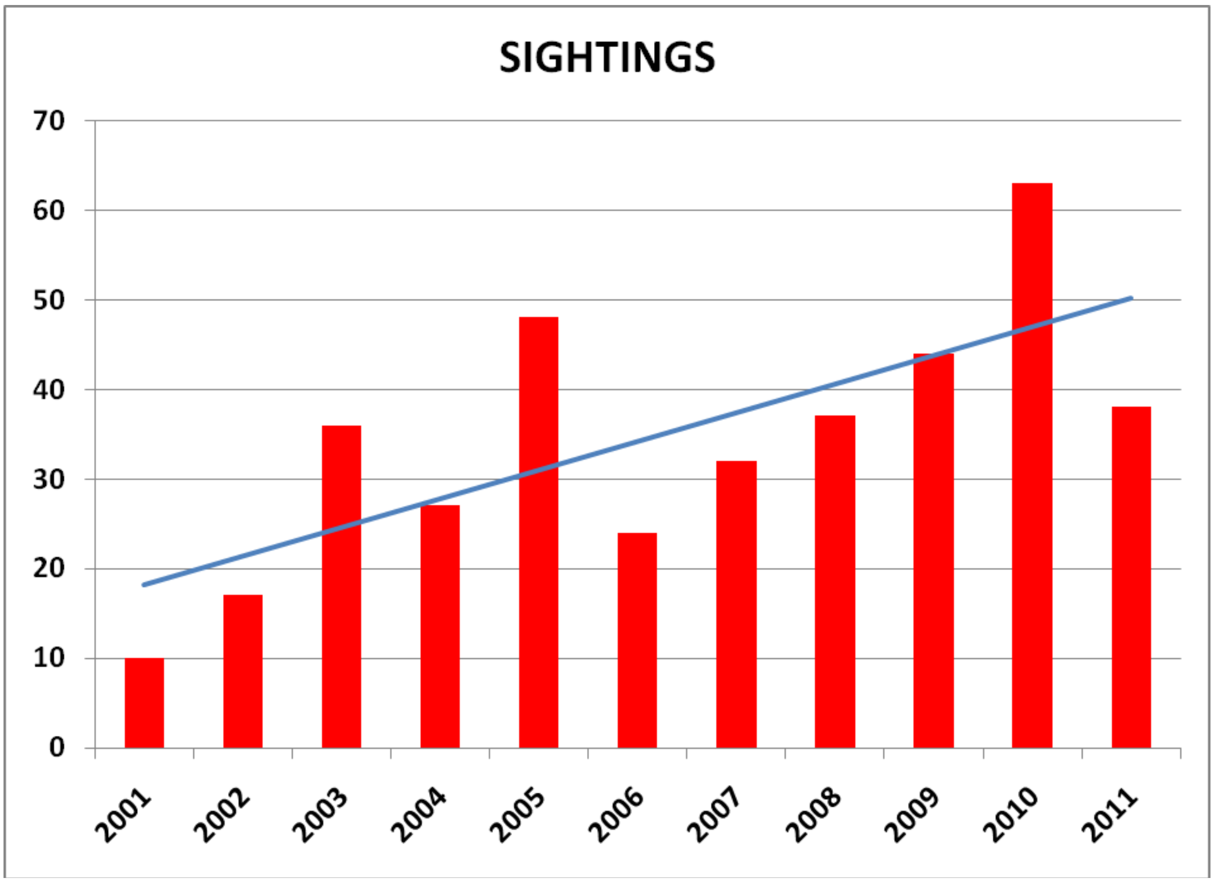


Figure 12: Marineland Right Whale Project Data, 2001 through 2011: total right whale sightings per year with a simple linear trend line. Source: Associated Scientist at Woods Hole, Inc Marineland Right Whale Project (USACE, 2015).

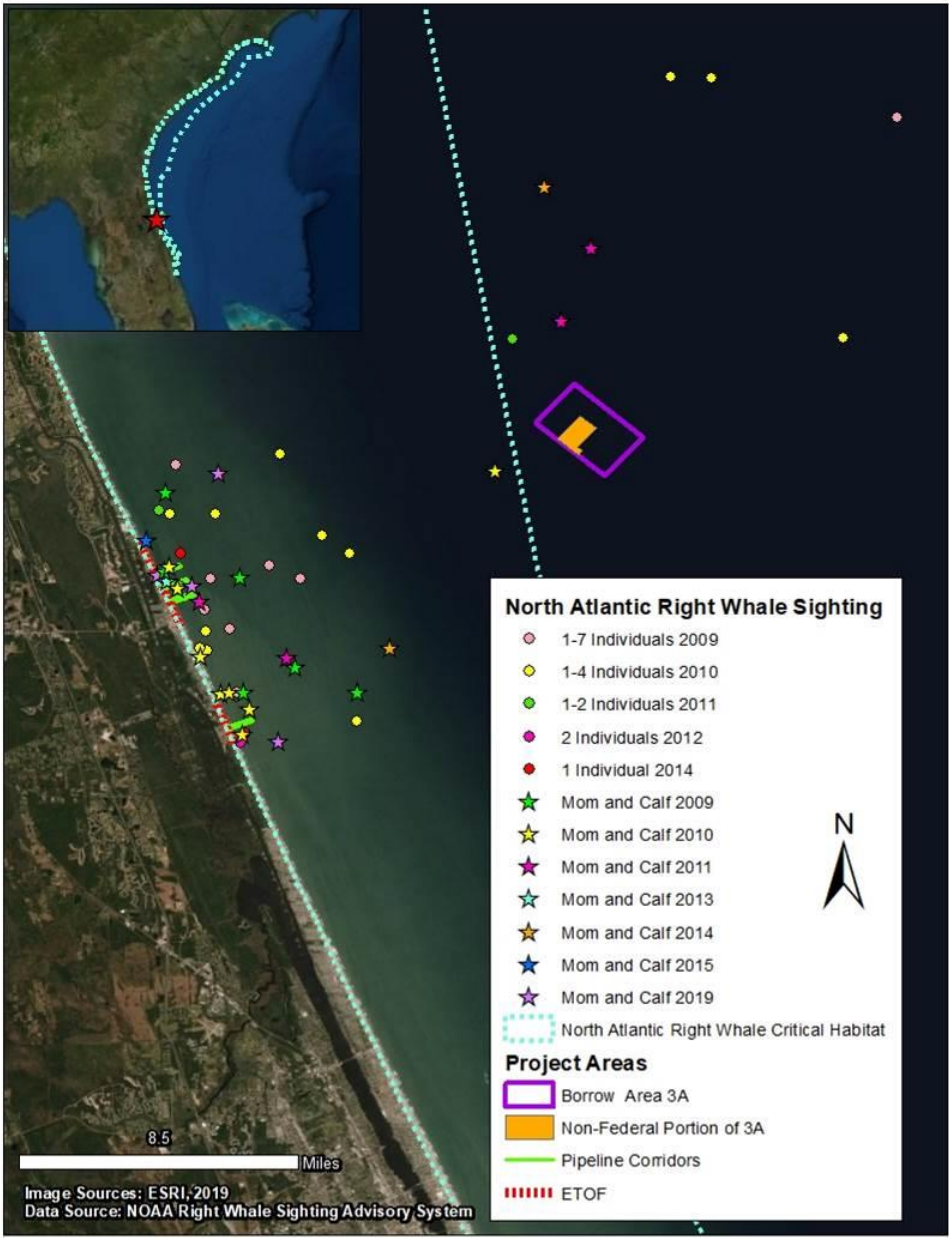


Figure 13. North Atlantic right whale sightings, January 1, 2009 through June 9, 2019. Source: NOAA Right Whale Sighting Advisory System (2019).

3.0 ANALYSIS OF EFFECTS ON LISTED SPECIES AND HABITATS- CFR 402.12(f)(4)

3.1 PIPING PLOVER

The PAA in Flagler County is not considered Optimal Piping Plover habitat in the P^3BO (USFWS, 2013). Piping plovers have been recorded in the PAA in low numbers. Piping plover sightings have not been reported to eBird since 2015 (see **Section 2.1.4**). Between 2014 and May 2019, there were only two days in 2015 where piping plover sightings were reported to the eBird database.

3.1.1 Direct Effects

The proposed project is not located within designated critical habitat for wintering piping plover and will therefore have no direct effects on critical habitat.

Because the migratory and wintering period for piping plover in Florida is July 15th through May 15th, the construction window for the proposed nourishment project will overlap a portion of the migratory and overwintering season for piping plovers. Heavy machinery and equipment operating within the PAA (e.g., trucks and bulldozers, placement of pipeline, and sand placement) may adversely affect migrating piping plovers by disturbing and disrupting normal activities such as roosting and foraging and possibly forcing birds to expend valuable energy reserves to seek habitats in less disturbed adjacent areas along the shoreline. These impacts would be temporary and limited to 3 to 5-month construction period.

Beach wrack is important to shorebirds for camouflage and foraging. Destruction of wrack through beach nourishment or wrack-removal programs eliminates this habitat. Creating beach profiles that closely match original beach conditions and protection of wrack can offset direct and indirect impacts associated with beach nourishment and human disturbance.

3.1.2 Indirect effects

Direct placement of sand will result in high mortality of benthic infauna at the beach fill areas. Project activities will affect up to 4.1 miles of shoreline at the beach fill site during initial fill placement and subsequent nourishment events. The majority of infaunal loss will be in the shallow waters of the surf zone. Due to direct burial of the intertidal food base, short-term impacts to preferred prey for piping plover may occur following beach nourishment (Peterson et al., 2006). A softbottom macroinvertebrate monitoring program for the 2011 South Amelia Island Beach Nourishment Project evaluated impacts to beach macrofauna and recovery time following beach fill placement. *Donax* spp. populations in the high-density area had not recovered at the 8-month post-construction sampling; but at approximately two years after nourishment in the spring of 2013, populations had recovered and exceeded pre-construction abundances. The monitoring program did not document any adverse impacts to mole crab populations following beach nourishment (CEG, 2014).

Temporary depletion of the food base for shorebirds will occur immediately following sand placement. Given the compatibility of the borrow area sediments with the existing beach and expected recolonization rate of prey species, it is anticipated that impacts to the benthic communities at the proposed project fill site would be minimal and short term (less than two years). The borrow area sediments have a very low fraction of fine material averaging 1.92%. Repopulation of benthic macrofauna is likely during the first wintering season following project construction; however, the quality of foraging habitat may be less than optimal for one to two years due to temporary reductions in species diversity and abundance/ richness of preferred prey taxa.

Beach nourishment may increase recreational usage within the project area immediately after project construction. Recreational activities, including increased pedestrian use, have the potential to adversely affect piping plovers through disturbance and increased presence of predators, including domestic and feral animals attracted by the presence of people and their trash. Disturbance levels following project construction are not expected to exceed current levels from existing recreational uses in the PAA.

3.1.3 Interrelated, Interdependent and Cumulative Effects

The Federal nourishment project area is located between the two County (Local) project area reaches. It is likely that the Federal project will be constructed prior to the proposed County project; therefore, this stretch of shoreline would provide little to no alternative foraging habitat during construction of the County project. Adjacent foraging habitat will be available immediately north of the north County reach and immediately south of the south County reach.

Projects adjacent to the PAA include Florida Intracoastal Waterway (ICWW) maintenance dredging; no material is disposed in Flagler County during these dredging events. The ICWW near Matanzas Inlet north of Flagler County is subject to shoaling and must regularly be dredged. This material is pumped onto the beach at Summer Haven directly adjacent to the northern border of Flagler County. The fine-grained sand placed at Summer Haven tends to migrate south rapidly after placement and may reach beaches north of the PAA near Marineland.

The expected renourishment interval for the County project is 11 years. The proposed project is a one-time nourishment event with one future emergency event if needed. The renourishment interval will provide sufficient time for softbottom benthic macroinvertebrate populations to re-establish to pre-nourishment densities and diversity.

3.1.4 Conservation Measures

The project is proposed for construction as early as Fall 2020. The County agrees to implement the Conservation Measures agreed to by the Corps in the USFWS P^3BO for all projects that are located in non-optimal piping plover habitat including survey guidelines for non-breeding shorebirds (USFWS, 2013). These measures include adherence to the appropriate seasonal windows to the maximum extent practicable to minimize the potential for direct disturbance of wintering piping plovers; modification of pipeline alignment and associated construction activities to reduce impacts to foraging, sheltering, and roosting; facilitating awareness of piping plover habitat by educating the public on ways to minimize disruption to the species; and providing the mechanisms necessary to monitor impacts to piping plovers if present within the PAA. The County will adhere to shorebird monitoring and protection conditions provided in FDEP Permit No. 0379716-00-JC for the project.

3.1.5 Recommended Determination

The proposed project is not located within critical habitat for the piping plover; therefore, critical habitat will not be directly impacted by the proposed project. There is alternative foraging and roosting habitat immediately north and south of the two County project reaches that will not be disturbed by project construction or other authorized nourishment activities. Based on compliance with the Terms and Conditions for non-optimal habitat in the P^3BO, the proposed project may affect but is not likely to adversely affect the piping plover. This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment for this project area in 2015 (USACE, 2015).

3.2 RUFA RED KNOT

3.2.1 Direct Effects

The proposed project is expected to be constructed as early as the fall of 2020 and will last 3 to 5 months. Red knots are rarely observed in the vicinity of the PAA (see **Section 2.2.4**). If project construction occurs when red knots are present in the PAA, direct effects would include harassment in the form of disturbing or interfering with birds foraging and/or roosting within the construction area and on adjacent beaches as a consequence of heavy machinery and operational equipment (*e.g.,* trucks and bulldozers and pipeline) utilized to dispose and place fill.

The majority of infaunal loss will be in the shallow waters of the surf zone. Reported red knot prey items in wintering and stopover areas along the Gulf coast of Florida include dwarf surf clams (*Mulinia lateralis*), coquina clams (*Donax* spp.) and amphipod crustaceans (*Emerita* spp.) found in the intertidal zone (USFWS, 2014a). See **Section 3.1.1** for a discussion on the direct effects to the prey base for red knots.

3.2.2 Indirect Effects

As described in **Section 3.1.2,** the quality of foraging habitat along the project fill shoreline is expected to be less than optimal for one to two years following project construction due to beach fill placement. Long-term adverse effects to foraging habitat are not anticipated based upon the expected re-colonization of *Donax* spp. within two years following nourishment.

3.2.3 Interrelated, Interdependent and Cumulative Effects

Potential interdependent and cumulative effects on wintering red knot are similar to the effects described for wintering piping plover in **Section 3.1.3**.

3.2.4 Conservation Measures

The monitoring requirements in the Terms and Conditions of the P^{3}BO will be expanded to include surveys for wintering red knot in the PAA.

3.2.5 Recommended Determination

Critical habitat has not been designated for the rufa red knot. Based on compliance with the Terms and Conditions in the P^{3}BO for piping plovers and infrequent sightings of red knots in the PAA, the proposed project may affect but is not likely to affect the rufa red knot. This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment for this project area in 2015 (USACE, 2015).

3.3 SEA TURTLES

Flagler County and the PAA is included under both terrestrial and neritic critical habitat areas for the loggerhead sea turtle: Terrestrial Critical Habitat Unit LOGG-T-FL-03 and Neritic Critical Habitat Unit LOGG-N-15. Loggerhead and green sea turtles regularly nest and leatherback sea turtles occasionally nest within the PAA. One Kemp's ridley nest was documented in 2012. Flagler County is within the range of all five species of sea turtles found in the waters around Florida (loggerhead, green, leatherback, hawksbill, and Kemp's ridley).

The USFWS 2015 Statewide Programmatic Biological Opinion (SPBO) (USFWS, 2015), addresses nesting sea turtles, their nests and eggs, and hatchlings as they emerge from the nest and crawl to the sea. The Applicants agree to adhere to the Terms and Conditions of the USFWS SPBO for nesting and hatchling sea turtles. The USFWS SPBO allows for project construction during sea turtle nesting season in Flagler County, provided adherence to the Terms and Conditions and Reasonable and Prudent Measures.

The proposed project will most likely be constructed using a trailing suction hopper dredge. Flagler County agrees to adhere to the Terms and Conditions of the Regional Biological Opinion on hopper dredging for beach nourishment on the south Atlantic Coast for incidental take of swimming sea turtles (NMFS SARBO, 2020).

3.3.1 Direct Effects

The initial proposed beach project is scheduled for the fall of 2020. Construction of the beach fill project is expected to last approximately 3 to 5 months and may be completed outside of sea turtle nesting season. Beach nourishment activities during sea turtle nesting season, particularly on or near high density nesting beaches, can cause increased loss of eggs and hatchlings through disruption of adult nesting activity and increased mortality via burial, crushing of nests and/or hatchlings. Nest monitoring and egg relocation programs reduce these impacts, but nests may be inadvertently missed or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed.

Beach restoration projects which have been constructed during turtle nesting season generally have not been detrimental to sea turtles (Fletemeyer 1980; Wolf 1988; Burney and Mattison 1992). Nesting sea turtles tend to avoid the immediate construction area during beach restoration projects (Fletemeyer 1980; Wolf 1988; Burney and Mattison 1992); however, more frequent non-nesting emergences involve an increased expenditure of energy and, therefore, a potential decrease in overall reproductive fitness.

Equipment
Operation of construction equipment on or near the beach can have direct impacts on nesting females and hatchlings. Motor vehicles can interrupt or collide with female turtles, disorient emergent hatchlings with headlights, run over hatchlings attempting to reach the ocean, or cause tracks that prevent hatchlings from crawling to the ocean. Pipeline placement can create barriers to nesting females emerging from the surf and impede their progress up the beach, causing a higher incidence of non-nesting emergences (NNE) and unnecessary energy expenditure.

The project is anticipated to be constructed using a hopper dredge. Dredged sand will travel through the dragheads into the dredge's open hopper, where most effluent will drain out the overflow structures, putting sea turtles at risk of entrainment. The vessel(s) will transport the dredged material to pump-outs positioned approximately 0.5 mile from shore, where the material will be pumped directly from the hopper via pipeline to the beach. The pipeline will be placed perpendicular to shore; therefore, it will not disrupt ingress and egress of nesting sea turtles to the beach.

Pump-out buoys will be relocated several times to facilitate pump-out along the nourishment template. Pipeline will be rafted, floated into place, and flooded and submerged to the sea floor. The placement and relocation of nearshore mooring buoys may involve the use of tender tugboats and a barged pipeline hauler or crane. Pump-out buoys may be anchored using multi-ton point anchors and/or clump weights. Support vessels and tugs may support the hopper dredge in other activities, such as crew rotations and pump-out connection.

Artificial Lighting
Construction lights along the project beach and on the dredge can deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings both from project beaches and adjacent non-project beaches. Artificial lighting on offshore dredges also has the potential to impact nesting females who may be deterred from nesting by the lights in the nearshore waters. Hatchling exposure time to predation may also increase as a result of lights on a nearshore dredge or anchored barge as hatchling may crawl/swim toward the lights instead of taking the shortest path to offshore waters, thus increasing their exposure to predators (NMFS, 2018). Bright lighting can increase the disorientation rate of hatchlings as well as predation by fishes on swimming hatchlings due to offshore barge lights.

A review of selected nourished beaches in Florida (South Brevard, North Brevard, Captiva Island, Ocean Ridge, Boca Raton, Town of Palm Beach, Longboat Key, and

Bonita Beach) indicated disorientation increased by approximately 300% during the first nesting season after project construction and up to 542% during the second year compared to pre-nourishment reports (Trindell*,* 2005). The newly created, wider, flatter beach berm exposes sea turtles and their nests to lights that were less visible, or not visible, from nesting areas prior to the beach fill; elevated disorientation events lead to potentially higher mortality of newly emerged hatchlings.

Nest relocation
Nest relocation may result in direct impacts including damage to eggs, reduction of hatching success and hatchling emergence relative to natural nests, and sex ratio alteration based on incubation temperature (Godfrey and Mrosovsky, 1999; Limpus et al*.*, 1979; Mortimer, 1999; Yntema and Mrosovsky, 1982). If nests are not relocated within 12 hours of deposition, damage to eggs will occur from movement. Additionally, if nests are relocated into sands deficient in oxygen and moisture, morbidity, reduced behavioral competence of hatchlings and/or mortality occurs.

Missed Nests
Aside from the number of construction activity impacts being reduced as a result of a nest survey/marking program, nests are unintentionally missed due to crawls being obscured by current environmental conditions at the time of the nesting survey (rainfall, wind, and/or tides). Nests are inadvertently misidentified as NNE during daily patrols by experienced sea turtle nest surveyors.

3.3.2 Indirect Effects
Several studies (Brock et al. 2009; Rumbold et al. 2001; Steinitz et al. 1998) have indicated that the principal initial effect of beach project construction on sea turtle reproduction is a reduction in nesting success (i.e. the percentage of emergences resulting in nests) due to beach compaction and the unnatural beach profile created during project construction. High compaction levels result in an increased expenditure of energy by nesting females due to the increased length of time required to excavate the nest, as well as repeated attempts to successfully excavate a nest. These studies suggest that the negative effects of beach nourishment on nesting success can persist for approximately two years after beach project construction.

Ernest and Martin (1999) found that the principal effect on sea turtle reproduction was a reduction in nesting success during the first year after project construction in Martin County, FL. The reduction in nesting success was similar in both tilled and untilled areas, indicating that factors other than compaction, such as changes in the width of the beach profile, were responsible for the decrease in attractiveness of the beach as nesting habitat (Ernest, 2001). As a constructed beach is reworked by natural process, the beach will adjust to a more natural profile, reducing both beach compaction and escarpment formation frequency.

Sea turtle hatching success may be reduced when sediment grain size, density, shear resistance, color, gas diffusion rates, organic composition, and moisture content of the fill material are different from the natural beach sand (Nelson and Dickerson, 1988;

Nelson, 1991; Ackerman, 1991; Ackerman et al., 1991, 1992; Ehrhart, 1995; Rice, 2001). Sand temperature changes can alter the incubation time, which can lead to increased predation and alter the sex ratio of hatchlings (Schulman et al., 1994). Temperature-dependent sex determination in sea turtles results in the production of female hatchlings at warm temperatures and male hatchlings at cooler temperatures relative to the threshold temperature range between 28 and 30°C (68 and 86°F) (Mrosovsky, 1995).

Altered beach conditions may also hamper embryonic development (Ackerman et al., 1992) and reduce behavioral competence of hatchlings, including changes in locomotion (Miller et al., 1987). Beaches nourished with sand dredged from an offshore sand source are warmer due to increased water retention and darker sediment color as compared to natural beaches (Ernest, 2001). The warmer sands of nourished beaches may significantly reduce incubation periods and contribute to a higher incidence of late-stage embryonic mortality (Ernest, 2001). No significant differences in overall reproductive success were recorded during a three-year study of nourished Martin County beaches despite changes in the temperature and moisture content of the nest cavity (Ernest, 2001).

Table 8 and **Figure 14** show recent sediment grain characteristics of the proposed borrow area, FCBA, in comparison with native beach sediment. The borrow area sand for the Local project compares favorably with existing beach sediments. The native beach and borrow area materials vary in color. Visually, the native beach of Flagler County is commonly viewed as having an orange-yellow color, especially across the upper beach berm, that is related mostly to the shell materials in the beach.

The most notable difference between the native beach and borrow sediments is that native beach sediments have a wider range of sizes than the proposed borrow area material. The borrow area material is slightly coarser, on average, than the native beach sediments and appears to have more uniform sediment sizes. All sampled borrow area sediments fall well within the range of material sizes found on the native project beach.

The borrow area composite samples have a median grain size ranging from 0.22 mm to 0.23 mm and a mean grain size range of 0.26 mm to 0.27 mm. The difference in these sizes is indicative of the amount of shell fragments and hash in the borrow area sediment. The sorting value, σ, of the composite ranges from 0.88φ to 0.94φ. The sorting value provides a description of the degree to which sediments in the composite sample are similarly sized. Smaller values of σ, closer to σ =0.5, indicate very poorly graded (or well sorted) samples in which the sediment grains are similarly sized.

The native beach contains about 19.2% visual shell while both borrow area sediment composites contain about 20.1 to 21.1% shell. Carbonate content, determined by burn testing on selected samples and visually on all others, reveals a range of carbonate (shell) content from 9 to 35% with an average of about 21% for the three zones in FCBA.

Analysis of sea turtle nesting data collected before and after placement of beach fill material with high shell content during the Juno Beach and Jupiter-Carlin nourishment projects in Palm Beach County in 2001 and 2002 suggests that adverse effects potentially related to placement of shelly beach fill did not exceed expected reductions in nesting success known to occur during the first two years following beach nourishment. There did not appear to be any long-term negative effects to nesting density and success directly attributable to the higher shell content of the project fill areas (CEG, 2016).

Table 8. Summary comparison of native beach sediment to the proposed FCBA composite sediment with overfill ratios.

	Folk and Ward (1957) Method			Method of Moments					Munsell Color				
	D_{16} (mm)	D_{50} (mm) (Median)	D_{84} (mm)	Mean (phi)	Mean (mm)	Sorting (phi)	Carbonate Content (%)	Passing #230 (%)	Hue	Value	Chroma	Overfill James (1974)	Overfill Dean (2000)
Native Beach Composite	0.13	0.18	0.57	2.11	0.23	1.04	19.2	0.23	10Y	7	2	1.00	1.00
Borrow Area FCBA-A Composite	0.16	0.23	0.45	1.88	0.27	0.94	20.1	1.58	10YR	6	1		
Borrow Area FCBA-B Composite	0.16	0.22	0.41	1.92	0.26	0.91	21.1	1.70	10YR	6	1		
Borrow Area FCBA-C Composite	0.16	0.23	0.45	1.87	0.27	0.88	20.6	1.67	10YR	6	1		

Notes: Fines are percent material passing No. 230 sieve. Percent shell determined from carbonate burn testing. Source: OAI, 2017 and 2018.

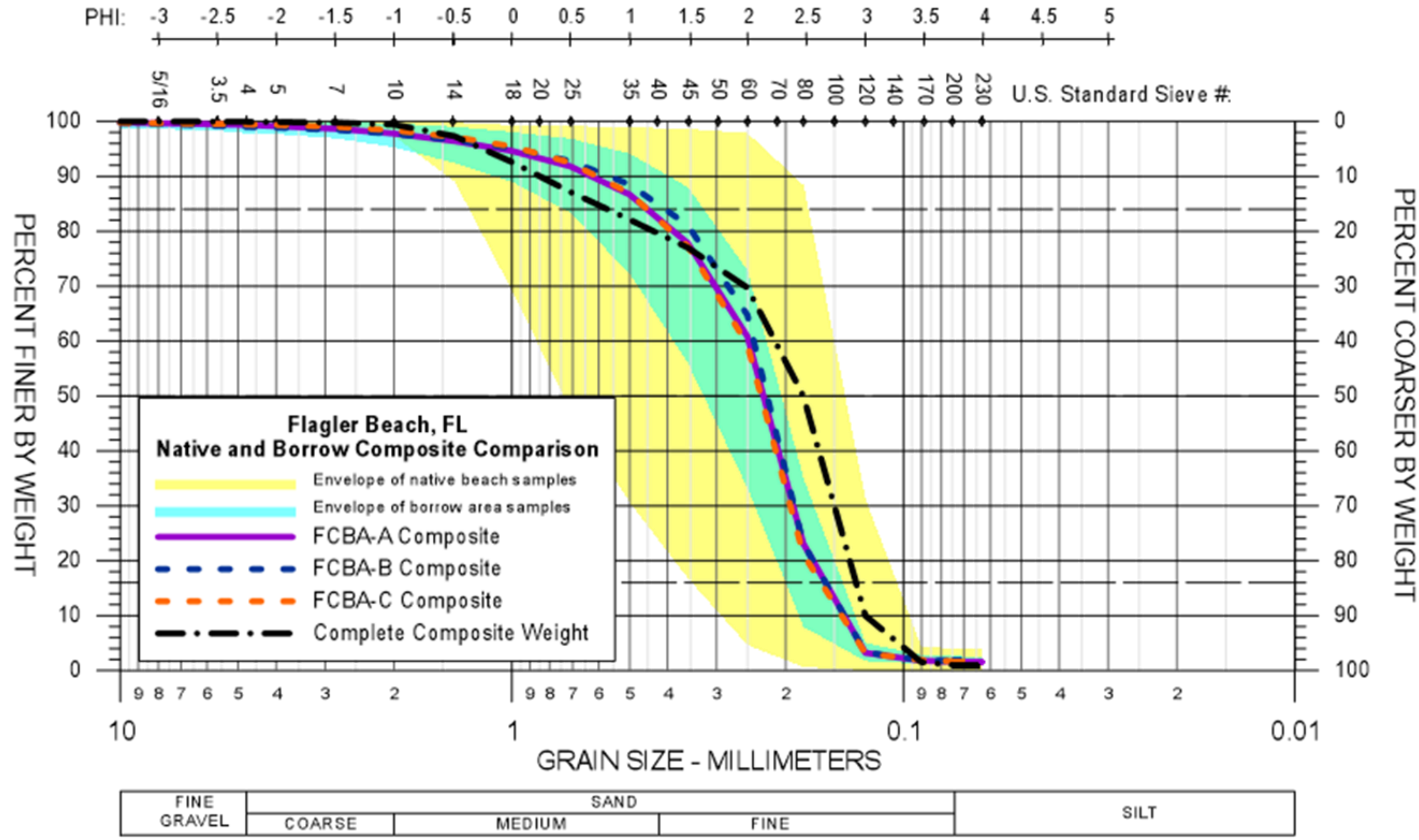


Figure 14. Cumulative grain size curves for the borrow area and existing beach sediments.

Based on data collected throughout Florida's nesting beaches by FWC, the proportion of nests to NNEs should be relatively similar, and the balance between the two serves as an indicator of nesting suitability. When the number of NNEs substantially exceeds deposited nests, this typically indicates that some combination of factors is deterring females from nesting. A skewed ratio of nests to NNEs can be associated with multiple causes (e.g., escarpments, beach compactness, engineered beaches, beach lighting, beach armoring structures, beach furniture, or physical harassment). An increase in the frequency of NNEs (i.e. false crawls) involves an increased expenditure of energy and, therefore, a potential decrease in overall reproductive fitness.

The quality of sea turtle nesting habitat within the PPA appears to be higher than average for Florida’s beaches with nesting success exceeding 50% at Gamble Rogers SRA from 2009 through 2018 (see **Table 3**). The lowest nesting success in Gamble Rogers SRA (58%) and the lowest nesting density (26 nests) were recorded in 2015 while the highest nesting success was recorded in 2014 (91%). Nesting success on Flagler Beach is generally lower than Gamble Rogers but is still higher than average with only 3 years between 2009 and 2018 lower than 50%. The lowest nesting success on Flagler Beach (40%) was in 2012, and the highest nesting success was in 2015 (64%). Geotechnical evaluation of the FCBA sand has demonstrated compatibility with existing beach sediments such that the nourished beach will continue to provide suitable nesting substrate for sea turtles.

3.3.3 Interrelated, Interdependent and Cumulative Effects

Multiple beach nourishment projects can cumulatively affect sea turtle nesting habitat including alteration of the beach profile, sand compaction, and other chemical and physiological changes to the natural beach sand which all deter sea turtles from nesting. Flagler County has not had a history of beach nourishment, but the effects of future nourishment projects may increase the area of potential sea turtle nesting habitat, provided compliance with the Terms and Conditions for beach sand compatibility in the SPBO. Regular nourishments also protect existing beaches from future storm erosion.

3.3.4 Conservation Measures

Potential impacts to sea turtles will be mitigated by manipulating the configuration of the placed material to achieve a more turtle-friendly profile. In order to minimize potential impacts to nesting females and sea turtle hatchlings, the proposed beach fill design incorporates a dipping 1:55 slope over the seaward 100 feet of the berm, effectively lowering the seaward edge of the berm by 3.5 ft. over a nearly 200 ft. distance. The seaward-dipping seaward slope should minimize the potential for escarpment formations, prevent ponding on the new beach berm, and assist in directing hatchlings seaward to the ocean.

Swimming

Flagler County shall comply with the *NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (*__Appendix 1__), NOAA Vessel Strike Avoidance Measures (**Appendix 2**), and Terms and Conditions of the NMFS SARBO (2020). Should a collision with and/or injury to a sea turtle occur, NMFS shall be notified immediately, and

FWC Florida Sea Turtle Stranding and Salvage Network Contact 888-404-FWCC (3922).

Nesting
Flagler County has agreed to implement the Reasonable and Prudent Measures and Terms and Conditions for sea turtles in the USFWS SPBO for beach nourishment. If project construction overlaps sea turtle nesting season, a nest relocation program will be implemented to avoid and minimize the potential for incidental take of sea turtles during construction activities during sea turtle nesting season.

Project lighting will be limited to the immediate construction zone and shall comply with safety requirements. Offshore lighting shall be minimized to reduce excessive illumination of nearshore waters and the nesting beach.

Sand Compaction/Mechanical Tilling
Potential effects of increased sand compaction and scarp formation can be greatly reduced or eliminated through compaction monitoring, mechanical tilling, and grading of the beach. Compaction monitoring is a State and Federal permit requirement following nourishment activities, prior to nesting season commencement, and for two years following project completion. Tilling of project area beaches is currently required by State and Federal agencies if penetrometer testing demonstrates compaction in excess of 500 pounds per square inch (psi) at any two adjacent sampling stations or depths. If tilling is needed, the area shall be tilled to a depth of 36 inches. Each pass of the tilling equipment shall be overlapped to allow more thorough and even tilling.

All tilling activity, if performed voluntarily or following compaction measurements that mandate tilling, shall be completed at least once prior to the nesting season. An electronic copy of the results of the compaction monitoring shall be submitted to the local FWCC Field Office prior to any tilling actions being taken or if a request not to till is made based on compaction results. The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post construction compaction levels. Additionally, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.

a. Compaction sampling stations must be located at 500-foot intervals along the sand placement template. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high-water line (normal wrack line).

b. At each station, the cone penetrometer must be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary, to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lie over less compact layers. Replicates must be located as close to each other as possible, without interacting with the previous hole or disturbed sediments. The three replicate compaction values for each depth must be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final six averaged compaction values.

c. If the average value for any depth exceeds 500 psi for any two or more adjacent stations, then that area must be tilled immediately prior to April 15.

d. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

e. Tilling must occur landward of the wrack line and avoid all vegetated areas 3 square feet or greater with a 3 square foot buffer around the vegetated areas.

Escarpments
Visual surveys for escarpments along the project area must be made immediately after completion of the sand placement and within 30 days prior to the start dates for nesting season for 3 subsequent years if sand in the project area still remains on the dry beach. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet must be leveled and the beach profile must be reconfigured to minimize scarp formation by the dates listed above. Any escarpment removal must be reported by location. If the project is completed during the early part of the sea turtle nesting and hatching season (March 1 through April 30), escarpments may be required to be leveled immediately, while protecting nests that have been relocated or left in place. USFWS must be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, USFWS or FWCC will provide a brief written authorization within 30 days that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the local FWCC Field Office.

Implementation of the proposed project during sea turtle nesting season would increase the potential for take of loggerhead sea turtles. Project construction during sea turtle nesting season in Flagler County (May 1 through October 31) would involve increased beach sand compaction due to the presence of heavy equipment and sand deposition, and negative impacts associated with construction-related lighting. A nest relocation program will be implemented to avoid and minimize the potential for incidental take of sea turtles during construction activities according to the Terms and Conditions of the USFWS Biological Opinion. Sea turtle monitoring (daily nest surveys and nest relocations) will be performed by the authorized Florida Fish and Wildlife Conservation Commission (FWCC) marine turtle permit holder for the project area.

3.3.5 Recommended Determination

Incidental take of nesting sea turtles may occur on up to 22,000 ft. of nesting beach in the project area if the construction schedule overlaps sea turtle nesting season. Loggerhead, green, and leatherback sea turtles regularly nest on the project area beach. If the proposed project overlaps the early and/or late portion of sea turtle nesting season, the project may affect nesting and hatchling loggerhead, leatherback and green sea turtles. This determination was also made in the USACE Integrated Feasibility Study and Environmental Assessment for this project area in 2015 (USACE, 2015). The proposed project may also affect terrestrial critical nesting habitat for the loggerhead sea turtle within Critical Habitat Unit LOGG-T-FL-03,

Incidental take for nesting sea turtles and their nests/hatchlings has been authorized by the SPBO. Flagler County agrees to implement the Terms and Conditions and Reasonable and Prudent Measures of the USFWS SPBO for shore protection activities along the Florida east coast (SPBO, 2020). Extensive armoring and revetment have disrupted sea turtle nesting due to disturbance to the habitat quality. These areas are anticipated to become desirable nesting areas once the dune and beach are reconstructed as the quality of habitat will be increased significantly. The construction of a stable dune and wider beach will provide sufficient habitat for sea turtle to nest (USACE, 2015).

The project is anticipated to be constructed using a hopper dredge. Dredged sand will travel through the dragheads into the dredge's open hopper, and most of the effluent will drain out the overflow structures putting sea turtles at risk of draghead entrainment. The vessel(s) will transport the dredged material to pump-outs positioned approximately 0.5 mile from shore where the material will be pumped directly from the hopper via pipeline to the beach. The pipeline will be placed perpendicular to shore and therefore no disrupt ingress and egress of nesting sea turtles and their critical habitat. Pump-out buoys will be relocated several times to facilitate pump-out along the nourishment template. Pipeline will be rafted, floated into place, and flooded and submerged to the sea floor. The placement and relocation of the nearshore mooring buoys may involve the use of tender tugboats and a barged pipeline hauler or crane. Pump-out buoys may be anchored using multi-ton point anchors and/or clump weights. Support vessels and tugs may support the hopper dredge in other activities, such as crew rotations and pump-out connection.

Based on project construction with a hopper dredge, the proposed project may affect the five swimming sea turtle species found in Florida waters: loggerhead, green, leatherback, hawksbill, and Kemp's ridley sea turtles. The County will adhere to all turtle safety precautions outlined in the NMFS SARBO (2020).

The project area is also located within neritic nearshore reproductive critical habitat, Unit LOGG-N-15 for the Northwest Atlantic Ocean DPS of the loggerhead sea turtle. Neritic habitat "consists of the nearshore marine environment from the surface to the sea floor where water depths do not exceed 200 m (656 ft), including inshore bays and estuaries" (NMFS, 2014). Given the large size of designated critical habitat and temporary nature of short-term turbidity elevations during dredging within the offshore borrow area, Flagler County believes that the proposed project may affect, but is not likely to adversely affect neritic nearshore reproductive critical habitat within Unit LOGG-N-15.

3.4 NORTH ATLANTIC RIGHT WHALE

3.4.1 Direct Effects

The coastal area of Flagler County and the beach fill area is located in Critical Habitat Unit 2 for the North Atlantic right whale (NMFS, 2016). It is possible that right whales could travel in close proximity to the PAA. The borrow area is located just east of the limits of Critical Habitat Unit 2. Transporting sand from the borrow area to the pipeline corridor will entail crossing critical habitat. Collision with the hopper dredge vessel poses a moderate risk to the whales. The timing of project construction will likely overlap the months when rights whales are most likely to be present offshore of Flagler County. Flagler County will adhere to the Terms and Conditions of the 2020 SARBO. The 2020 SARBO requires aerial surveys in critical habitat from December 1 through 31 and one daytime observer from December 1 to March 1. The 2020 SARBO also requires the hopper dredge to not get closer than 750 yards to a right whale.

3.4.2 Indirect Effects

Dredging operations may present risk of vessel noise-related behavioral disruption to North Atlantic right whales and humpback whales. Principal effects or risk of exposure would be limited to possible behavioral changes from broad band, vessel and dredging noise less than 10 kHz.

3.4.3 Interrelated, Interdependent and Cumulative Effects

Other coastal construction projects permitted within or near the project area could impact right whales from interrelated activities via increased vessel strikes or impacts.

3.4.4 Conservation Measures

Flagler County agrees to the requirements and recommendations of the NMFS SARBO (2020). Conservation measures for sea turtles will also benefit the North Atlantic right whale. See **Section 3.3.4** for more details. The Contractor will be required to implement the NOAA Vessel Strike Avoidance Measures (**Appendix 2**). The Environmental Protection Specifications shall require the Contractor to receive and provide updates of right whale sightings during the period between December 1 and March 31.

Flagler County will adhere to the Terms and Conditions of the 2020 SARBO which requires aerial surveys in critical habitat and daytime observers from December 1 to March 31. The SARBO also requires the hopper dredge to not get closer than 750 yards to a right whale. The Environmental Protection Specifications shall require the Contractor to receive and provide updates of right whale sightings during the period between December 1 and March 31. The Contractor shall be held responsible for any whale harmed, harassed or killed as a result of construction activities.

3.4.5 Recommended Determination

Right whales are known to occur in the PAA and may be encountered if construction occurs during winter months. Transit from the borrow area to the beach fill area crosses right whale critical habitat. Based on compliance with the NMFS SARBO and NOAA Vessel Strike avoidance measures, the Flagler County Beach Renourishment Project may affect but is not likely to adversely affect the North Atlantic right whale and its critical habitat.

4.0 CONCLUSIONS

Based upon the findings of this Biological Assessment and the Conservation Measures proposed herein, Flagler County believes that the proposed project may affect the following species and associated critical habitat under purview of the USFWS and NMFS:

> Nesting Sea Turtles - Loggerhead sea turtle (*Caretta caretta*), Loggerhead Critical Habitat LOGG-T-FL-03, Green sea turtle (*Chelonia mydas*), Leatherback sea turtle (*Dermochelys coriacea*)
>
> Swimming sea turtles – Kemp's ridley (*Lepidochelys kempii*), Hawksbill (*Eretmochelys imbricata*), Loggerhead (*Caretta caretta*), Loggerhead Critical Habitat LOGG-N-15, Green (*Chelonia mydas*), and leatherback (*Dermochelys coriacea*) sea turtles

Flagler County has agreed to implement the Terms and Conditions and Reasonable and Prudent Measures of the NMFS SARBO dated March 27, 2020 and the USFWS SPBO dated March 13, 2015. Incidental take for swimming sea turtles by hopper dredge has been authorized by the SARBO. Incidental take of nesting sea turtles and their nests/hatchlings associated with beach fill placement has been authorized by the SPBO. The SARBO requires right whale aerial surveys in critical habitat and one daytime observer from December 1st through March 31st. Flagler County has also agreed to implement the Terms and Conditions of the P^{3}BO for wintering piping plover.

Based upon the findings of this Biological Assessment and conservation measures proposed herein, Flagler County believes that the proposed project may affect, but is not likely to adversely affect the following species and designated habitat under the purview of the USFWS and NMFS:

> Piping plover (*Charadrius melodus*)
> Rufa Red Knot (*Calidris canuta rufa*)
> North Atlantic right whale (*Eubalaena glacialis)* and its Critical Habitat Unit 2
> Nearshore reproductive Critical Habitat Unit LOGG-N-15 for the loggerhead sea turtle

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BA-Appendix 1

Sea Turtle and Smalltooth Sawfish Construction Conditions

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
O:\forms\Sea Turtle and Smalltooth Sawfish Construction Conditions.doc

BA-Appendix 2
NOAA Vessel Strike Avoidance Measures

Vessel Strike Avoidance Measures and Reporting for Mariners NOAA Fisheries Service, Southeast Region

Background

The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training

Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance

In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews shall maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel shall attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners shall check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews shall report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties shall remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office shall be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov

EA-Appendix 2

SHPO Approval Letters

RON DESANTIS
Governor

LAUREL M. LEE
Secretary of State

Angela E. Dunn
Planning and Policy Division
Chief, Environmental Branch
701 San Marco Blvd.
Jacksonville, Florida 32207

September 26, 2019

RE: DHR Project File No.: 2019-5234, Received by DHR: August 29, 2019
Draft Flagler County Shore Protection Project Intensive Cultural Resources Assessment Survey

To Whom It May Concern:

The Florida State Historic Preservation Officer reviewed the referenced project for possible effects on historic properties listed, or eligible for listing, on the *National Register of Historic Places.* The review was conducted in accordance with Section 106 of the *National Historic Preservation Act of 1966*, as amended, and its implementing regulations in *36 CFR Part 800: Protection of Historic Properties.*

In June and July of 2019, Panamerican Consultants, Inc., (PCI) conducted the above referenced cultural resource assessment survey (CRAS) on behalf of the U.S. Army Corps of Engineers (Corps) in support of the *Flagler County Shore Protection Project*. The terrestrial fieldwork consisted of a magnetometer survey and subsequent shovel testing of the Beach Placement Area. PCI encountered no cultural material during the terrestrial survey. The submerged cultural resource survey consisted of a comprehensive remote sensing survey of the both the Nearshore Placement Area and Borrow Area 3A. PCI identified three (3) targets in the Nearshore Placement Area which have the potential to represent significant historic cultural resources. PCI recommended avoidance of the identified targets by any adverse project activities and stated that if avoidance is not possible, the targets should be further investigated by archaeological divers.

Based on the results of the cultural resources survey, the Corps determined that the proposed undertaking will have no effect to historic properties, contingent upon the maintained avoidance of Target USACE-0130 with a 150 foot buffer, and the avoidance of Target UASCE-0131 and Target USACE-0132 with a 100 foot buffer.

Based on the information provided, our office concurs with the Corps' determination that the proposed project will have no adverse effect to historic properties listed, eligible, or potentially eligible for listing in the NRHP contingent upon the continued avoidance of Target USACE-0130 with a 150 foot buffer, and Targets USACE-0131 and USACE-0132 with a 100 foot buffer. If avoidance of these three (3) targets is not feasible, additional investigation to identify and evaluate the significance of these targets and additional consultation with our office is needed. We find the submitted report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code*.

If you have any questions, please contact Kelly L. Chase, Historic Sites Specialist, by email at *Kelly.Chase@dos.myflorida.com*, or by telephone at 850.245.6425 or 800.847.7278.

Sincerely,

Jason Aldridge
For

Timothy A Parsons, Ph.D.
Director, Division of Historical Resources
& State Historic Preservation Officer

DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS, JACKSONVILLE DISTRICT
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

December 31, 2019

Regulatory Division
North Permits Branch
Jacksonville Permits Section
SAJ-2019-02065 (SP-TMM)

Dr. Timothy Parsons
Compliance and Review
R. A. Gray Building
500 S. Bronough Street, Room 423
Tallahassee, Florida 32399-0250

ATTN: Jason Aldridge

Dear Dr. Parsons:

This letter is in reference to the Department of the Army permit application SAJ-2019-02065, Flagler County Board of County Commissioners Beach Renourishment. In accordance with the National Historic Preservation Act of 1966 as amended 2014, it's implementing authority, 36 CFR 800; and 33 CFR 325: Appendix C, the Corps has completed an initial review of SAJ-2019-02065 for effects to historic properties.

The proposed Flagler County beach renourishment project is comprised of approximately 4.1 miles of Atlantic Ocean Shoreline and four 600-foot-wide by 4,000-foot-long conveyance pipe corridors seaward of the project area, which are located in Sections 26, 35, 36, 1, 12, 19, 30, 29, 32, Townships 11 and 12 south, Ranges 31 and 32 East, in Flagler County, Florida. The project also consists of a 345 acre borrow area on the Outer Continental Shelf approximately 10 nautical miles east of the project area shoreline.

The Section 106 review for this application includes the beach renourishment areas located between FDEP range monuments R-64.5 and R-80, and R-94 and R-101; four 600-foot-wide by 4,000-foot-long conveyance pipe corridors seaward of the project area; and Borrow Area 3A for the sand source which is located approximately 10 nautical miles east of the project area shoreline. The sand placement areas abut the Federal portion of the project on the north and south (Figure 1). Your office has already reviewed this central, Federal portion in consultation with USACE Civil Works staff. The borrow area is under the province of the Bureau of Ocean Energy Management (BOEM) and BOEM has accordingly been a coordinating agency in the Section 106 assessment of the current undertaking. The Area of Potential Effect (APE) for this project includes the onshore sand placement and staging areas, borrow area (Figure 2), and four near-shore pipeline corridors where pipe will be laid upon the seabed (Figure 3). The strategy for addressing the cultural resource review of effects for the APE was developed by the Corps in coordination with SHPO and BOEM staff.

The shoreline placement portion of the project area and the three staging areas were included in a cultural resource assessment survey (DHR Survey #18819) for archaeological and architectural resources of 10.2 miles of shoreline along Flagler County in 2009. The survey included background research, architectural survey, shovel testing, and metal detecting lanes along the coastline. Based on the results of that survey, the Corps determined that placement of dredged material along the 10.2 miles of beach would have no effect to historic properties listed or eligible for listing in the National Register of Historic Places (NRHP). The Florida SHPO concurred with the Corps' determination in a letter dated February 28, 2012 (DHR Project #2012-03934). The borrow area planned for this project, Borrow Area 3A, was surveyed by the Corps under the aegis of BOEM in 2019. For the entire borrow area footprint, the survey identified no magnetic, sonar, or gradiometer anamolies and no paleo-features in the subbottom profiler data. The Corps consulted on the CRAS document with the SHPO in August 2019, and the SHPO concurred in a letter dated September 26, 2019 that sand borrowing activities in Borrow Area 3A will have no effect to historic properties (DHR Project #2019-5234). There is no additional consultation necessary for use of Borrow Area 3A for the current undertaking.

The near-shore pipeline corridors for the current project area, which include four 4,000 x 600 foot corridors where pipeline will be routed from offshore to the beach to convey sand, were surveyed for cultural resources in October 2019 under the oversight of Tidewater Atlantic Research (TAR). As a result of the survey, 12 magnetic anomalies were identified in the project area, one in Corridor 1, two in Corridor 2, one in Corridor 3, and eight anomalies in Corridor 4 though four of the eight were noted to be outside of the Corridor 4 boundaries. No sonar targets were identified. TAR researchers interpreted all anomalies as having magnetic signatures suggestive of small ferrous objects not indicative of larger shipwreck components. However, there is a possibility that the scatter of anomalies could be associated with the 33-ton oil screw vessel, *Service*, which wrecked off Flagler Beach in 1929. The scatter could represent elements of this vessel if the vessel had broken up in this region of the near-shore. No sonar targets correlate with the anomalies suggesting the anomalies are either too small to be detected or are buried. The researchers recommended that the pipeline lying atop the seabed, and the deposition of sand in the renourishment process would have no detrimental effect to these minor anomalies. The Corps finds that the survey work and reporting for the pipeline corridors is complete and sufficient and concurs with the investigator's recommendations.

Based upon the findings of the shoreline survey (#18819), the 2019 offshore borrow area survey, and the results of the recent pipeline corridor survey, the Corps finds that the proposed undertaking will have no effect to historic properties and no further work is required.

By this letter the U. S. ARMY Corps of Engineers requests your comments within 30 calendar days from this notice, per 33 CFR 325: Appendix C.4 (b), and CECW-CW, dated January 31, 2007.

If you have any questions or comments concerning the proposed project, please contact the project manager, Terri Mashour at the letterhead address, by email at Terri.M.Mashour@usace.army.mil or by phone at 904-570-4512. If you have any questions or comments concerning the cultural resources request addressed above, please contact Mr. Robin Moore at 904-232-3270 or by email at Robin.E.Moore@usace.army.mil.

Sincerely,

Terri Mashour

for Shawn H. Zinszer
Chief, Regulatory Division

Enclosure:

cc. Robin Moore, Regulatory Archeologist
Faith Alkhatib, Flagler County
Douglas Piatkowski, Bureau of Ocean Energy Management
Chris Creed, Olsen Associates, Inc.

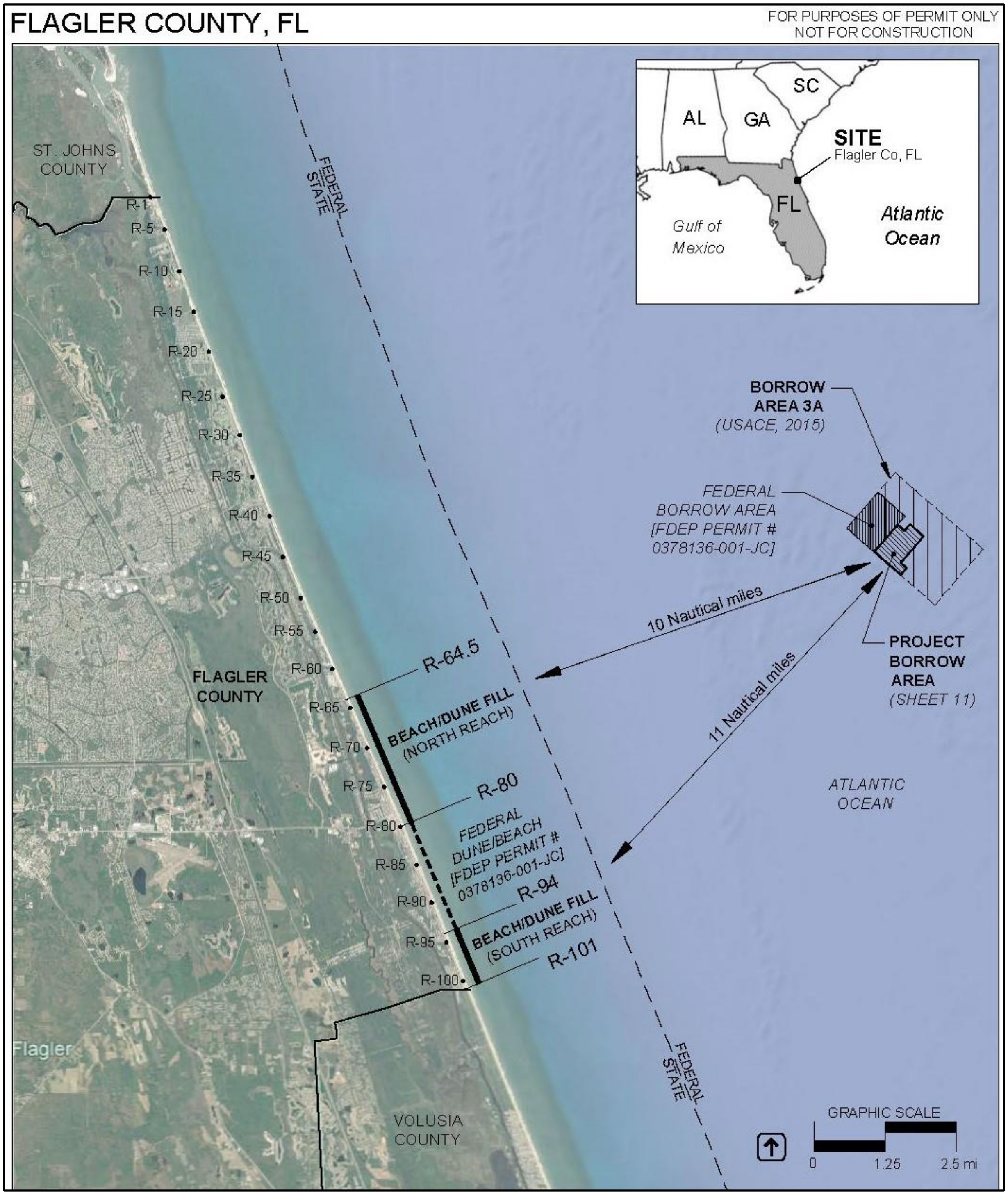

Figure 1. Project location map – Flagler County Dune/Beach Restoration Project.

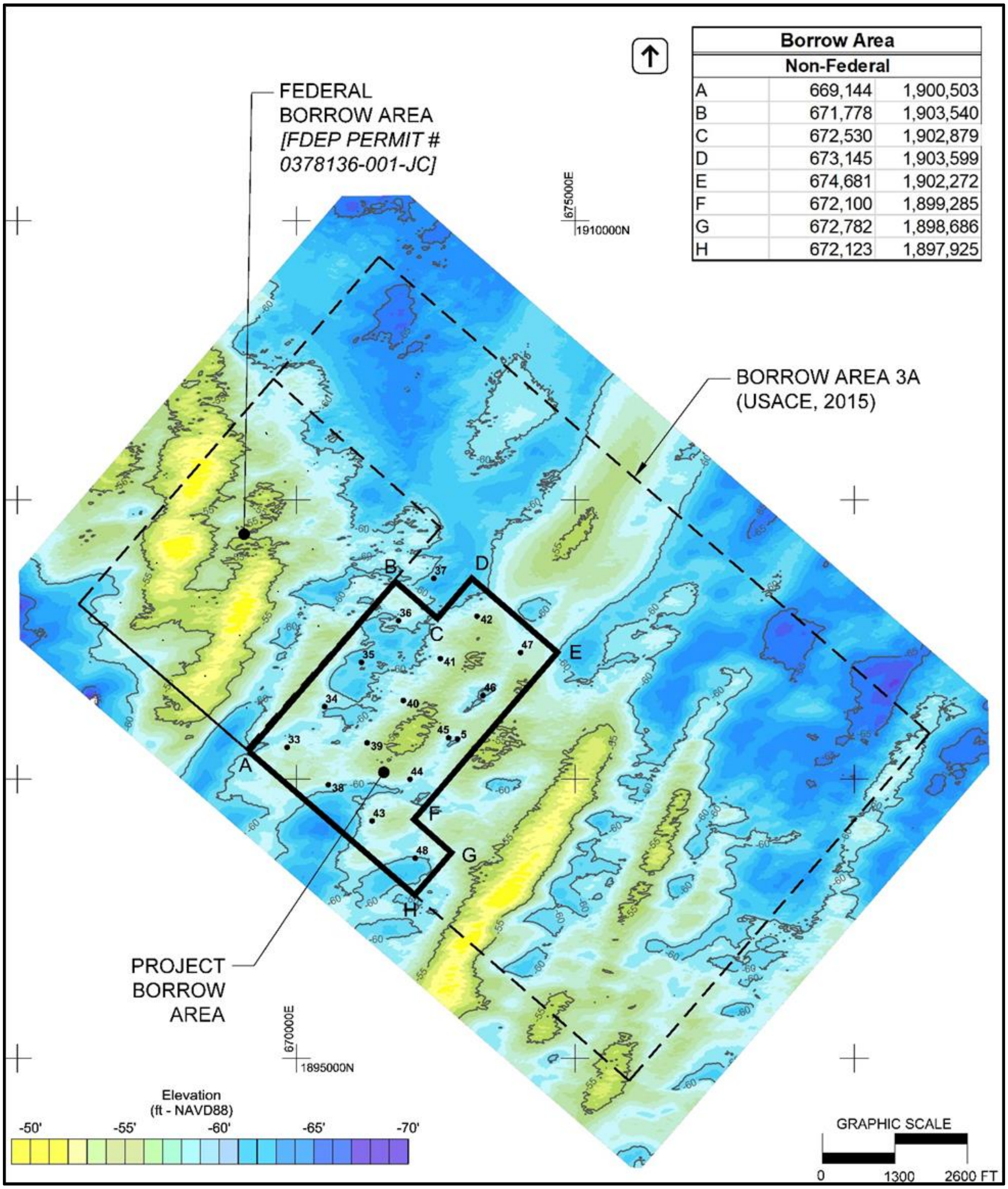

Figure 2. Borrow Area 3A plan view showing the Local and Federal borrow area sections.

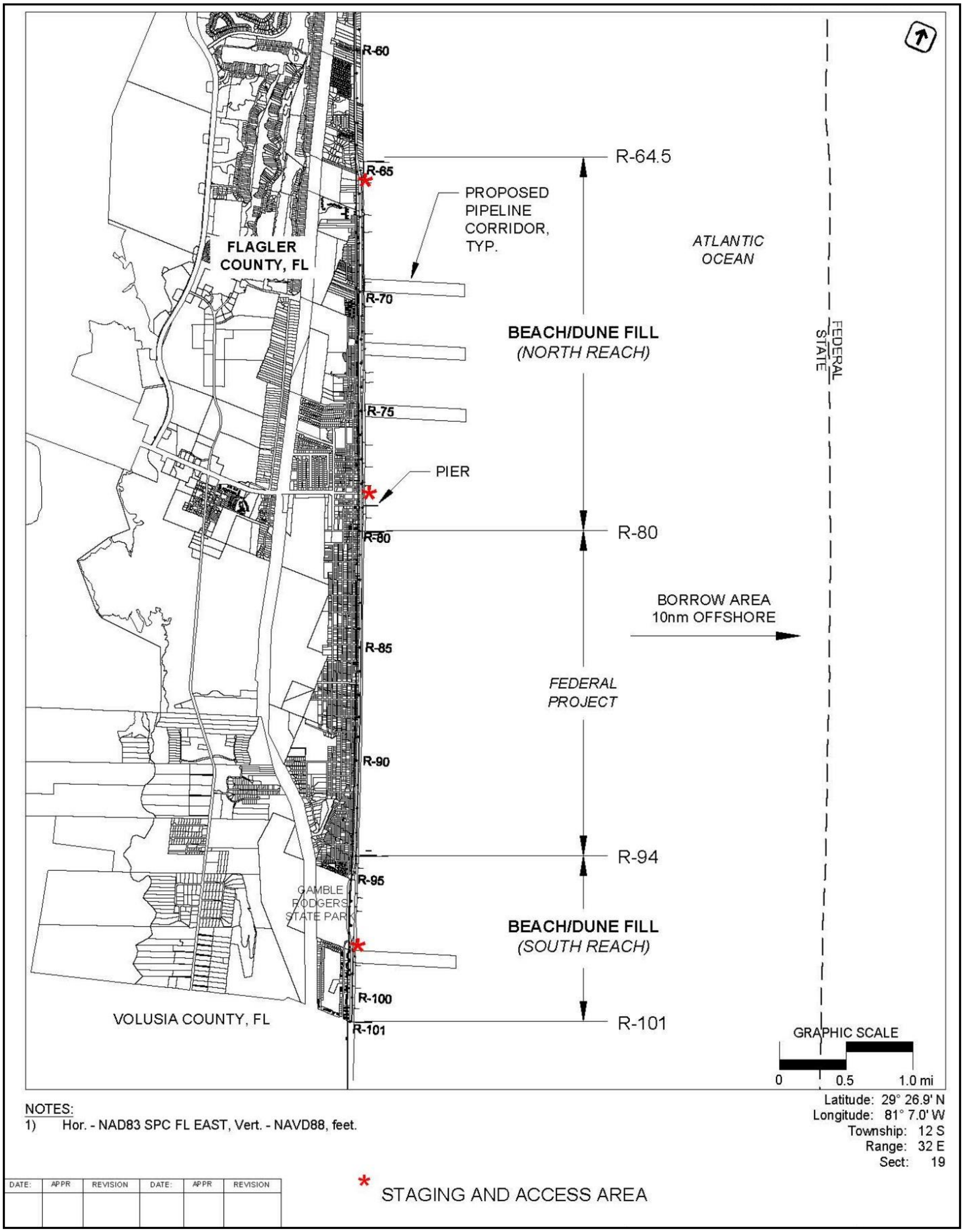

Figure 3. Beach fill placement areas for the Local and Federal projects in Flagler County.

RON DESANTIS
Governor

LAUREL M. LEE
Secretary of State

March 13, 2020

Ivana Kenny Carmola
Beaches, Inlets & Ports Program
Office of Resilience and Coastal Protection
Florida Department of Environmental Protection
2600 Blair Stone Road, MS 3544
Tallahassee, FL 32399

Re: DHR Project File No.: 2018-4830-F, Received by DHR: February 14, 2020
FDEP P/N 0378136-001-JC, Flagler County Dune/Beach Restoration Project

Dear Ms. Carmola:

Our office reviewed the referenced project in accordance with Chapters 267.061 and 373.414, *Florida Statutes*, and implementing state regulations, for possible effects on historic properties listed, or eligible for listing, in the *National Register of Historic Places*, or otherwise of historical, architectural or archaeological value.

The proposed undertaking includes beach and dune restoration along a 4.1-mile portion of the Atlantic Ocean shoreline in Flagler County, Florida. The project will involve placing up to 1.3 million cubic yards of sand during the initial nourishment with future nourishment as determined necessary. The project will use sand material procured under US Army Corps of Engineer's permit number SAJ-2019-02065. Our office consulted with the Corps of Engineers to complete a cultural resource assessment survey for the sand borrow areas as well as sand pipeline locations. We concurred that work associated with SAJ-2019-02065 would have no adverse effect to historic properties.

Based on the information provided and on the condition that all work is conducted in a manner consistent with requirements of SAJ-2019-02065, it is the opinion of this office that the proposed beach and dune restoration project will have no adverse effect to historic properties listed, or eligible for listing, in the National Register of Historic Places.

If you have any questions, please contact me by email at *Jason.Aldridge@dos.myflorida.com* or by telephone at 850-245-6344.

Sincerely,

Jason Aldridge
Deputy State Historic Preservation Officer
for Compliance and Review

From:	Bradley Mueller
To:	Dunn, Angela E CIV USARMY CESAJ (USA)
Cc:	Clark, Ryan N CIV USARMY CESAJ (USA); David Echeverry
Subject:	[Non-DoD Source] Flagler County Shore Protection Project, Florida
Date:	Wednesday, September 25, 2019 10:51:13 AM
Attachments:	image005.png

September 25, 2019

Ms. Angela E. Dunn

Chief, Environmental Branch

Planning and Policy Division

Department of the Army

Corps of Engineers, Jacksonville District

701 San Marco Boulevard

Jacksonville, FL 32207-8915

Subject: Flagler County Shore Protection Project, Florida

THPO Compliance Tracking Number: 0031617

Dear Ms. Dunn,

Thank you for contacting the Seminole Tribe of Florida – Tribal Historic Preservation Office (STOF-THPO), Compliance Section regarding the Flagler County Shore Protection Project, Florida. The proposed undertaking does fall within the STOF Area of Interest. We have reviewed the documents you provided and have no objections at this time provided the target buffers for anomalies USACE-0130, 0131, and 0132 are maintained. Please notify us if any archaeological, historical, or burial resources are inadvertently discovered during project implementation and feel free to contact us with any questions or concerns.

Respectfully,

Bradley M. Mueller, MA, Compliance Specialist

STOF-THPO, Compliance Review Section

30290 Josie Billie Hwy, PMB 1004

Clewiston, FL 33440

Office: 863-983-6549 ext 12245

Fax: 863-902-1117

Email: bradleymueller@semtribe.com <mailto:bradleymueller@semtribe.com>

Web: Blockedwww.stofthpo.com

EA-Appendix 3

FDEP-Approved Sediment QA-QC Plan

SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE PLAN
FOR BEACH RESTORATION OR NOURISHMENT USING AN OFFSHORE BORROW AREA

0379716-001-JC

Flagler County Non-Federal Nourishment Project

January 29th, 2020

A. INTRODUCTION

As indicated in the title above, this template plan is for use for beach restoration and beach nourishment when an offshore borrow area is used. A different plan document will be used for inlet excavation involving beach or nearshore placement of dredged material.

Pursuant to Fla. Admin. Code r. 62B-41.008 (1) (k) 4.b., permit applications for inlet excavation, beach restoration, or nourishment shall include a quality control/assurance plan that will ensure that the sediment from the borrow areas to be used in the project will meet the standard in Fla. Admin. Code r. 62B-41.007(2)(j). To protect the environmental functions of Florida's beaches, only beach compatible fill shall be placed on the beach or in any associated dune system. Beach compatible fill is material that maintains the general character and functionality of the material occurring on the beach and in the adjacent dune and coastal system.

The Permittee has conducted geotechnical investigations that provide adequate data concerning the character of the sediment and the quantities available within the spatial limits of the permitted borrow area(s). The Permittee has provided an analysis of the existing or native sediment and the sediment within the permitted borrow area(s) that demonstrates its compatibility with the naturally occurring beach sediment in accordance with Fla. Admin. Code r. 62B-41.007(2)(j). The sediment analysis and volume calculations were performed using established industry standards, and are certified by a Professional Engineer or a Professional Geologist registered in the State of Florida.

Based upon this information and the design of the borrow area(s), the Department of Environmental Protection (Department) has determined that use of the sediment from the borrow area(s) will maintain the general character and functionality of the sediment occurring on the beach and in the adjacent dune and coastal system. Furthermore, this information and the borrow area design provides sufficient quality control/quality assurance (QC/QA) that the mean grain size and carbonate content of the sediment from the borrow area(s) will meet the requirements of Fla. Admin. Code r. 62B-41.007(2)(j); hence, additional QC/QA procedures are not required for these sediment parameters during construction.

This plan outlines the responsibilities of each stakeholder in the project as they relate to the placement of beach compatible material on the beach. These responsibilities are in response to the possibility that non-beach compatible sediments may exist within the borrow area(s) and could be unintentionally placed on the beach. The QC Plan specifies the minimum construction management, inspection and reporting requirements placed on the Marine Dredging Contractor and enforced by the Permittee, to ensure that the sediment from the borrow area(s) to be used in the project meet the compliance specifications. The QA Plan specifies the minimum construction oversight, inspection and reporting requirements to be undertaken by the Permittee or the Permittee's On-Site Representative to observe, sample, and test the placed sediments to verify the sediments are in compliance.

B. SEDIMENT QUALITY SPECIFICATIONS

The sediment from the borrow area(s) is similar in Munsell color and grain size distribution to the material in the existing coastal system at the beach placement site. The Department and the Permittee acknowledge that it is possible that discrete occurrences of non-beach compatible sediments may exist within the permitted borrow area(s) that do not comply with the limiting parameters of Fla. Admin. Code r. 62B-41.007(2)(j) 1. – 5., or vary in Munsell color from the composite value. Furthermore, the Department may consider more restrictive values for the sediment parameters to ensure that the sediment from the borrow area(s) is similar in color and grain size distribution to the sediment in the existing coastal system at the beach placement site. Therefore, fill material compliance specifications for the sediment from the borrow area(s) proposed for this project are provided in Table 1.

The compliance specifications take into account the variability of sediment on the native or existing beach, and are values which may reasonably be attained given what is known about the borrow area sediment. Beach fill material which falls outside of these limits will be considered unacceptable and subject to remediation.

Table 1- Sediment Compliance Specifications

Sediment Parameter	Parameter Definition	Compliance Value
Max. Silt Content	passing #230 sieve	**≤ 5%**
Max. Shell Content*	retained on #4 sieve	**≤ 5%**
Munsell Color Value	moist Value (chroma = 1)	**6 or lighter**
The beach fill material shall not contain construction debris, toxic material, other foreign matter, coarse gravel or rocks.		

*Shell Content is used as the indicator of fine gravel content for the implementation of quality control/quality assurance procedures.

C. Quality Control Plan

The contract documents shall incorporate the following technical requirements, or equivalent language that addresses the location of dredging, sediment quality monitoring on the beach, and, if necessary, remedial actions. The Permittee will seek to enforce these contract requirements during the execution of work.

1. **Electronic Positioning and Dredge Depth Monitoring Equipment**. The Contractor will continuously operate electronic positioning equipment, approved by the Engineer, to monitor the precise positioning of the excavation device location(s) and depth(s). A Differential Global Positioning System (DGPS) or equivalent system providing equal or better accuracy will be used to determine the horizontal position and will be interfaced with an appropriate depth measuring device to determine the vertical position of the bottom of the excavation device. The horizontal positioning equipment will maintain an accuracy of +/- 3.0 feet. The vertical positioning equipment will maintain a vertical accuracy of +/-0.5 feet with continuous applicable tidal corrections measured at the project site.

2. **Dredge Location Control**. The Contractor is required to have, in continuous operation on the dredge, electronic positioning equipment that will accurately compute and plot the position of the dredge. Such fixes, and the accompanying plots, will be furnished to the Permittee's on-site representative daily as part of the QC Reports. The electronic positioning equipment will be installed on the dredge so as to monitor, as closely as possible, the actual location of the excavation device(s). The location of the master antenna on the dredge and the distance and direction from the master antenna to the bottom of the excavation device will be reported on the Daily Reports. A printout of the excavation device positions in State Plane Coordinates, the excavation device depths corrected for tide elevation and referenced to the North American Vertical Datum of 1988 (NAVD 88) and the time, will be maintained using an interval of two (2) minutes for each printed fix. A printed and computer file (in ASCII format) copy of the position data will be provided to the Engineer as part of the daily report. The Contractor will prepare a plot of the data that includes the State Plane Coordinate grid system and the borrow area limits. The format of the plot may be subject to approval by the Permittee's Engineer. No dredging will take place outside of the borrow area limits (horizontal and vertical limits) as shown on the drawings.

3. **Dredging Observation.** The Contractor will be responsible for establishing such control as may be necessary to insure that the allowable excavation depths and spatial limits are not exceeded. If the Contractor encounters noncompliant sediment during dredging, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and will verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant

sediment in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor, in cooperation with the Permittee's Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable.

4. **Beach Observation**. The Contractor will continuously visually monitor the sediment being placed on the beach. If noncompliant sediment is placed on the beach, the Contractor will immediately cease dredging, relocate the dredge into compliant sediment, and verbally notify the Permittee's On-site Representative, providing the time, location, and description of the noncompliant sediment. The Contractor will also report any encounters with noncompliant sediment in the Contractor's Daily Report, providing depth and location in State Plane Coordinates of said materials within the borrow area. The Contractor will take the appropriate remediation actions as directed by the Permittee or Permittee's Engineer.

5. **Excavation Requirements**. The Contractor will excavate within the approved boundaries and maximum depths of the borrow area(s) in a uniform and continuous manner. If directed by the Permittee's Engineer, the Contractor will change the location and/or depth of excavation within the borrow area limits.

6. **Vibracore Logs and Grain Size Data.** The Contractor will be provided with all descriptions of sediment vibracore borings collected within the borrow area(s), and will acknowledge that he is aware of the quality of the sediment as described in the sediment vibracore logs. These logs and grain size data will be presented in the construction specifications.

D. Quality Assurance Plan

The Permittee will seek to enforce the construction contract and Department permits related to sediment quality. In order to do so, the following steps shall be followed:

1. **Construction Observation.** Construction observation by the Permittee's On-Site Representative will be performed 7 days a week, at least 8 hours a day during periods of active construction. Most observations will be conducted during daylight hours; however, random nighttime observations shall be conducted.

2. **On-Site Representative.** The Permittee will provide on-site observation by individuals with training or experience in beach nourishment and construction inspection and testing, and who are knowledgeable of the project design and permit conditions. The project Engineer, a qualified coastal engineer, will actively coordinate with the Permittee's On-Site Representative, who may be an employee or sub-contractor of the Permittee or the Engineer. Communications will take place between the Engineer and the Permittee's On-Site Representative on a daily basis.

3. **Pre-Construction Meeting.** The project QC/QA Plan will be discussed as a matter of importance at the pre-construction meeting. The Contractor will be required to acknowledge the goals and intent of the above described QC/QA Plan, in writing, prior to commencement of construction.

4. **Contractor's Daily Reports.** The Engineer will review the Contractor's Daily Reports which characterize the nature of the sediments encountered at the borrow area and placed along the project shoreline with specific reference to moist sand color and the occurrence of rock, rubble, shell, silt or debris that exceeds acceptable limits. The Engineer will review the dredge positions in the Contractor's Daily Report.

5. **On Call.** The Engineer will be continuously on call during the period of construction for the purpose of making decisions regarding issues that involve QC/QA Plan compliance.

6. **Addendums.** Any addendum or change order to the Contract between the Permittee and the Contractor will be evaluated to determine whether or not the change in scope will potentially affect the QC\QA Plan.

7. **During Construction Sampling for Visual Inspection.** To assure that the fill material placed on the beach is in compliance with the permit, the Permittee's Engineer or On-Site Representative will conduct assessments of the beach fill material as follows:

a. During excavation and fill placement activities, the Permittee's On-Site Representative will collect a sediment sample at not less than 200-foot intervals of newly constructed berm to visually assess grain size, Munsell color, shell content, and silt content. The sample shall be a minimum of 1 U.S. pint (approximately 200 grams). This assessment will consist of handling the fill material to ensure that it is predominantly sand to note the physical characteristics and assure the material meets the sediment compliance parameter specified in this Plan. If deemed necessary, quantitative assessments of the sand will be conducted for grain size, silt content, shell content and Munsell color using the methods outlined in section D.8.b. Each sample will be archived with the date, time, and location of the sample. The results of these daily inspections, regardless of the quality of the sediment, will be appended to or notated on the Contractor's Daily Report. All samples will be stored by the Permittee for at least 60 days after project completion.

b. If the Permittee or Engineer determines that the beach fill material does not comply with the sediment compliance specifications for fine and coarse gravel content in this QC/QA Plan, the Permittee or Engineer will immediately instruct the Contractor to cease material excavation operations and take whatever actions necessary to avoid further discharge of noncompliant sediment The Contractor, in cooperation with the Permittee's Engineer, will use the dredge positioning records, plans, and vibracore descriptions to determine where the Contractor may dredge to avoid additional placement of noncompliant sediment. The Contractor will adjust his or her construction operation to avoid the noncompliant sediment to the greatest extent practicable. The sediment inspection results will be reported to the Department.

8. **Post-Construction Sampling for Laboratory Testing.** To assure that the fill material placed on the beach was adequately assessed by the borrow area investigation and design, the Project Engineer will conduct assessments of the sediment as follows:

a. Post-construction sampling of each acceptance section and testing of the fill material will be conducted to verify that the sediment placed on the beach meets the expected criteria/characteristics provided during from the geotechnical investigation and borrow area design process. Upon completion of an acceptance section of constructed beach, the Engineer will collect two (2) duplicate sand samples at each Department reference monument profile line to quantitatively assess the grain size distribution, moist Munsell color, shell content, and silt content for compliance. The Engineer will collect the sediment samples of a minimum of 1 U.S. pint (at least 200 grams) each from the bottom of a test hole a minimum of 18 inches deep within the limits of the constructed berm. The Engineer will visually assess grain size, Munsell color, shell content, and silt content of the material by handling the fill material to ensure that it is predominantly sand, and further to note the physical characteristics. The Engineer will note the existence of any layering or rocks within the test hole. One sample will be sent for laboratory analysis while the other sample will be archived by the Permittee. All samples and laboratory test results will be labeled with the Project name, FDEP Reference Monument Profile Line designation, State Plane (X,Y) Coordinate location, date sample was obtained, and "Construction Berm Sample."

b. All samples will be evaluated for visual attributes (Munsell color and shell content), sieved in accordance with the applicable sections of ASTM D422-63 (Standard Test Method for Particle-Size Analysis of Soils), ASTM D1140 (Standard Test Method for Amount of Material in Soils Finer than No. 200 Sieve), and ASTM D2487 (Classification of Soils for Engineering Purposes), and analyzed for carbonate content. The samples will be sieved using the following U.S. Standard Sieve Numbers: 3/4", 5/8", 3.5, 4, 5, 7, 10, 14, 18, 25, 35, 45, 60, 80, 120, 170, and 230.

c. A summary table of the sediment samples and test results for the sediment compliance parameters shall accompany the complete set of laboratory testing results. The column headings will include: Sample Number; Mean Grain Size (mm); Sorting Value: Silt Content (%); Shell Content (%); Munsell Color Value; and a column stating whether each sample MET or FAILED the compliance values found in Table 1 The sediment testing results will be certified by a P.E or P.G. registered in the State of Florida. A statement of how the placed fill material compares to the sediment analysis and volume calculations from the sand search investigation and borrow area design shall be included in the sediment testing results report. The Permittee will submit sediment testing results and analysis report to the Department within 90 days following beach construction.

d. In the event that a section of beach contains fill material that is not in compliance with the sediment compliance specifications, then the Department will be notified. Notification will indicate the volume, aerial extent and location of any unacceptable beach areas and remediation planned.

E. Remediation

1. **Compliance Area.** If a sample does not meet the compliance value for construction debris, toxic material, other foreign material, coarse gravel, or rock the Permittee shall determine the aerial extent and remediate regardless of the extent of the noncompliant material. If a sample is noncompliant for the silt content, shell content, or Munsell color and the aerial extent exceeds 10,000 square feet, the Permittee shall remediate.

2. **Notification.** If an area of newly constructed beach does not meet the sediment compliance specifications, then the Department (JCPCompliance@dep.state.fl.us) will be notified. Notification will indicate the aerial extent and location of any areas of noncompliant beach fill material and remediation planned. As outlined in section E.4 below, the Permittee will immediately undertake remediation actions without additional approvals from the Department. The results of any remediation will be reported to the Department following completion of the remediation activities and shall indicate the volume of noncompliant fill material removed and replaced.

3. **Sampling to determine extent.** In order to determine if an area greater than 10,000 square feet of beach fill is noncompliant, the following procedure will be performed by the Engineer:

a. Upon determination that the first sediment sample is noncompliant, at minimum, five (5) additional sediment samples will be collected at a 25-foot spacing in all directions and assessed. If the additional samples are also noncompliant, then additional samples will be collected at a 25-foot spacing in all directions until the aerial extent is identified.
b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, shell content, and Munsell color using the methods outlined in section D.8.b. Samples will be archived by the Permittee.
c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of noncompliant fill.
d. The total square footage will be determined.
e. The site map and analysis will be included in the Contractor's Daily Report.

4. **Actions.** The Permittee or Permittee's Engineer shall have the authority to determine whether the material placed on the beach is compliant or noncompliant. If placement of noncompliant material occurs, the Contractor will be directed by the Permittee or Permittee's Engineer on the necessary corrective actions. Should a situation arise during construction that cannot be corrected by the remediation methods described within this QC/QA Plan, the Department will be notified. The remediation actions for each sediment parameter are as follows:

a. Silt: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value, or removing the noncompliant fill material and replacing it with compliant fill material.
b. Shell: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
c. Munsell color: blending the noncompliant fill material with compliant fill material within the adjacent construction berm sufficiently to meet the compliance value or removing the noncompliant fill material and replacing it with compliant fill material.
d. Coarse gravel: screening and removing the noncompliant fill material and replacing it with compliant fill material.
e. Construction debris, toxic material, or other foreign matter: removing the noncompliant fill material and replacing it with compliant fill material.

All noncompliant fill material removed from the beach will be transported to an appropriate upland disposal facility located landward of the Coastal Construction Control Line.

5. **Post-Remediation Testing.** Re-sampling shall be conducted following any remediation actions in accordance with the following protocols:

a. Within the boundaries of the remediation actions, samples will be taken at maximum of 25-foot spacing.

b. The samples will be visually compared to the acceptable sand criteria. If deemed necessary by the Engineer, quantitative assessments of the sand will be conducted for grain size, silt content, and Munsell color using the methods outlined in section D.8.b. Samples will be archived by the Permittee.

c. A site map will be prepared depicting the location of all samples and the boundaries of all areas of remediation actions.

6. **Reporting.** A post-remediation report containing the site map, sediment analysis, and volume of noncompliant fill material removed and replaced will be submitted to the Department within 7 days following completion of remediation activities.

All reports or notices relating to this permit shall be emailed and sent to the Department at the following locations:

DEP Office of Resiliency and Coastal Protection
JCP Compliance Officer
2600 Blair Stone Rd.
Mail Station 3544
Tallahassee, FL 32399
phone: (850) 245-8336
e-mail: JCPCompliance@dep.state.fl.us

End of Plan

FDEP Version dated December 19, 2019

Attachment 3
Environmental Commitments

Flagler County and/or its Contractors shall commit to avoiding, minimizing, or mitigating for adverse effects during construction activities and ensure all environmental mitigation requirements outlined in the EA and associated consultation and permit documents are reflected in the contract plans and specifications as appropriate. It is the responsibility of Flagler County to ensure compliance with all environmental mitigation requirements prior to, during, and after construction. Before solicitation, Flagler County shall prepare an Environmental Compliance Matrix (ECM), in coordination with BOEM, documenting all environmental mitigation requirements and associated lead Agency roles and responsibilities for implementation and enforcement. The following referenced documents contain all required environmental mitigation requirements for implementation by Flagler County, as appropriate. Documents containing BOEM enforceable mitigation are highlighted including relevant sections and pages.

NEPA:

- ***2014. Final Integrated Feasibility Study and Environmental Assessment, Hurricane and Storm Damage Reduction Project, Flagler County, FL. U.S. Army Corps of Engineers Jacksonville District (September 2014).***
    - ***Section 7.26; pages 7-22 to 7-31***
- *2016. Finding of No Significant Impact (FONSI). Flagler County Hurricane and Storm Damage Reduction Project, Integrated Feasibility Study and Environmental Assessment. U.S. Army Corps of Engineers Jacksonville District (signed 22 January 2016).*
- ***2020. Flagler County Dune and Beach Restoration Project. Final Environmental Assessment. Prepared by Flagler County. March 2020.***
    - ***Section 2.3; pages 18-19***

ESA:

- *2013. U.S. Fish and Wildlife Service Programmatic Piping Plover Biological Opinion (P3BO) (May 22, 2013).*
- *2015. U.S. Fish and Wildlife Statewide Programmatic Biological Opinion (SPBO) (March 13, 2015).*
- ***2020. National Marine Fisheries Service. South Atlantic Regional Biological Opinion (SARBO) for dredging and material placement activities in the Southeastern United States. 27 March 2020****.*
    - ***Section 2.9.1 (USACE and/or BOEM Project-Specific Review for a Project to be Covered under SARBO)***
    - ***2.9.3 (SARBO Team Communication and Reporting)****; Section 2.9.3.3-2.9.3.5.2*
    - ***Appendix A****; pages 519-520*
    - ***Appendix B****; Section 1.1 (DREDGE.2); Section 1.2 (PLACE.2); Section 1.3; Section 2 (pages 525-528); Section 3.1 (pages 529-531); Section 3.5 (pages 532-533)*
    - ***Appendix F;*** *(pages 589-596)*
    - ***Appendix H;*** *(*pages 599-628)

- ***Appendix I;*** (pages 629-632)

EFH:

- *2019. Email dated 21 November 2019 from Pace Wilber (NMFS) to Terri Mashour (USACE) documenting “no comment” in response to USACE public notice and associated EFH consultation.*

SHPO:

- *2019. USACE letter to Tim Parsons, Ph.D., SHPO (dated 28 August 2019). Consultation associated with borrow area 3A and placement locations.*
- *2019. SHPO response letter to USACE (DHR Project File No.: 2019-5234) (dated 26 September 2019)*
- *2019. USACE letter to Tim Parsons, Ph.D. SHPO (dated 31 December 2019). Consultation associated with pipeline corridor surveys.*
- *2020. SHPO response letter to USACE (DHR Project File No.: 2018-4830-F) (dated 13 March 2020)*

FDEP:

- *Consolidated Joint Coastal Permit and Sovereign Submerged Lands Authorization. Permit No. 0379716-001-JC. Issued April 13, 2020.*

DA Permit

- Pending