FINAL ENVIRONMENTAL ASSESSMENT

FLAGLER COUNTY
DUNE/BEACH NOURISHMENT PROJECT

FLAGLER COUNTY, FL

USACE PERMIT NO. SAJ-2019-02065

FDEP PERMIT NO. 0379716-001-JC

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Table of Contents

APPENDICES

FIGURES (Appendix 3)

TABLES (Appendix 3)

IMAGES (Appendix 3)

List of Acronyms and Abbreviations

BA	Biological Assessment
BOEM	Bureau of Ocean and Energy Management
CAA	Clean Air Act
CBRA	Coastal Barrier Resources Act
CEG	Coastal Eco-Group Inc.
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CW	Clean Water Act
cy	cubic yard(s)
DCA	Dial Cordy and Associates Inc.
DGPS	Differential Global Positioning System
DPEC	Dredging Project Emissions Calculator
DPS	distinct population segment
EA	Environmental Assessment
EFH	essential fish habitat
ESA	Endangered Species Act
ETOF	equilibrium toe-of-fill
EO	Executive Order
FCBA	Flagler County Borrow Area
FDEP	Florida Department of Environmental Protection
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FLUCCS	Florida Land Use, Cover and Forms Classification System
FNAI	Florida Natural Areas Inventory
FONSI	Finding of No Significant Impact
FWC-	Fish and Wildlife Conservation Commission (of Florida)
GHG	greenhouse gas
HAPC	Habitat Areas of Particular Concern
JCP	Joint Coastal Permit
MEC	munitions and explosives of concern
Mcy	million cubic yards
MHWL	mean high water line
MLLW	mean low low water
NAAQS	National Ambient Air Quality Standard
NAGPRA	Native American Graves Protection and Repatriation Act
NAVD	North American Vertical Datum

NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NM	nautical mile(s)
NMFS	National Marine Fisheries Service
NNA	Noncompetitive Negotiated Agreement
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NTU	Nephelometric Turbidity Units
OCS	Outer Continental Shelf
OPA	Otherwise Protected Area
P^3BO	Programmatic Piping Plover Biological Opinion
PAA	Project Action Area
PM	particulate matter
SARBO	South Atlantic Division Regional Biological Opinion
SAV	Submerged Aquatic Vegetation
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SPBO	Statewide Programmatic Biological Opinion
SR	State Road
SRA	State Recreation Area
UME	Unusual Mortality Event
USACE	United States Army Corps of Engineers
U.S.C.	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
UXO	unexploded ordnance
VOC	volatile organic compounds

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1 INTRODUCTION

1.1 PURPOSE AND NEED

The purpose of the proposed action is to support Flagler County's efforts to restore the beach along critically eroded segments of its shoreline. The project is intended to reduce risks to life, property, infrastructure, and natural resources by improving the resiliency of the coastal system against continued erosion and future storm events. The need for the proposed action arises from persistent shoreline erosion and repeated storm impacts that have resulted in significant beach and dune degradation.

1.2 PROJECT AUTHORITY

In accordance with the National Environmental Policy Act of 1969 (NEPA), the Council on Environmental Quality (CEQ) regulations implementing NEPA (40 Code of Federal Regulations [CFR] Parts 1500 through 1508), and Federal regulations for NEPA compliance (Federal Emergency Management Agency [FEMA] Directive 108-1), the Federal agencies must fully understand and consider the environmental consequences of actions proposed for Federal funding[1]. The purpose of this Environmental Assessment (EA) is to meet the Federal agency's responsibilities under NEPA and to determine whether to prepare a Finding of No Significant Impact (FONSI) or a Notice of Intent (NOI) to prepare an Environmental Impact Statement for the proposed project.

The EA presented herein expands upon the previous Final EA completed for the Flagler County Beach/Dune Nourishment Project, dated March 2020 (CEG, 2020). This EA is required to analyze new listed species and critical habitat, activities, and/or effects not previously considered in the 2015 United States Army Corps of Engineers (USACE) Feasibility Study for the Federal Project (completed in September 2024) or 2020 EA (e.g., extension of the Local Project sand placement footprint northward of R-64.5, increased volume dredged from the proposed Phase 2 borrow area, etc.). 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).

The proposed project is being coordinated with the following agencies: USACE, Florida Department of Environmental Protection (FDEP), Bureau of Ocean and Energy Management (BOEM), FEMA,[2] and the United States Fish and Wildlife Service

[1] Executive Order 14154, Unleashing American Energy (Jan. 20, 2025), and a Presidential Memorandum, Ending Illegal Discrimination and Restoring Merit-Based Opportunity (Jan. 21, 2025), require the Department to strictly adhere to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 et seq. Further, such Order and Memorandum repeal Executive Orders 12898 (Feb. 11, 1994) and 14096 (Apr. 21, 2023). Because Executive Orders 12898 and 14096 have been repealed, complying with such Orders is a legal impossibility. The Bureau of Ocean Energy Management (BOEM) verifies that it has complied with the requirements of NEPA, including the Department's regulations and procedures implementing NEPA at 43 C.F.R. Part 46 and Part 516 of the Departmental Manual, consistent with the President's January 2025 Order and Memorandum.

[2] FEMA is aware of the November 12, 2024, decision in Marin Audubon Society v. Federal Aviation Administration, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the Council on Environmental Quality (CEQ) regulations implementing NEPA are not judicially enforceable or binding on this agency action, FEMA has nonetheless elected to follow those regulations at 40 C.F.R. Parts 1500–1508, in addition to DHS and FEMA's procedures implementing NEPA found in DHS Directive 023-01-01, DHS Instruction 023-01-001-01, FEMA Directive 108-1, and FEMA Instruction 108-1-1to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

(USFWS), National Marine Fisheries Service (NMFS), and the Florida Fish and Wildlife Conservation Commission (FWC). 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. FEMA is also a cooperating agency due to the potential of Federal financial assistance for a portion of the project shoreline (Category G) and will likewise adopt this EA. A Biological Assessment (BA) for the Local Project has been included as **Appendix 1** of this EA.

The following categories were identified as relevant to the proposed project and appropriate for further evaluation: cultural resources; threatened and endangered species; turbidity and water quality; fish and wildlife resources and essential fish habitat (EFH, presented in **Appendix 2**); and noise produced during dredging operations. The waters immediately adjacent to the Project Action Area (PAA) are critical habitat for the North Atlantic right whale (NMFS, 2016) and loggerhead sea turtle (NMFS, 2014) and proposed critical habitat for the green sea turtle. The sand placement 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 BA)
- National Oceanic and Atmospheric Administration (NOAA) Vessel Strike Avoidance Measures (Appendix 2 of the BA)
- NMFS South Atlantic Division Regional Biological Opinion (SARBO) (NMFS 2020)
- USFWS Statewide Programmatic Biological Opinion (SPBO) (USFWS 2015)
- USFWS Piping Plover Programmatic Biological Opinion (P^3BO) (USFWS 2013)

1.3 PROJECT LOCATION AND OVERVIEW

Flagler County (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 in Appendix 3**). 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 (USACE, 2015). Flagler County has 18 mi of Atlantic Ocean shorefront.

For beach management planning and implementation purposes, the Flagler County shoreline is sub-divided into four project Phases. These “Phases” are represented by specific areas of the Flagler County shoreline and encompass the following shoreline reaches and are shown in **Figure 1**:

Phase 1: R-80 to R-94 - Authorized Federal Project (completed summer 2024)
Phase 2 North: R-46 to R-80 (FEMA Category G3) - Flagler County Local Project (proposed)
Phase 2 South: R-94 to R-101 - Flagler County Local Project (future project)
Phase 3: R-14 to R-46 (FEMA Category G2) - Flagler County Local Project (future project)
Phase 4: R-1 to R-14 (FEMA Category G1) - Flagler County Local Project (future project)

In summary, Flagler County’s approach to beach management began with construction of the Phase 1 Federal Project (completed in September 2024), including non-Federal tapers (a small portion of Phase 2) from R-77 to R-80 and R-94 to R-96, which were entirely funded by Flagler County. The County intends to construct the reach of Phase 2 from R-46 to R-77 in 2025, for which permits currently exist from R-64.5 to R-80 and R-94 to R-101 (*FDEP 0379716-001-JC & SAJ-2019-02065 [SP-TMM*]). This EA will support permitting of the remainder of the reach from R-46 to R-64.5 (contains FEMA Reach G-3 R-47 to R-65), in addition to including an analysis of the entirety of Phase 2 for a wholistic review of the project. The Phase 2 South reach from R-94 to R-101 will be constructed during a future project that is not currently planned. Upon completion of Phase 2, the County intends to develop and construct a project for Phases 3 (contains FEMA Reach G-2) and 4 (contains FEMA Reach G-1) along the northern half of the Flagler County shoreline. The scope and scale of such projects have not been formulated at this time and will require additional permitting and agency coordination for project development.

The USACE Hurricane and Storm Damage Reduction Project: Phase 1 (Federal Project) was co-authorized along 2.6 mi of shoreline between FDEP control monuments R-80 and R-94 in the City of Flagler Beach with an 11-year nourishment interval (**Figure 1**). The Federal Project was evaluated by the USACE with BOEM acting as a cooperating agency in an integrated Feasibility Study and EA in 2014 (revised in 2015) (USACE 2015). The 2015 Feasibility Study and EA is incorporated by reference given the direct overlap of the project footprint with the present evaluation. The Federal Project evaluation included reaches of shoreline from R-1 to R-4 and from R-50 to R-101; however, only the reach from R-80 to R-94 is part of the authorized project because the benefit to cost ratio beyond this area was too low to justify the use of Federal funds for construction. As such, Flagler County has sought to construct areas beyond the Federal Project with local and State funds. The 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).

Phase 2 is currently permitted between R-64.5 and R-80, and from R-94 to R-101 (Flagler/Volusia County line). Phase 2 is described in FDEP Permit *0379716-001-JC* and USACE Permit *SAJ-2019-02065 (SP-TMM).* The existing permits for Phase 2 will be modified to extend the permitted limits northward from R-64.5 to R-46. The proposed borrow area for the project is approximately 10 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 EA -- Borrow Area 3A (USACE, 2015). The borrow area is divided between the Federal and Local projects. The portion of the borrow area for the Local Project is designated as the “borrow area” (Flagler County Borrow Area, or FCBA, in the previous EA), otherwise referred to in this document as the “Phase 2 borrow area” (**Figure 2a/b**).

The project beach/dune fill template will require up to 1.8 Mcy (million cubic yards) of sand (approximately 64 cy/ft) for the initial nourishment with an expected renourishment interval of 6 to 8 years. A dredging volume of at least 2.6 Mcy is required for initial construction due to anticipated dredging losses and access issues with dredging the Phase 2 borrow area. The scope of future renourishment volumes will be based upon project performance.

The Phase 2 borrow area is roughly 320 acres (130 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 (USACE 2015). The project will be constructed using a hopper dredge with sand delivered by dredge from the borrow area to nearshore pipelines (**Figure 3**). Flagler County’s goal is for construction to begin in 2025, or as soon as possible after permits are issued, and will last approximately 3 to 5 months.

The PAA is defined as all areas to be affected directly or indirectly by the action, not solely the immediate area involved in the action (50 CFR 402.02). The PAA for Phase 2 includes the local portion of Borrow Area 3A (320 acres of 2,465 total acres available in the entirety of Borrow Area 3A), the 6.0-mi- (9.7-km-) long sand placement area from R-46 to R-77 and 1.3 mi (2.1 km) from R-94 to R-101, and unvegetated softbottom habitat within the turbidity mixing zone around the borrow area and sand placement areas.

Sixteen (16) vibracores were collected in January 2019 by the USACE Jacksonville District to describe sediments within the offshore borrow area. Flagler County collected an additional 50 vibracores in 2023 to support expansion of the Phase 2 borrow area and their beach management program. The geotechnical study area assessed for project development included the entire BLACK outlined area in **Figure 2a** and is estimated to contain about 18 to 21 Mcy of accessible, beach-compatible sand. The proposed Phase 2 borrow area (initial construction R-46 to R-77) is shown as the BLUE outlined area in **Figures 2a/b** and contains approximately 3.4 Mcy above the proposed maximum dredging excavation depth of -64.5 ft (North American Vertical Datum [NAVD] 88). Based upon the May 2019 survey, the minimum material layer thickness above -64.5 ft is approximately 2 ft, and the maximum is approximately 11 ft. The operation will include a 2-ft disturbance buffer to -66.5 ft (NAVD88). A typical cross-section fence plot of vibracores and borrow area seabed elevation is shown in **Figure 4**. This sand volume is expected to accommodate the initial nourishment (R-46 to R-77) and a portion of one renourishment (depending upon requisite volume) during the 15-year life of the FDEP and USACE permits for the Local Project.

The modified project will utilize staging and beach access areas at Varn Park (towards the north end of the project, approx. R-48 to R-49) and Beverly Beach (towards the south end of the project, R-65). Varn Park (**Images 1a/b in Appendix 3**) will be the primary staging and access area for the project because of its size; the Beverly Beach (**Images 2a/b**) access is anticipated to be a light access area for the southern end of the project. Both accesses are located at areas that have been previously disturbed for the purposes of dune and beach nourishment, which will minimize the impacts to existing dune vegetation.

1.4 SHORELINE/PROJECT HISTORY AND NEED

The shoreline in Flagler County is subject to erosion caused by storms and natural shoreline processes and has experienced sporadic accelerated beach erosion rates due to hurricanes and northeaster storms since its earliest development in the 1920s. Flagler County is particularly at risk of damage 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 presently occur more frequently and with longer duration of damaging waves and storm surge. Several notable hurricanes that have affected Flagler County include Dora (1964); David (1979); Bob (1985); Dennis, Floyd, and Irene (1999); Frances and Jeanne (2004); Matthew (2016); Irma (2017); Dorian (2019); and Ian and Nicole (2022). 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). 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 (SR) A1A, to increased threats from future coastal storms. The proposed modification to the Local Project: Phase 2 permits will allow restoration of eroded beach that was severely impacted by the hurricanes.

Flagler County beaches are impacted annually by severe northeaster storm events. Northeast Florida experienced intense northeaster storm events in 1984, 1993, 1994, 2007, and 2022—all drastically altering beach profiles statewide. Florida's entire Atlantic coast experienced several intense northeaster storms in 2007, which exacerbated erosion in some areas of Flagler County and prompted FDEP to add a shoreline segment at Painters Hill to the 2008 critically eroded beaches listing.

Shoreline erosion in Flagler County threatens oceanfront infrastructure, such as the National Scenic Highway, SR A1A, and over 1,476 structures having a combined estimated structural and content value of at least $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. 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 as shown in **Figure 5** (for the area from R-48 to R-70) (USACE, 2015).

Initial hardening actions along SR A1A, constructed because of Hurricane Dora impacts in 1964, included sand and coquina rock placement. In 1981, permits were issued for 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 mi of SR A1A between 22nd Street and South 9th Street, spending approximately $22.4 million to repair damage from Hurricane Matthew (FDOT, 2020).

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 July 2023, there are three areas of shoreline designated as critically eroded in Flagler County (**Table 1).** Depending on the timeline for permit issuance, a goal of the proposed project is to construct the project in 2025.

1.5 PROJECT GOALS AND OBJECTIVES

The goal of the proposed project is to sequentially restore the eroded beach and dune along the Flagler County project Phases. The USACE completed construction the Federal Project (Phase 1: R-80 to R-94) and non-Federal tapers (R-77 to R-80 & R-94 to R-96, i.e., a small portion of Phase 2) from July to September 2024. Thus, Flagler County seeks to build the initial construction of Phase 2 in 2025 as quickly as reasonably possible after the completion of Phase 1 (**Figures 1** and **2**).

1.6 PROPOSED ACTION

Flagler County is proposing a beach and dune nourishment project to renourish critically eroded sections of its shoreline to protect adjacent infrastructure and improve community resilience. In support of this effort, the County has submitted a request for Federal financial assistance to FEMA under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act), Public Law 93-288, as amended. FEMA’s consideration and potential provision of financial assistance constitutes the agency's Federal action for this project. In conjunction with this, BOEM has identified a connected Federal action: the issuance of a Negotiated Noncompetitive Agreement (NNA), which would authorize the use of specified offshore sand source areas requested by Flagler County to support the proposed beach renourishment activities.

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 and the Final Supplemental EA for the Flagler County Coastal Storm Risk Management Project (USACE, 2015 and 2024a). Most of the proposed Local Project falls within the USACE (2015) economic study area (R-50 to R-101). The portion of the project area not included from R-46 to R-50 (0.7 mi) is not inherently different physically or environmentally from the Federal study area south of R-50. The Preferred Alternative of dune and beach nourishment was selected for the Local Project phases.

2.1.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative represents future conditions without implementation of a beach nourishment project, which provides a comparison for all other alternatives considered in the analysis. For the No-Action Alternative, the rate of shoreline and beach volume 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.

2.1.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Based on the analysis, dune and beach nourishment was selected as the Preferred Alternative. Ultimately, based on the results of the USACE analysis, consistency with the Federal Project (R-80 to R-94), and the desires of Flagler County and the FDOT (which provided funding for the Local Project), dune and beach nourishment is the Preferred Alternative for the Local Project that is implementable at current sea level. The dune and beach nourishment alternative consists of a 10-ft seaward extension of the dune and a 20-ft to 80-ft 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-ft dune and 20-ft berm extensions, low sea level change scenario), and 42.19 Mcy (Reach A, B, C, and D, 10-ft dune and 80-ft berm extension, high sea level change scenario). Most of Reach B and all of Reach D identified in the 2015 USACE Feasibility Study are located within the Local Project.

Dune and Beach Nourishment. The current Phase 2 project will consist of placement of approximately 1.8 Mcy of sand between R-46 and R-77 during the initial nourishment with an expected nourishment interval of 6 to 8 years. It is noted that the Phase 2 areas R-77 to R-80 and R-94 to R-96 were restored as a component of the constructed Federal Project in 2024. Likewise, the Phase 2 area from R-96 to R-101 will not be restored at this time but may require on the order of 300,000–400,000 cy of sand during a potential, future nourishment project (dependent upon survey conditions at that time). The FDOT will implement a wall construction project in 2025 along this latter reach. Future renourishments of the Phase 2 reach will likely include all portions of the Phase 2 area, as needed. Dredging volumes are commonly as much as 1.5 times the design fill placement volumes due to losses during dredging; therefore, the total initial nourishment of all Phase 2 components may require dredging up to about 3.2 Mcy to address these potential losses and access issues.

The project construction template includes both dune and beach berm features. The dune will be constructed along the landward limits of the beach berm and seaward of existing bulkheads, revetments, and/or established dune vegetation. The dune will have a crest elevation that typically varies between +15.0 ft and +22.0 ft (NAVD) and will tie into the existing upland. The dune crest will have a variable width, depending on location, and will thence slope seaward at a slope of 1V:4H to an elevation of +9.0 ft (toe of dune). There will be a flat berm between the toe of dune and the landward edge of berm with a width of approximately 50 ft that will function to provide additional space along the beach for marine turtle nesting activities, among other benefits. The beach berm will have a crest elevation of +9.0 ft and slope gently from onshore to offshore at a slope of 1V:20H to an elevation of +5.0 ft before transitioning to the seaward berm slope of 1V:12H to intersect the existing beach profile at the time of construction. The use of compound slopes (i.e., multiple) is intended to reduce the magnitude of post-placement fill equilibration, and thereby reduce potential scarping of the beach profile that may adversely affect nesting turtles. There will be an approximately 2,000-ft taper into the existing beach at the north end between R-48 and R-46, while the south end will tie-in to the currently permitted project described in FDEP Permit *0379716-001-JC* and USACE Permit *SAJ-2019-02065 (SP-TMM)* at approximately R-77. See the Joint Coastal Permit (JCP) Permit Application for the full set of permit drawings. Permit application documents are publicly available on the FDEP OCULUS site. Select “Beaches & Coastal Systems” under Catalog, and “Permitting Authorization” under Profile, then search for “Flagler County” and Application Number “*0379716”.

The scope of the Phase 2 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 600,000 and 700,000 cy of sand. The actual required amount will be based upon project monitoring, and a separate BOEM NNA will be requested for each future nourishment event.

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.

Offshore Borrow Area. 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, 6472, and 6522 (**Figures 2a/b**). BOEM is authorized under Public Law 103-426 [43 United States Code (U.S.C.) 1337(k)(2)] to negotiate on a noncompetitive basis the rights to OCS sand resources for shore protection projects. BOEM's proposed connected action is to issue an NNA authorizing use of the sand source areas at the request of Flagler County.

The study area for the Phase 2 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 EA (USACE, 2015). This larger area is known as Borrow Area 3A which encompasses a total area of approximately 2,465 acres (998 hectares). The study area for the Phase 2 borrow area, within Borrow Area 3A occupies roughly 1,545 acres (625 hectares) of seabed (**Figure 2a**). Existing water depths within the Phase 2 borrow area geotechnical study area typically range from -50 to -66 ft NAVD88. The complete geotechnical study area (black boundary in **Figure 2a**) is estimated to contain about 18 to 21 Mcy of accessible, beach-compatible material—and includes the Phase 2 borrow area within. 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 will be provided to BOEM (Olsen Associates, Inc., 2024).

Initial construction of the Phase 2 reach by Flagler County will utilize the proposed Phase 2 borrow area (**Figures 2a/b)**. Borrow area dredging will begin with the "Primary" area, and then proceed to the "Secondary" area as necessary (**Figures 2a/b**). It is anticipated only the Primary area will be needed for initial construction, and the Secondary area will only be accessed once the contractor has exhausted the Primary area. A maximum post-cut seabed elevation at -64.5 ft (NAVD88) has been established for both the Primary and Secondary areas. The Primary area is estimated to contain approximately 2.9 Mcy of beach-compatible material above -64.5 ft, and the Secondary area 500,000 cy, for a total of approximately 3.4 Mcy.

The project will be constructed using a trailing suction hopper dredge, traditional hydraulic sand placement, and mechanical dune and berm shaping methods using bulldozers. Sand will be delivered to the beach from mooring points through submerged pipelines. The mooring points and pipelines will be deployed along predetermined pipeline corridors and areas that have been surveyed and cleared of significant cultural and hardbottom resources (**Figure 3**). Ancillary equipment may include, but not be limited to, support crew watercraft (transport, anchoring, etc.), semi-trucks to deliver equipment, loaders to transport shore pipes, material screening equipment, and utility task vehicles. Construction operations will be allowed 24 hours a day. A typical operational cycle will involve the dredge excavating material from the offshore borrow area, sailing to a discharge pipeline at the beach fill site, hydraulically pumping sand from the dredge to the beach, and then sailing back to begin the cycle again while the shore-crews shape the beach fill into the prescribed template.

This project will provide additional protection to Public Services and Utilities by creating a greater buffer between upland infrastructure (i.e., Services and Utilities) and the Atlantic Ocean through dune and beach fill placement. Construction operations will not alter existing services or utilities within the project area. The primary construction staging and access location will be at Varn Park, which will be temporarily closed during active project construction. Street closures are not anticipated during construction.

2.1.3 ALTERNATIVES CONSIDERED AND ELIMINATED FROM FURTHER CONSIDERATION

Although dune and beach nourishment was selected as the Preferred Alternative, additional alternatives were considered for the project area: 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. Structural alternatives constituted most of the alternatives removed from consideration; these were primarily removed due to uncertainties related to the potential downdrift erosional effects of the structures, as well as impacts to nesting sea turtles.

An exhaustive description of the alternatives considered is presented in the USACE Feasibility Study and Final Supplemental EA (USACE, 2015 and 2024a).

2.2 COMPARISON OF ALTERNATIVES

Table 2 presents a summary comparison of impacts for the Preferred Alternative and No-Action Alternative for the Local Project.

3 AFFECTED ENVIRONMENT AND POTENTIAL IMPACTS

The proposed project is expected to have a net long-term, beneficial impact to the coastal system through restoration of the highly eroded beach and dune system. The proposed project lies along sections of Critically Eroded Beach as designated 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.

The presence of construction equipment and personnel will temporarily weaken the aesthetics of the beach and temporarily limit recreational beach activity by the public 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, 2024a). The additional beach width and elevation from project construction (2.6 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.

3.1 PHYSICAL RESOURCES

3.1.1 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 mi 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.

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 (National Ocean Service Station 8720692 [SR A1A Bridge]) and on the back-bay side of the barrier island (National Ocean Service Station 8720833 [Smith Creek, Flagler Beach]). The SR A1A Bridge Station is located at Matanzas Inlet, approximately 17 mi north of Flagler Beach, and the Smith Creek tide station is located directly west of Flagler Beach.

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 over long distances, causing erosion along the Flagler County shoreline.

Mean seasonal offshore wave height from Wave Information Study hindcast data (1980–1999) ranges from 2.2 ft (0.7 m) in July to 4.6 ft (1.4 m) in October. 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 northeaster activity. Overall, the dominant wave direction ranges from northeast to southeast and reflects both open-ocean swell and locally generated wind-waves. Like wave height, the shortest period waves occur more frequently during the summer months (USACE, 2015).

Water Currents

The Florida Gulf Stream is the primary ocean current in the project area. The current is located approximately 60 mi offshore of Flagler County and mostly flows northward except for intermittent local reversals. Average annual current velocity is approximately 28 mi/day and varies from an average monthly low of 17 mi/day in November to an average monthly high of approximately 37 mi/day in July. 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. 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 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 mi) and Ponce de Leon Inlet to the south (27 mi). 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).

3.1.1.1 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.

3.1.1.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

The sand ridges in the Phase 2 borrow area 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 shallow cuts to sequentially remove the upper sediment layer with each pass of the draghead (est. roughly 1 ft each pass), avoiding creation of a deep depression which could accumulate fine materials. The average depth of dredging within the proposed Phase 2 borrow area is approximately 6.5 ft (2 m) (**Figures 2a/b**). It is anticipated that the dredge will remove sand from the shallower ridges first (i.e., “high spots”), before proceeding to the deeper areas. The shallow dredge cut depths for Phase 2 borrow area 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 (South Carolina Department of Natural Resources Marine Resources, 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 borrow areas 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).

Dredging of sand from the Phase 2 borrow area 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 represents 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.

3.1.2 GEOLOGY AND GEOMORPHOLOGY

Florida currently occupies a portion of the geological unit known as the Floridian Plateau. The Floridian Plateau is a partly submerged platform that represents the seaward extension of the coastal plain of Georgia and Florida. 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. 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 (Pilkey and Dixon, 1997; USACE, 2015).

The Phase 2 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, 6472, and 6522 (**Figures 1**, **2a/b**). The Phase 2 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 EA (USACE, 2015). This larger area is known as Borrow Area 3A. The Phase 2 borrow area within Borrow Area 3A occupies roughly 1,545 acres (625 hectares) of seabed (**Figures 1**, **2a/b**). The Phase 2 borrow area contains bathymetric peaks and ridges on the seascape rather than level sea bottom. The sand ridges are elongated shoals comprised of mostly sandy sediments (**Figure 2a**). The ridges tend to be semi-permanent features that have slowly formed into linear mounds by currents over time. Existing water depths within the Phase 2 borrow area typically range from -50 to -66 ft NAVD88.

<u>Subsurface Conditions</u>

There are no submerged aquatic vegetation (SAV) habitats or hardbottom/reef resources in the PAA. Nearshore hardbottom habitat was documented by scientific divers in May 2024 approximately 1,050 ft north of the equilibrium toe-of-fill (ETOF) taper and 2,930 ft north of the last full sand placement station at R-48 (**Figure 6**). 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 7**) (DCA, 2011). 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, and 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. Scientific 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 8** and **9**). 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 and landward of the projected ETOF. No hardbottom was found at these 15 sites. The bottom consisted of sand and/or shell hash in the nearshore areas (**Image 3**), and sand and muck in the offshore areas in the pipeline corridors.

Similar features were observed continuing north approximately 920 ft and 2,100 ft from shore through R-35 in imagery from a side scan sonar survey in April 2024 by Arc Surveying, Inc. A portion of these features is shown in comparison to July 2019 verification dives on similar side scan features as June 2019 in **Figure 10**. No hardbottom was found during the July 2019 verification dives on similar signatures to the April 2024 side scan sonar survey (**Figures 11** and **12**). All features beyond 150 ft offshore in the April 2024 side scan survey do not represent consolidated hardbottom and are most likely sand/shell hash mounds. Hardbottom was observed on verification dives in May 2024 near R-44 and R-45 in the nearshore environment in water depths of approximately 4 to 8 ft. The side scan signature of this hardbottom is very different from the offshore signatures (**Figure 12**).

The southern extent of the nearshore ephemeral hardbottom offshore of R-45 to R-44 was mapped by CEG scientific divers in May 2024. CEG scientific divers investigated 19 anomalies identified in the April 2024 nearshore side scan sonar survey for the presence of exposed hardbottom resources and characterized the seafloor at each of the 19 points (**Figure 13, Table 4**). Divers first mapped the southernmost segment of nearshore hardbottom from R-46 to R-44, which encompassed the first five anomaly points. Mapping was conducted by divers towing a float with a Trimble Geo 7x Differential Global Positioning System (DGPS), which constantly recorded diver positions. Divers swam along the landward and seaward edges of the hardbottom formation after first determining the southernmost terminus of the feature. This feature ended approximately 1,050 ft north of the proposed ETOF taper and approximately 2,930 ft north of the nearest full sand placement station at R-48 (**Figure 6**).

Following mapping of exposed hardbottom, bounce dives were conducted on the remaining 14 anomaly points. The vessel navigated to each point with DGPS and dropped a weighted buoy to ensure that the exact point was surveyed by divers. Exposed hardbottom was documented along the shoreline in 4- to 8-ft water depths from Point 1 through Point 7 (**Figure 6**). The exposed ephemeral hardbottom 1,050 ft north of the ETOF, and 2,930 north of the last full fill station at R-48 consisted of scoured, low (<30 cm) to medium (30–80 cm) relief coquina rock. Visibility was very poor during the survey, ranging from 6 to 12 in, and still photos did not produce clear images. Turf algae was the dominant biotic cover; low profile macroalgae were observed occasionally (*Gracilaria* sp. and an unidentified green alga). Biotic cover and composition indicated that this hardbottom is ephemeral and not exposed for long periods of time. Fauna were not identified due to poor visibility and surge; however, one bony fish was encountered via touch. See **Appendix 4** for a description of beach profile elevation fluctuations in relation to nearshore hardbottom features.

Points 8 to 19 were comprised of various substrate types of different colors and composition; tan, brown, and gray fine sand were each recorded along with fine shell hash and orange shell hash deposits, and mixtures of the different types (**Figure 6**). Divers recorded the color and description of substrate at each point as presented in **Table 4**. Large deposits of orange shell hash were common and visible on the beach. Fine, siliceous sand ranging from tan to brown to gray was observed often intermixed with fine shell hash. Divers reported different compositions at the margins of anomaly points, suggesting the side scan survey targets represent transitions between sediment types.

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 Phase 2 borrow area (**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. Chronicle Heritage conducted geophysical surveys of the sand placement area offshore of R67 to R35 from April 6 through 24, 2024. Their results concluded that the placement area offshore R67-R35 consisted solely of unconsolidated marine sediments (Chronicle Heritage, 2024).

<u>Sediment and Sand Placement Characteristics</u>

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 hardbottom exposed rock outcrops which influence shoreline erosion and accretion. The FDEP completed a shoreline change rate study in July 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).

<u>Borrow Area 3A</u>

Borrow Area 3A (**Figure 2a**) is a portion of the larger shoal feature, Borrow Area 3, that was investigated by the USACE as part of the Flagler County Hurricane and Storm Damage Reduction Project Feasibility Study and utilized in the Federal Project completed in September of 2024 (USACE, 2015 and 2024a). Area 3A is approximately 2,465 acres and comprises the USACE Federal Borrow Area and the Phase 2 borrow area. In 2019, the USACE conducted design level geophysical and geological data collection in Borrow Area 3A. This work included a complete geophysics suite (seismic sub-bottom, side scan, and magnetometer) and the collection of 48 vibracores on a 1,000-ft grid spacing. The vibracores were collected in the western half of Area 3A. Following review of the geophysical data and vibracores, the USACE Jacksonville District delineated the sand source to provide for initial construction and 50-years of maintenance for the Federal Project.

In 2023, Olsen Associates, Inc. under contract to Flagler County, collected 50 sediment vibracores to supplement a geotechnical investigation to expand the County's understanding of available materials within Borrow Area 3A. This investigation aided in development of a potential sand borrow area for the Phase 2 proposed project (presented herein) and is anticipated to also be used for future borrow area development within the non-Federal portions of Borrow Area 3A. All vibracore collections were conducted on 9–10 May 2023 under BOEM authorization E22-022.

The boundary of the geotechnical study area for this assessment is presented as the black polygon shown in **Figure 2a** (approximately 1,545 acres). Within this area lies the proposed borrow area for the Phase 2 project discussed below. A complete description of the vibracore sediment data collected in 2019 and 2023 are respectively presented in Olsen Associates, Inc. (2020, 2024). Sampling data from both investigations were used in development of this assessment and the Phase 2 borrow area design.

Existing water depths within the Phase 2 borrow area geotechnical study area typically range from -50 to -66 ft NAVD88. The complete Phase 2 borrow area is estimated to contain 18 to 21 Mcy of accessible, beach-compatible sediment.

Proposed Phase 2 Borrow Area

Table 5 and **Figure 14** show recent sediment grain characteristics of the proposed Phase 2 borrow area 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, which is related mostly to the shell materials in the beach.

The most notable difference between the native beach and borrow area 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 composite borrow area sediments exhibit a mean grain size of 0.27 mm, a median grain size of 0.22 mm and a sorting value (σ) of 1.03 Φ. 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 poorly graded (or well sorted) samples in which the sediment grains are similarly sized; while σ>1.0 is well graded (poorly sorted), in which sediment grains tend to vary more in size.

Visual shell content between the native beach (17.3%) and borrow area (24.3%) are similar (**Table 5**). Shell content is greater along both the subaerial beach and intertidal zone than the offshore profile portions (as described above) since shell hash tends to be deposited along the beach face. The native beach color can be described with a Munsell color as having Hue of 10YR, Value that ranges from 7 to 8, and Chroma of 1. The borrow area sand Munsell color (moist) is generally described as a Hue of 10Y, with Value that ranges from 5 to 7, and Chroma of 1. Some samples with a Value of 6 were dried and found to have a Value of 7 after drying.

3.1.2.2 NO-ACTION ALTERNATIVE (STATUS QUO)

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

3.1.2.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Subsurface Conditions

There are no SAV habitats or hardbottom/reef resources in the PAA. Ephemeral hardbottom habitat was documented in May 2024 approximately 1,050 ft north of the ETOF taper and 2,930 ft north of the nearest full sand placement station at R-48 (**Figure 6**). Historical records of beach profile surveys show the southern limits of apparent, persistent exposed hardbottom between R-43.5 and R-43.7. The ephemeral hardbottom in the May 2024 diver-mapped edge survey near R-45 had become exposed within the past 6 months and is expected to be a short-term, temporary condition as summer sand bar recovery occurs. The burial and re-exposure of hardbottom in this area is likely related to natural onshore and offshore movement of sediments in the form of nearshore sand bars, as well as acute changes resulting from storm impacts. The Flagler County shoreline has a known and well documented bar-trough system that behaves seasonally. Observations of shoreline behavior suggest bi-modal transport with a moderate bias towards net southerly transport which places the project downdrift of the hardbottom resources (**Appendix 4**). Biotic growth observed by scientific divers on ephemeral hardbottom at R-45 in May 2024 is consistent with hardbottom habitat that is frequently buried and re-exposed, and exposure does not last for long periods of time. Turf algae was the dominant biotic cover; low profile macroalgae were observed occasionally. There is a buffer (1,050 ft from the ETOF taper and 2,930 ft from the nearest full sand placement station) between the ephemeral hardbottom documented in May 2024 at the northern end of the proposed project. Due to the ephemeral nature of the hardbottom, downdrift location, and buffer distance, the proposed beach nourishment project is not anticipated to have negative impacts on nearshore hardbottom.

<u>Sediment and Sand Placement Characteristics</u>

The proposed beach renourishment project is anticipated to not have 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 dredging operations.

The overfill ratio is commonly used to estimate the amount of borrow area material, if any, that should be added to a sand placement project to achieve the same stability and 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 5**, using both the James and Dean methods, the overfill ratio for the Phase 2 borrow area is 1.00, meaning that no additional borrow area sand is required to approximate the physical performance of the native beach sand (Dean, 1999; James, 1974).

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. 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 Phase 2 borrow area during permitting (FDEP *JCP 0379716-001-JC* and DA *SAJ-2019-02065 (SP-TMM)*) to exclude as much of the darker material by raising the maximum dredge depth. Flagler County demonstrated that there are sand ridges within Phase 2 borrow area 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. Accordingly, as is typical with most sand placement projects where borrow materials are darker when moist and first placed on the beach, the materials lighten through weathering and mixing with the native beach materials.

A Sediment Quality Control/Quality Assurance Plan for the permitted project from R-64.5 to R-80 and R-94 to R-101 has been approved by the FDEP (**Appendix 6**). 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 Florida Administrative Code 62B-41.007(2)(j). The proposed modification (R-46 to R-64.5) to the project seeks to implement the identical Sediment QA/QC plan as JCP *0379716-001-JC*.

3.1.3 NATURAL OR DEPLETABLE RESOURCES

Sand is the natural or depletable resource utilized in this project. See **Section 3.2** for a discussion on the sand source and placement area.

3.1.3.1 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative, there would be no impact to natural or depletable resources.

3.1.3.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Sand is a natural and depleting resource. Using sand from the offshore borrow area will deplete the sand source in the Phase 2 borrow area over the project life. The sand will be depleted from the Phase 2 borrow area but will enter the nearshore sand transport system. Sand will eventually return to offshore areas and redistribute over nearshore areas downdrift of the project. No hardbottom is located downdrift of the proposed Phase 2 project. It is unlikely that the redistributed sand will be sufficient to refill the Phase 2 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 Phase 2 (Local) projects, 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). This approach optimizes the use of finite resources and avoids waste. Contractors will be required to stay within the limits outlined in Contract Specification and project permits.

3.1.4 AIR QUALITY

The Clean Air Act (CAA), as amended (42 U.S.C. 7401 et seq.), requires Federal actions to conform to an approved state implementation plan (SIP) designed to achieve or maintain an attainment designation for air pollutants as defined by the National Ambient Air Quality Standard (NAAQS). The NAAQS were designed to protect public health and welfare. The criteria pollutants include carbon monoxide (CO), ozone (O_3), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter ($PM_{2.5}$ and PM_{10}; particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 and 10 microns), volatile organic compounds (VOCs), and lead (Pb). The General

Conformity Rule (40 CFR Parts 51 and 93) implements these requirements for actions occurring in air quality nonattainment areas.
The U.S. Environmental Protection Agency (USEPA) (40 CFR § 81.310) designates air quality compliance on a county level. A review of USEPA data indicates that the project area is in attainment status for all the criteria pollutants. 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 lead to further air quality improvement 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). USEPA has not established air quality standards for Federal waters.

On January 9, 2023, CEQ issued *NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change* (CEQ-2022-0005). Recent CEQ NEPA Implementing Regulations (40 CFR 1500-1508) further adopted these requirements into NEPA documents. The CEQ guidance is intended to assist agencies in disclosing and considering the effects of greenhouse gas (GHG) emissions and climate change. Consistent with section 102(2)(C) of NEPA, Federal agencies must disclose and consider the reasonably foreseeable effects of their proposed actions including the extent to which a proposed action and its reasonable alternatives (including the No-Action Alternative) would result in reasonably foreseeable GHG emissions that contribute to climate change.

CEQ defines GHGs as carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride. CO_2 is the primary GHG emitted from diesel engines. CH_4 is emitted to a lesser extent but, over a 100-year period, the emissions of a ton of methane contributes 28 to 36 times as much to global warming as a ton of CO_2.

3.1.4.2 NO-ACTION ALTERNATIVE (STATUS QUO)

There will be no additional air quality effects without a project because dredging and associated effects (i.e., air emissions) will not occur at any existing sand sources for the Flagler County project, and placement will not occur on the beach.

3.1.4.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Emissions of criteria pollutants, greenhouse gases, and other hazardous air pollutants will result from operation of the dredge pumps and coupled pump-out equipment, dredge propulsion engines, and tugs, barges, and support vessels used in the placement and relocation of mooring buoys. In addition, air emissions will result from bulldozers, trucks, and other heavy equipment used in the construction of the berm, beach, and dunes. CO and particulate emissions at the project site during construction may be considered offensive but are not likely to be considered far-reaching. The primary emissions will result from the burning of fossil fuels by this equipment. Variables that will affect the impact to ambient air quality include the amount of material dredged, the distance from shore at which the dredge operates, and meteorological conditions

(e.g., wind velocity and direction). Generally, the dredge produces the majority of emissions during a nourishment project.
To ensure the proposed activity's emissions do not violate NAAQS for criteria pollutants—including CO, NO_2, Pb, SO_2, hydrocarbons (HC), and particulate matter (PM)—an emissions analysis was performed to estimate the levels of each of these pollutants that may be generated during project construction. In cooperation with BOEM, ENVIRON International Corp. and the Woods Hole Group developed a Dredging Project Emissions Calculator (DPEC) to estimate the emissions levels that may be generated by proposed beach nourishment and coastal restoration projects (ENVIRON International Corp. and Woods Hole Group, 2013). This Microsoft Access program can be used to calculate emissions during multiple phases of a project, from dredging, to pump-out and sand placement, thereby providing a basis to determine conformity with regulations and impacts analysis.

The analysis was run for the Flagler nourishment project using a large hopper dredge with 6,540 CY hopper capacity, and Phase 2 borrow area, which represents the farthest distance the dredge will need to travel. The hopper dredge is the likeliest methodology employed for this project. The following analysis also included auxiliary equipment (such as tenders, tow boats, and crew boats) as well as shore-based equipment (such as loaders and excavators). Estimated emissions levels generated by the DPEC for this project are shown in **Table 6**. These emissions are from the initial nourishment effort considered in this EA but could be repeated with similar air quality impacts for future borrow area use requests. The total project emissions are dominated by CO_2 followed by NOx (represents the sum of nitric oxide (NO) and NO_2 emissions). CH_4 emission factors are 2% of HC emission factors (USEPA, 2023) and were also calculated as part of this emissions analysis. CH_4 emissions from diesel engines are of minor importance (Cooper and Gustafsson, 2004).

There will be no long-term accumulation of particulates in the project area because offshore sea breezes are likely to disperse pollutants away from the coast and the construction activity is brief and temporary in nature. Exhaust from the construction equipment will have an effect on the immediate air quality around the construction operation but should not impact area away from the construction area. These emissions will subside upon cessation of operation of heavy equipment. No air quality permits are required for this borrow area lease. **Table 6** shows a summary of project emissions by source and location for HC, VOC, CO, NOx, PM, and CO_2.

3.1.5 NOISE

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

3.1.5.2 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative, there would be no impacts from noise.

3.1.5.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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 (Thomsen et al., 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 limited available data 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 (Thomsen et al., 2009). Noise associated with dredging activities can be placed into five categories:

1. **Collection noise**, e.g., the scraping of the buckets on a bucket ladder dredge or the operation of the drag head
2. **Pump noise from** the pump driving the suction through the pipe
3. **Transport noise** of the material being lifted from the sea floor to the dredge
4. **Deposition noise** associated with the placement of the material within the barge or hopper
5. **Ship/machinery noise** associated with the dredging ship itself

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 μPa @ 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 sand placement 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).

3.1.6 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 sand placement areas in their integrated Feasibility Study and Supplemental EA in 2024. (USACE, 2015 and 2024a). The magnetometer survey of the borrow area conducted for the USACE in July 2019 did not detect any signals that suggest the potential presence of explosives of concern (MEC) and/or unexploded ordnance (UXO) in Borrow Area 3A (which contains the Phase 2 borrow area). The Phase 1 Federal Project was recommended to be classified as "Low Probability" of encountering MEC by USACE Baltimore District (CENAB) Military Munitions Design Center (USACE, 2024).

3.1.6.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not pose any additional risks of encounters with hazardous, toxic, or radioactive waste.

3.1.6.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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.

No evidence of bombing targets or ordinance dump sites occur within the project footprint (USACE, 2015). In June 2024, the USACE conducted a Probability Assessment for munitions and explosives of concern for the nearby Federal Project, and it was determined to have a "low probability" of encountering MEC (USACE, 2024a). This project implemented the following which the Phase 2 project will also implement the following:

- A screening process will be used during beach fill. The process involves (1) excavating material from the borrow area by hopper dredge; (2) sailing to the discharge area; (3) pumping the material from the dredge to the beach and through the screener to allow sandy material to pass through the screens onto the beach and exclude any material that is larger than the screens; (4) spreading the excluded material onto the beach; (5) the spread material will be investigated by a UXO technician who is trained in identifying MEC/UXO and will remove and log any encountered MEC/UXO for disposal; (6) the remaining shell material will be re-integrated into the beach and is anticipated to slowly mix with the existing beach material over time. Screens implemented may be mechanical or non-mechanical.
- In areas where dredge material will be placed and publicly accessible MEC will be screened on land by an appropriately trained and certified UXO Technician.

- All site workers that are involved with soil disturbance will follow the 3Rs of explosive safety education (Recognize, Retreat, and Report). More information can be found at https://www.denix.osd.mil/uxo/.
- The UXO technicians will determine the type of MEC (if encountered) and follow an approved MEC work plan. A MEC re-assessment may be required if any MEC that could raise the probability assessment beyond "Low Probability" are encountered.
- Contact David Holland, Ordnance & Explosives Safety Specialist, U.S. Army Corps of Engineers, Baltimore District for MEC Probability Assessment information (USACE, 2024).

During the Federal Project, munitions such as 20-mm practice rounds and .50 caliber full rounds were primarily identified in screenings, collected, and properly disposed of by the MEC/UXO technicians on site. The technicians performed monitoring operations and maintained communications throughout the project to continually evaluate the probability assessment of MEC and whether the assessment would need to be elevated. Upon completion, the project remained at a "low probability" of encountering MEC. As noted, the Phase 2 project will employ similar MEC mitigation measures.

3.1.7 SOLID WASTE AND DRINKING WATER

3.1.7.1 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative there will be no impact to solid waste or drinking water.

3.1.7.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

No impacts related to solid waste are expected from 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.

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

3.2 BIOLOGICAL RESOURCES

3.2.1 VEGETATION

<u>Dune and Scrub Communities</u>

The sandy beaches along Flagler County are typically fronted by a line of dunes ranging in height from 10 to 23 ft above mean sea level. 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 can rapidly re-colonize after disturbances (USACE, 2015; Myers and Ewel, 1990).

The project sand placement area extends 6 mi (9.7 km) from R-46 to R-77 and 1.3 mi (2.1 km) R-94 to R-101, along the Atlantic Ocean shoreline in southern Flagler County. Roughly half of the project area lies along portions of Flagler County where single-family residences, light commercial, and recreational vehicle areas are located immediately adjacent to the beach, followed landward by SR A1A. Along the other half, SR A1A is located immediately adjacent to the beach, where the area landward thereof is developed with light commercial, single-family residence, condominiums, hotels, and resort areas. Approximately 0.5 mi of the project shoreline lies within Gamble Rogers State Recreation Area (SRA) Coastal Barrier Resources Act (CBRA) Unit P07P.

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 (Florida Land Use, Cover and Forms Classification System [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*). 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). **Images 4-5a/b** show existing beach conditions.

Seaward of the dune vegetation line, the sand placement area is classified as Marine - Unconsolidated Substrate (sand) from the supratidal to subtidal areas. Within this broad unvegetated zone, where most 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).

Seagrasses

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

3.2.1.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would be a 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.

3.2.1.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

The proposed dune and beach nourishment 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.

R-64.5 to R-80 and R-94 to R-101 (Permitted): The dune will have a crest elevation of +12.0 ft, on average. The beach berm will have a crest elevation of +10.0 ft 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.

R-46 to R-64.5 (Modification): The dune will have a crest elevation that typically varies between +15.0 ft and +22.0 ft (NAVD). The dune crest will have a variable width, depending on location, and will thence slope seaward at a slope of 1V:4H to an elevation of +9.0 ft (toe of dune). There will be a flat berm between the toe of dune and the landward edge of berm with a width of approximately 50 ft. The beach berm will have a crest elevation of +9.0 ft and slope gently from onshore to offshore at a slope of 1V:20H to an elevation of +5.0 ft before transitioning to the seaward berm slope of 1V:12H to intersect the existing beach profile at the time of construction. There will be an approximately 2,000-ft taper into the existing beach at the north end between R-48 and R-46, while the south end will tie-in to currently permitted project described in FDEP permit 0379716-001-JC at approximately R-64.5.

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 nourishment sand will provide a source of material for wind-blown accretion of the existing dune system within the project area.

3.2.2 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, BOEM, and FEMA requirements as outlined under Section 7(c) of the Endangered Species Act (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 USACE and BOEM transmitted an informal consultation package to USFWS on September 3, 2024, analyzing effects to listed species and critical habitat. The USFWS provided concurrence on May 5, 2025, stating that the proposed action is not likely to adversely affect listed species or designated critical habitat and is covered by the SPBO and P^3BO, where applicable. Flagler County will adhere to the Terms and Conditions and Reasonable and Prudent Measures of the USFWS SPBO (dated March 13, 2015) and P^3BO dated (May 22, 2013) and will implement standard manatee conditions for in water work. Additionally, the County will implement all applicable project design criteria in accordance with the NMFS SARBO (dated March 27, 2020) (NMFS, 2020).

<u>Sea Turtles</u>

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 turtle nests in this region. Comparatively 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. 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, though leatherback sea turtles may start nesting as early as March. 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). 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). On July 10, 2014, USFWS and NMFS designated specific areas in the terrestrial and marine environment as critical habitat for the Northwest Atlantic Ocean DPS of the loggerhead sea turtles, effective August 11, 2014 (79 FR 39855) (79 FR 39755). The beach and nearshore areas in the PAA are located within USWFS Terrestrial Critical Habitat Unit LOGG-T-FL-03 and NMFS Neritic Critical Habitat Unit LOGG-N-15. The offshore borrow area is not located within critical habitat (**Figure 15**).

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 11 DPSs under the ESA: three were listed as endangered (Central South Pacific, Central West Pacific, and Mediterranean), 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). USFWS and NMFS proposed specific areas in the terrestrial and marine environment as critical habitat for the green sea turtle on July 19, 2023 (FR 2023-14225). The beach and nearshore areas in the PAA are located within the proposed NMFS nearshore (FL-01) and NMFS sargassum (NA-02) critical habitat marine environments, and the proposed USFWS terrestrial Critical Habitat Unit FL-02. The offshore borrow area is located within the proposed NMFS nearshore (FL01) and NMFS sargassum (NA01) marine critical habitat units (**Figure 16**).

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, diving to great depths, and seldom approaches land, except for nesting (Eckert, 1992).

The Kemp's ridley sea turtle (*Lepidochelys kempii*) was listed as endangered throughout its range on December 2, 1970 (35 FR 18320). Between 2011 and 2023, one Kemp's ridley nest was documented in the PAA by the Volusia/Flagler turtle patrol in 2012. 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). No hawksbill sea turtle nests have been recorded in Flagler County, Florida.

Sea turtle nesting data for Flagler County is available from the Volusia/Flagler Turtle Patrol and FWC. **Table 7** presents nesting data from 2014 through 2023 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 three Local Project reaches. It excludes approximately 0.45 mi at the northern end of the project area. Within the project area, the FWC index beach identified as Flagler County Beaches (South) begins at Jungle Hut Road to 23rd St. N at Beverly Beach/Flagler Beach Line and is approximately 9.7 km. The FWC index beach identified as Flagler Beach is 9.6 km and 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 south of the County line. Daily patrols are performed by the Volusia/Flagler Turtle Patrol.

The loggerhead sea turtle is responsible for most nesting in Flagler County, with an annual average of approximately 439.9 (SE ± 17.7) nests/year (~20.8 nests/km) along 21.1 km of study area (Jungle Hut Road to the Flagler/Volusia County line). Between 2011 and 2018, the earliest loggerhead sea turtle 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 2- or 3-year cycle.

Loggerhead sea turtle nesting success within the FWC index beaches (Flagler Beach and Gamble Rogers SRA) is variable over the 10-year period (**Table 8**). However, the 10-year average (61% nesting success) is slightly higher than the typical 1:1 ratio of nests to false crawls for loggerhead sea turtles. Nesting success is similar between

Flagler County Beaches (South) and in Gamble Rogers SRA (65% and 66% respectively), compared to Flagler Beach (55%). Of the 10-year monitoring period shown in **Table 8**, Gamble Rogers SRA had the highest nesting success in 2014 (91%) and the lowest in 2023 (50%). Flagler Beach had the highest nesting success in 2016 (76%) and lowest in 2020 (47%). Flagler County Beaches (South) had the highest nesting success in 2017 (80%) and the lowest in 2023 (42%) (FWC and FWRI 2024).

Loggerhead hatchling success data in Flagler County are shown in **Table 9**. Between 2011 and 2018, loggerhead hatchling success ranged from 82% (2016) to 87% (2014 and 2017).

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 three index beaches, combined from 2014 through 2023, is approximately 110.2 (SE ± 9.0) nests/year (~5.2 nests/km) along the 21.1 km of study area (Jungle Hut Road to the Flagler/Volusia County line). Nesting success for *C. mydas* was highly variable over the 10-year period between 2014 and 2023. The lowest nesting success for Flagler County Beaches (South) was observed in 2018 (43%), and the highest was observed in 2015 (89%). The lowest nesting success for Flagler Beach was observed in 2014 (27%), and the highest was observed in 2016 (100%). The lowest nesting success for Gamble Rogers Memorial SRA was observed in 2018 (0%), and the highest was observed in 2015 (100%) (**Table 10**) (Olsen Associates, Inc., 2024). Overall nesting success was equal between each FWC index beach (70% for Flagler County Beaches South and Flagler Beach and 71% for Gamble Rogers SRA). Hatching success from 2011 through 2018 ranged from 72% in 2011 to 95% in 2018 (**Table 11**).

Forty leatherback sea turtle nests were recorded by FWC from 2014 through 2023 (**Table 12**) (FWC and FWRI, 2024). Between 2011 and 2018, Volusia/Flagler turtle patrol documented the earliest nest on April 18 in 2011, and the latest nest on July 6, 2015. The high nesting success rates (**Table 12**) are due to the low number of nests recorded. Hatchling success for the leatherback sea turtle between 2011 and 2018 ranges from 13% in 2013 to 93% in 2017 (**Table 13**).

<u>North Atlantic Right Whale</u>

The North Atlantic right whale (*Eubalaena glacialis*) is a federally listed endangered aquatic mammal protected under the ESA. 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 360 individuals in the Atlantic in 2024 (NOAA, 2024a). The eastern Atlantic population is nearly extinct (NMFS, 2005). In August 2017, an Unusual Mortality Event (UME) was declared by NMFS, with 40 documented mortalities occurring since 2017. There has been one North Atlantic right whale mortality recorded in Florida since the declaration of the UME. The carcass was found near St. Augustine on February 13, 2021. Most mortalities recorded during the UME have occurred off the coast of New England and Canada (NOAA, 2024b).

Wintering and calving grounds occur along the coast of Georgia and Florida, while feeding and nursery grounds occur in the northwestern Atlantic. Migrations south to the calving grounds occur by pregnant females during mid-November (Kraus and Rolland, 2007). 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 deepwater depths (100–200 m) adjacent to steep sloping topography are preferable areas for feeding (NMFS, 2005; Winn et al., 1986; Clapham et al., 1999). In the late winter and early spring, right whales leave the southeast and travel north to feeding and nursery areas in Cape Cod Bay, Massachusetts (Kraus and Rolland, 2007).

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 sand placement areas in the PAA (**Figure 17**).

North Atlantic right whales occur offshore of Flagler County. Right whale sightings by the Marineland Right Whale Project from 2001 through 2021 are shown in **Figure 18**. There are numerous reports of right whales immediately offshore of the sand placement areas in the PAA of both mother and calf, individual and group sightings (**Figure 19**). The sightings span from December 7 through March 29 from January 1, 2014, through March 6, 2024. Most sightings occur in January and February. The borrow area is located outside of critical habitat unit for the North Atlantic right whale. Fewer sightings are reported near the borrow area; however, project vessels transit corridor will extend through Critical Habitat Unit 2. Construction may overlap female right whale migration to and from calving grounds. Right whales may be present while the dredge is transiting to and from the borrow area to the pipeline pump-out sites. Dredging operations are not expected to impact the primary biological features of the critical habitat designation but do present a strike risk to migrating females and their calves. This risk will be mitigated through adherence to the 2020 SARBO project design criteria.

Piping Plover

The piping plover (*Charadrius melodus*) is a federally listed threatened migratory shorebird endemic to North America. This species was listed by the USFWS as threatened on January 10, 1986. Much of the decline in piping plover population is attributed to habitat destruction, disturbance by humans and pets, and predation. To reduce the threat of population decline, the USFWS designated critical habitat on July 10, 2001 (66 FR 17; 36038-36143) along the southeast U.S. coastline, which provides necessary protection for this species during migration and residency on wintering grounds. Critical habitat includes 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. A total of 137 areas were designated as critical habitat for wintering piping plover along the coasts of North Carolina, South Carolina Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas. There is no federally designated piping plover critical habitat in the PAA. 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 mi south of the PAA (USFWS, 2001).

The USFWS P³BO for wintering piping plover and its designated critical habitat, dated May 22, 2013, identified all Federal, State, and County publicly owned land within 1 mi of an inlet as Optimal Piping Plover Areas. The definition of an Optimal Piping Plover Area includes that all coastal processes are allowed to function mostly unimpeded within these areas. Matanzas Inlet is approximately 17 mi north of the PAA, and the Ponce de Leon inlet is approximately 26 mi south of the PAA. Therefore, the PAA is not located within an Optimal Piping Plover Area.

Piping plovers overwinter along most 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 plovers 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 (personal communications 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 20 shows piping plover sightings reported to eBird from January 1, 2014, through May 6, 2024, between R-46 and R-101 (this range includes the Federal nourishment project area being pursued under a separate permit by the USACE). Sightings of piping plovers were only recorded in 2015 and 2020. In 2015, four birds were reported on February 8 and one bird reported on September 28. In 2020, sightings were reported on October 13 and December 27. Of these sightings, three of them occurred at Gamble Rogers State Park. The typical wintering stopover for piping plover lasts from October to March (Doonan et. al, 2006).

<u>Red Knot</u>

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 reasons as the loss of breeding and non-breeding habitats due to 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, though 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 Florida 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 (personal communication with Billy Brooks, USFWS, 2019). **Figure 20** shows eBird reports of red knots from January 1, 2014, through May 2, 2024, between R-46 and R-101 in the project fill areas (this range includes a previously permitted federal project not a part of this project). Three red knot sightings were reported to the eBird database: one on October 13, 2020; one on March 29, 2021; and one on December 19, 2021. 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).

<u>Elasmobranchs</u>

Smalltooth sawfish were listed as endangered under the ESA in May of 2003 (68 FR 15674). The species historically ranged from Texas to North Carolina, but now the primary population is known to inhabit the waters of southwest Florida (Brame et al. 2019). Reports of smalltooth sawfish being observed on the east coast of Florida are increasing, and recent studies suggest management efforts have been successful in stabilizing and increasing the population (Wiley and Brame, 2018).

The giant manta ray was listed as threatened under the ESA in January of 2022 (83 FR 2916). The greatest threat to the giant manta ray is commercial exploitation. They are both intentionally targeted and unintentionally captured as bycatch in various fisheries worldwide, with the highest vulnerability occurring in artisanal and industrial purse-seine fisheries. The giant manta ray inhabits tropical, subtropical, and temperate waters around the world and is commonly observed in offshore oceanic zones, as well as in nutrient-rich coastal regions (NOAA, 2025). Juvenile giant manta rays are frequently observed on the east coast of Florida, and it is possible they would overlap with the project area.

<u>Other Protected Marine Mammals</u>

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 ESA 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*). Most of these 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 will be found in the vicinity of the borrow area due to its relatively shallow water depths. The applicant will adhere to all marine mammal safety precautions outlined in the NMFS SARBO (NMFS 2020).

Humpback whales 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.

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, 2024). Pygmy sperm whales commonly strand on southeast Florida beaches; 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 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, 2024).

3.2.2.2 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).

3.2.2.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Appendix 1 contains the BA for the proposed project. 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.

Sea Turtles

The sand placement area and nearshore waters of the PAA are included under both USFWS terrestrial and NMFS neritic (marine) 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 sand placement and nearshore areas in the PAA are located within the proposed green sea turtle nearshore (FL01) and sargassum (NA01) critical habitat marine environments and the proposed terrestrial Critical Habitat Unit FL-02. The Phase 2 borrow area is located within the proposed green sea turtle nearshore (FL01) and sargassum (NA01) marine critical habitat units. 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. Given the large size of designated critical habitat and temporary nature of short-term turbidity elevations during dredging within the Phase 2 borrow area, the proposed project may affect, but is not likely to adversely affect, neritic nearshore reproductive critical habitat within Unit LOGG-N-15 for the loggerhead sea turtle, terrestrial proposed unit (FL-02), nearshore proposed Unit FL01, and proposed sargassum Unit NA01 for the green sea turtle.

Although Kemp's ridley sea turtles may be found offshore of the sand placement 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 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 initial proposed beach project is scheduled for 2025. Construction of the sand placement project is expected to last approximately 3 to 5 months and could 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 7.3 mi (11.6 km) along sand placement areas from R-46 to R-80 (Phase 2 North) and R-94 to R-101 (Phase 2 South) of nesting beach in the project area if the construction schedule overlaps sea turtle nesting season. If the proposed project overlaps sea turtle nesting season, the project may affect nesting and hatchling loggerhead, leatherback, and green sea turtles.

Incidental take for nesting sea turtles and their nests/hatchlings has been authorized by the 2015 USFWS 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 (USFWS, 2015). 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 turtles to nest (USACE, 2015). 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 beach profile. To minimize potential impacts to nesting females and sea turtle hatchlings, the proposed sand placement design incorporates a dipping slope over the crest of the berm, ranging between 1:20 and 1:55 (depending on location) slope over the seaward 100 ft of the berm, effectively lowering the seaward edge of the berm by 3.5 ft. over a nearly 200 ft. distance. Portions of the design also incorporate a flat berm, landward of the berm edge, that extends to the toe of dune. 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. Dredged sand will travel through the dragheads into the dredge's open hopper, putting sea turtles at risk of entrainment. 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 mi from shore, where the material will be pumped directly from the hopper via submerged pipeline to the beach. The pipelines will only be deployed within the four approved pipeline corridors located perpendicular to the shoreline; therefore, it will not disrupt ingress and egress of nesting sea turtles to the beach.

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. 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 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.

Based on project construction with a hopper dredge and potential use of a relocation trawler, 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. This determination was also made in the USACE Integrated Feasibility Study and EA in 2015 (USACE, 2015). Relocation trawling may not be necessary since the project may be constructed outside of sea turtle nesting season in 2025. 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 project design criteria of the 2020 SARBO. 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 P^{3}BO issued on May 22, 2013. A BA has been prepared to fulfill the requirements as outlined under Section 7(c) of the ESA of 1973, as amended (**Appendix 1**).

North Atlantic Right Whale

The waters extending approximately 11 mi offshore the sand placement site overlap the limits of North Atlantic right whale southeast U.S. Coast critical habitat Unit 2 (50 CFR Part 226). The Phase 2 borrow area is approximately 1.2 mi east of the boundary of this designated critical habitat (**Figure 19**). It is possible that right whales could travel within or near the PAA. 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 right whales are most likely 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 yd 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. 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. Based on compliance with the NMFS SARBO and NOAA Vessel Strike avoidance measures, the Flagler County Dune and Beach Nourishment Project may affect, but is not likely to adversely affect, the North Atlantic right whale and its critical habitat.

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 plovers have been recorded in the PAA in low numbers. The most recent piping plover sightings within the PAA as of May 2024 were reported to the eBird database in 2020 (**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 the 3- to 5-month construction period.

Direct placement of sand will result in high mortality of benthic infauna at the sand placement areas. Project activities will sequentially affect up to 7.3 mi of shoreline at the sand placement 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 sand placement. *Donax* spp. populations in the high-density area had not recovered at the 8-month post-construction sampling; but at approximately 2 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 sand placement site would be minimal and short term (less than 2 years). The borrow area sediments have a very low fraction of fine material, averaging 1.91%. 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 authorized Federal Project area is located between the two County (Local) project area reaches from R-80 to R-94. The Phase 1 Federal Project, which includes non-Federal tapers from R-77 to R-80 and R-94 to R-96 was constructed from July to September in 2024; 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 (north of R-46) and immediately south of the south County reach (south of R-101).

Projects adjacent to the PAA include Florida Intracoastal Waterway 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 nourishment interval for the County (Local) project is 6 years. The proposed project is a one-time nourishment event with one future emergency event if needed. The nourishment interval will provide sufficient time for benthic populations to re-establish to pre-nourishment densities and diversity.

Proper monitoring and posting of educational signs may reduce the potential for adverse impacts to nesting shorebirds during project activities. 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^3BO 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 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. 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.

<u>Red Knot</u>

The proposed major modification (USACE Permit No. SAJ-2019-02065 / FDEP Permit No. 0379716-001-JC) is expected to be constructed in 2025 and will last 3 to 5 months. Red knots are rarely observed in the vicinity of the PAA. 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 because 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.

Most infaunal loss will be in the shallow waters of the surf zone. Red knot prey items in wintering and stopover areas along sandy beaches include dwarf surf clams (*Mulinia lateralis*), coquina clams (*Donax* spp.), and amphipod crustaceans (*Emerita* spp.) found in the intertidal zone (USFWS, 2014).

The quality of foraging habitat along the project fill shoreline is expected to be less than optimal for 1 to 2 years following project construction due to sand placement. Long-term, adverse effects to foraging habitat are not anticipated based upon the expected recolonization of *Donax* spp. within 2 years following nourishment. Potential interdependent and cumulative effects on wintering red knot are similar to the effects described for wintering piping plover.

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 EA for this project area in 2015 (USACE, 2015).

Elasmobranchs

Smalltooth sawfish and giant manta rays are mobile species that have a small chance of overlapping with the project area and activities. With the implementation of the *NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions* and 2020 SARBO project design criteria implementation, potential impacts are lessened even further. Any interactions will be reported to the NMFS, per the requirements in the SARBO.

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) and adhere to the project design criteria for the 2020 SARBO, which include aerial surveys to avoid potential encounters with whales.

3.2.3 FISH AND WILDLIFE RESOURCES

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 Society, 2024).

Nearshore Softbottom 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).

Essential Fish Habitat

An EFH analysis can be found in **Appendix 2**. EFH identified in Fisheries Management Plan Amendments of the South Atlantic Fisheries Management Council are summarized in **Table 1 of Appendix 2**. The project borrow area and surrounding 150-m turbidity mixing zone are located within EFH for spiny lobster and snapper/grouper (**Figure 1 of Appendix 2**). The marine water column (ocean side waters) and soft bottom (subtidal) habitats are located within the PAA.

In addition to EFH for each species or group of species, provisions of the Magnuson–Stevens Fishery Conservation and Management Act also include Habitat Areas of Particular Concern (HAPC). HAPC are ecologically important subsets of 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. There are no charted fishing grounds or rock bottom habitats within the footprint of the borrow area. The nearest charted fish havens are located approximately 6 mi to the east, and 4 mi to the south, while the locally known 'Flagler rock' and “Flagler original bottom” areas are situated about 3 mi to the south.

Gopher Tortoise

The gopher tortoise (*Gopherus polyphemus*) was State listed as threatened in November 2007 (68A-27.004, F.A.C.) by the FWC. In 2022, the USFWS determined that the eastern and western populations met the ESA DPS criteria. The service determined that the eastern DPS no longer met criteria for ESA listing (USFWS, 2025). The greatest threat to this species is habitat destruction, fragmentation, or degradation. Urban growth and development, increased vehicular traffic in urbanized areas, invasive exotic plant species’ growth, agricultural practices, and fire suppression are all threats to this species growth and longevity (FWC, 2025). A secondary threat to this species includes the predation of eggs and hatchlings by mammals, birds, and other reptiles. Approximately 80–90% of nests are preyed upon by raccoons, striped skunks, gray fox, and opossum. Predation intensifies the impact to the reproductive viability of the gopher tortoise because the species is known to be long-lived with low reproductive rates. Disease affecting the gopher tortoise population includes upper respiratory tract disease, a form of herpes virus, and irido virus. Impacts to population size by disease are unknown but are thought to be partially responsible for recent declines (FWC, 2025). The gopher tortoise has been identified as a keystone species and is an indicator of habitat degradation in its known habitat range.

Presence/absence surveys conducted in the staging sties for the Federal Project in August 2023 found a total of one active and one inactive borrow (USACE, 2024a). Two burrows were found during a survey for the North Flagler County Dune Restoration

Project between Shelter Cove Drive and Morning Light Circle at the southern end of the project. They were located more than 25 ft from construction and relocation was not required (AES, 2023). Because the gopher tortoise is not federally listed, a formal effects analysis is not required. Proper gopher tortoise relocation techniques will be implemented during construction as needed. Additionally, silt fencing will be implemented, as needed, surrounding the site to ensure that gopher tortoises cannot re-enter this area.

3.2.3.2 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, essential fish habitat (see **Appendix 2**). Continued shoreline erosion and beach profile deflation may reduce the amount of shorebird foraging habitat.

3.2.3.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Beach and Dune Habitat and Nearshore Softbottom Community

Section 3.2.2.3 discussed the effects of the Preferred Alternative on piping plover, which include effects on beach and dune habitat and the nearshore softbottom community.

Essential Fish Habitat

The proposed project includes activities which have the potential to temporarily impact EFH. Temporary impacts to EFH include immediate 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 Phase 2 borrow area. See **Appendix 2** for more details.

3.3 WATER RESOURCES

3.3.1 COASTAL BARRIER RESOURCES

The 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 ineligible for Federal expenditure and financial assistance. This promotes conservation of coastal barriers by restricting Federal expenditure in sensitive habitats. The seaward side of the CBRA unit comprises the entire sand-sharing system, including the beach and nearshore area. The sand-sharing system of coastal barriers is normally defined by the 30-ft bathymetric contour (USFWS, 2024).

CBRA Unit P05A Guana Tolomato Matanzas National Estuarine Research Reserve along the 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 R-12 to R-16 and is also located outside of the PAA. CBRA Unit P07P Gamble Rodgers Memorial SRA is an OPA that lies within the Local Project PAA sand placement area between R-95 to R-101 and immediately south of the Federal Project (USACE, 2015). CBRA Unit P07P North Peninsula State Park, an OPA, is located immediately south of Gamble Rodgers Memorial SRA. The only Federal spending prohibition within OPAs is the prohibition on Federal flood insurance. The project does not impact any system units, so no further action or consultation is needed for CBRA. **Figure 21** shows the limits of OPA Unit P07P with bathymetry survey contours and the Phase 2 borrow area. The borrow area is located approximately 12 mi waterward of the east limits of Unit P07P at the 60-ft bathymetric contour; therefore, there is no Federal action related to BOEM's decision to authorize OCS sand resources.

3.3.1.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would be a continuation of the existing shoreline condition. Loss of frontal dune vegetation and escarpment formation in CBRA Units 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.

3.3.1.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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 Phase 2 borrow area is located approximately 12 mi seaward of OPA Unit P07P (**Figure 21**); therefore, there is no Federal action related to BOEM's decision to authorize OCS sand resources. CBRA Unit P07P is not located within Flagler County's FEMA Category G reaches G-1, G-2, or G-3; therefore, there is no Federal action related to FEMA.

3.3.2 COASTAL ZONE MANAGEMENT ACT

The Coastal Zone Management Act, administered by NOAA, was passed in 1972 to address continued population growth in the coastal zone. This act allows for the management of coastal resources with a goal to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone" (NOAA, 2024c). The Florida Coastal Management Program is a network of statutes that protect Florida's coastal resources. FDEP implements Federal consistency reviews through the Florida State Clearinghouse or its permitting process. An FDEP JCP is required for activities located on Florida's natural sandy beaches that extend seaward of the mean high water line (MHWL), extend into sovereign submerged lands, and are likely to affect the distribution of sand along the beach.

3.3.2.1 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative, no work would occur, and there would be no impact to the coastal zone.

3.3.2.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Under the Preferred Alternative, activity and construction would occur in the coastal zone. The project would restore eroded areas of the shore by replacing beach-compatible sand to a designed beach profile meant to mimic the natural dune system. The applicant obtained a JCP from FDEP (0379716-003-JM) on March 10, 2025, and must adhere to the construction conditions and monitoring requirements. Issuance of this permit constitutes consistency review.

3.3.3 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 PM—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 nourishment activities.

3.3.3.2 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative, there would be no impact to water quality.

3.3.3.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Temporary increases in turbidity in the immediate vicinity of construction will likely 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 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 borrow area dredging should be minimal and less than the turbidity increase along the shore during nourishment (USACE, 2015).

During beach construction, Flagler County will employ best management practices to minimize turbidity, including construction of a shore-parallel sand dike and a minimum setback between pipeline discharge and open water. The sand within the Phase 2 borrow area 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.

3.3.4 FLOODPLAIN MANAGEMENT (EXECUTIVE ORDER 11988)

Executive Order 11988, Floodplain Management (EO 11988) requires Federal agencies to take action to minimize occupancy and modification of the floodplain. Specifically, EO 11988 prohibits Federal agencies from funding construction in the 100-year floodplain unless there are no practicable alternatives. FEMA's regulations for complying with EO 11988 are promulgated in 44 CFR Part 9. Section 402 of the 1986 Water Resources Development Act (33 U.S.C. 701b-12) (Section 14 of the 1988 Water Resources Development Act – Amended) explains that, "before construction of any project for local flood protection or any project for hurricane or storm damage reduction, that involves Federal assistance from the Secretary, the non-Federal interests shall agree to participate in and comply with applicable Federal floodplain management and flood insurance programs." The non-Federal sponsor and communities must be enrolled in and compliant with the National Flood Insurance Program (NFIP) to receive Federal funding for a recommended storm damage reduction project. Flagler County is enrolled in the NFIP and therefore is in compliance. Additionally, the proposed project does not include structures that require Federal flood insurance.

The most recently available Flood Insurance Study for Flagler County, Florida is dated June 6, 2018. The proposed project is within the 100-year floodplain as indicated in the Flood Insurance Rate Map (FIRM) (**Figures 22a-22g**). The segment of beach that is within the Federal Project footprint (Figure A1-A7) is located within a Coastal High Hazard Area, otherwise known as a Zone VE or velocity wave zone (FEMA, 2018). FEMA applies the Eight-Step Decision-Making Process to ensure that it funds projects consistent with EO 11988. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives as the Eight-Step Decision-Making Process. Therefore, the Eight-Step Decision-Making Process has been applied through implementation of the NEPA process (**Appendix 7**).

3.3.4.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not result in the construction or implementation of a beach nourishment project, and therefore the proposed project *would not* have any impacts on the floodplain. Under the No-Action Alternative, however, beach conditions are anticipated to continue eroding over the foreseeable future, thus reducing the available beach width that provides storm damage reduction benefit to upland development immediately landward of the proposed project shoreline and will thus remain at risk from future flooding events. A reduction of the beach width may result in an increased chance of coastal flood risk. 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).

3.3.4.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

The Preferred Alternative will not have adverse effects on the flood plain. 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. Under the Preferred Alternative, the proposed project would restore the beach and dune along the project shoreline, thus increasing the available beach width seaward of upland development. This would thereby provide additional storm damage reduction benefit and reduce the chance of coastal flood risk along the project area. An eight-step decision-making checklist, as required by 44 CFR Part 9 (**Appendix 7**), has been completed for the Preferred Alternative. Based on the review conducted, Alternative 3 would have minor beneficial impacts on the floodplain.

3.3.5 WETLANDS

Executive Order 11990, Protection of Wetlands (EO 11990), requires Federal agencies to avoid, to the extent possible, the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid indirect impacts to wetlands wherever there is a practicable alternative, which may result from federally funded actions. The proposed project beach fill areas and pipeline placement areas are located within estuarine marine deepwater and estuarine marine wetlands. Per the USFWS National Wetlands Inventory, accessed September 3, 2024, the borrow area is not located within designated wetlands (**Figure 23**).

The USEPA delegated FDEP the authority to issue wetland permits in the State of Florida under Section 404 of the CWA on December 22, 2020. The USACE retains jurisdiction and Section 404 permitting authority of wetlands no assumed by FDEP. The two step Jurisdictional Determination requires the USACE to identify and locate aquatic resources, such as wetlands on a property, prior to determining if these areas fall under its jurisdiction per Section 404 of the CWA or Section 10 of the Rivers and Harbors Act.

3.3.5.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not result in any construction activities; therefore, the estuarine and marine deepwater wetlands will not be impacted. No short-term or long-term effects to wetlands are expected.

3.3.5.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

The Preferred Alternative would involve placing sand in the near and foreshore marine wetland environment (**Figure 23**). Temporary increases to turbidity would be expected due to the dredging and sand placement activities; however, no long-term impacts are expected due to the lack of estuarine or marshy wetlands in the project vicinity. Borrow Area 3B is outside of wetland boundaries (**Figure 23**).

Short-term, negative impacts would also be expected to commercial and recreational fisheries near the shoreline and the dredge area, but impacts are expected to be limited to the construction timeframe. Impacts would include higher turbidity in the habitat, causing species to move from the area and reducing the catch available for a short period of time. The long-term impacts to the marine wetlands would be beneficial for preserving habitat and recreational value, as well as reducing rates of sand loss and erosion from future storms. The estuarine and marine deepwater wetlands will maintain current functionality and therefore will not be negatively affected by the Preferred Alternative. Beach fill activities and pipeline placement in the project footprint will not adversely affect wetland habitats. Permits currently exist for a portion of this project from R-64.5 to R-80 and R-94 to R-101. Permit application documents are publicly available on the FDEP OCULUS site. Select “Beaches & Coastal Systems” under Catalog, and “Permitting Authorization” under Profile, then search for “Flagler County” and Application Number *0379716.

3.4 CULTURAL RESOURCES

3.4.1 AESTHETIC RESOURCES

NEPA requires consideration of aesthetic resources as amended and USACE Engineering Regulation 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 **Image 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).

3.4.1.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would result in a reduced, less aesthetically pleasing beach. However, this alternative would not include the temporary appearance of unappealing construction equipment.

3.4.1.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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

3.4.2 RECREATION RESOURCES, PUBLIC SAFETY, AND URBAN QUALITY

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 threatened by 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 fewer 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, 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 1,265,250 by 2050 (USACE, 2015). Flagler County had 963,500 visitors in 2021 according to visitflagler.com.

3.4.2.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative would not temporarily displace beach goers and fisherman or pose a threat to public safety during construction. As the beach continues to erode recreation opportunities and space will decline. The No-Action Alternative would not enhance urban quality.

3.4.2.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

Nourishment of the beach and dune will enhance beach recreation, such as beach access, surfing, shore fishing, and wildlife viewing. 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 sand 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. Preserving recreational opportunities benefits the local economy in Flagler County (USACE, 2015).

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 sand placement to be placed immediately along the beach face, landward of locations where swimming and surfing occur (USACE, 2015). Restoring the beach will increase public safety in the long term, by providing storm protection to coastal infrastructure.

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 Phase 2 borrow area within Borrow Area 3A should not adversely impact recreational and commercial fishermen. The seabed in Borrow Area 3A 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.

Urban quality would be indirectly positively affected by nourishment 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, which also will lower the risk 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).

3.4.3 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).

3.4.3.2 NO-ACTION ALTERNATIVE (STATUS QUO)

Under the No-Action Alternative, there would be no impact to navigation.

3.4.3.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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).

3.4.4 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 was consistent 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 (**Image 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 (USACE, 2015).

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 Phase 2 borrow area is located within Borrow Area 3A. No magnetic anomalies or sonar contacts were found within Borrow Area 3A which includes the Phase 2 borrow area (Panamerican Consultants Inc., 2019). The results were coordinated with the Florida State Historic Preservation Office (SHPO) in August 2019. The 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) (**Appendix 5**).

Panamerican Consultants identified three targets in the Federal nearshore placement area that have the potential to represent significant historic cultural resources. Avoidance of these three targets was recommended; if not possible, the targets were required to be investigated further by archaeological 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, the 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 5**. By email dated September 25, 2019, the Seminole Tribe of Florida-Tribal Historic Preservation Office 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 5)**.

Panamerican Consultants also determined from the 2019 survey results that no paleo features were located. Their report specifically notes that "with respect to the sub-bottom profiler results, the project area revealed a bottom composed solely of unconsolidated marine sediments to the depth of the instrument capability, which was typically at least three to five meters. The surface facies was dominated by coarse sediments (sand). The only subsurface reflectors found in the data were horizontal reflectors representing periods of scour and infill, possibly from hurricanes. No paleofeatures, including relict channels, positive relief features, buried surfaces, or other features were located in the data. No further work regarding potential submerged prehistoric archaeological sites is recommended" (Panamerican Consultants Inc., 2019).

On October 18, 2019, Tidewater Atlantic Research completed a remote sensing survey of the four pipeline corridors for the Local Project from R-64.5 to R-80 and R-94 to R-101 of the original proposal (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 the SHPO for the Local Project in letter dated March 13, 2020—with a no-effect determination for historic properties. A copy of this letter is provided in **Appendix 5**.

Chronicle Heritage conducted an intensive terrestrial and nearshore cultural resources survey that included magnetometer, side scan sonar, and sub-bottom profiling of the area approximately from R-67 to R-35 from April 6-24, 2024. In a letter dated November 25, 2024, from the SHPO, a review of the Florida Master Site File indicated that Resource Group, Steamship Northwestern Maritime Landscape (FL00988) is within project boundaries; however, the opinion of the office is that this resource group will not be affected (**Appendix 5**). Chronicle Heritage reported that project activities in this terrestrial placement area will not affect significant cultural resources, and no avoidance or further work is recommended (Chronicle Heritage, 2024). Chronicle Heritage surveyed the nearshore pipeline zone within the project area for submerged cultural resources and identified eight significant targets recommended for avoidance. Four of these (labeled in the CRAS document as targets 5, 6, 7, and 8) fall within the current project footprint and includes the previously identified Beverly Beach Wreck (8FL0927). Chronicle recommended a 200-ft buffer around targets 6, 7, and 8, and a buffer of 300 ft around target 5/8FL0927. The USACE and BOEM concurred with these recommendations and determined that the proposed undertaking will have no adverse effect to historic properties, and no further work is required. In letter dated June 23, 2025, the SHPO concurred with this determination contingent upon avoidance of the targets with buffers.

FEMA consults with Tribes within Florida under Native American Graves Protection Repatriation Act (NAGPRA). The Miccosukee Tribe of Indians of Florida, the Poarch Band of Creek Indians, and Seminole Nation of Oklahoma were consulted for this project on April 14, 2025, and no comments were received.

3.4.4.2 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative may threaten historically significant architectural properties along the project shoreline by increasing their exposure due to erosion.

3.4.4.3 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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 of the Federal Project completed in September 2024. 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). In a letter dated November 25, 2024, from the SHPO, a review of the Florida Master Site File indicated that Resource Group, Steamship Northwestern Maritime Landscape (FL00988) is within project boundaries; however, the opinion of the office is that this resource group will not be affected (**Appendix 5**).

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

3.4.5 SOCIO-ECONOMIC

3.4.5.1 NO-ACTION ALTERNATIVE (STATUS QUO)

The No-Action Alternative could result in loss of property value and decreased tourism interest as the beach continues to erode.

3.4.5.2 PREFERRED ALTERNATIVE: DUNE AND BEACH NOURISHMENT

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 CUMULATIVE IMPACTS AND INDIRECT EFFECTS

4.1 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. Each phase of the Flagler County's beach projects will be analyzed separately for cumulative impacts. This section will address cumulative impacts for the Phase 2 project.

Cumulative impacts from the 2015 USACE Feasibility Study are summarized in **Table 14** as actions by identifying the past, present, and reasonably foreseeable future condition (50 years) of the various resources that are directly or indirectly impacted by the proposed action and its alternatives. This project was completed in September of 2024. **Table 14** illustrates the Preferred Alternative (Proposed Action) and No-Action Alternative (No-Action) condition (the difference being the incremental impact of the project), and the future condition with any reasonable alternatives (or range of alternatives) (USACE, 2015). In addition to the resources mentioned in **Table 14**, other physical resources—such as noise, air quality, hazardous, toxic and radioactive waste, solid waste, and drinking water—are not expected to have adverse cumulative impacts. Cumulative impacts on air quality will be reduced by predominant onshore winds and general temporal and spatial distance between neighboring projects. Adverse cumulative impacts are not expected to any cultural resources.

Other actions affecting similar resources or ecosystem were considered as part of the evaluation of cumulative impacts pursuant to CEQ's 1997 *Considering Cumulative Effects under the National Environmental Policy Act*. There are active beach nourishment projects in Northeast Florida in Nassau, Duval, and St. Johns Counties. The Federal Project (Phase 1: R-80 – R-94) for which the 2015 USACE Feasibility Study was conducted for was competed in September 2024. 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 nourishment 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 mi north of the project area) and Ponce Inlet (located approximately 27 mi south of the project area) (USACE, 2015).

4.2 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 cats, 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 Dune and Beach Nourishment Project is not expected to increase the potential for new shoreline development along the project area shoreline (USACE, 2015).

5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

5.1 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. Since sand is a finite resource, the use of that sand would be irreversible.

5.2 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 the loss of a type of vegetation due to armoring. Environmental impacts caused by use of the borrow areas for placement on the dune and beach would be somewhat minimal where the sandy bottom is impacted.

6 COMPATIBILITY WITH FEDERAL, STATE, AND LOCAL OBJECTIVES

The Preferred Alternative is compatible with Federal, State, and Local objectives of protecting upland properties while maintaining the natural functions of the 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

FLAGLER COUNTY

BEACH AND DUNE RESTORATION PROJECT

BIOLOGICAL ASSESSMENT
FLAGLER COUNTY
BEACH AND DUNE RESTORATION PROJECT

FLAGLER COUNTY, FL

USACE FILE NO. SAJ-2019-02065 (SP-TMM)
FDEP PERMIT NO. 0379716-001-JC

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April 2025

TABLE OF CONTENTS

List of Figures (Appendix 1)

List of Tables (Appendix 1)

List of Images (Appendix 1)

List of Appendices

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), the Bureau of Ocean Energy Management (BOEM), and the Federal Emergency Management Agency (FEMA) 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 PROJECT LOCATION AND NEED

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 in Appendix 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.

For beach management planning and implementation purposes, the Flagler County shoreline is sub-divided into four project Phases. These “Phases” are represented by specific areas of the Flagler County shoreline and encompass the following shoreline reaches shown in **Figure 1**:

Phase 1: R-80 to R-94 - Authorized Federal Project-Completed
Phase 2 North: R-46 to R-80 (FEMA Category G3) - Flagler County Local Project-Proposed
Phase 2 South: R-94 to R-101 - Flagler County Local Project-Future project
Phase 3: R-14 to R-46 (FEMA Category G2) - Flagler County Local Project-Future project
Phase 4: R-1 to R-14 (FEMA Category G1) - Flagler County Local Project-Future project

In summary, Flagler County's approach to beach management began with construction of the Phase 1 Federal Project (completed in September 2024), which included non-Federal tapers (a small portion of Phase 2) from R-77 to R-80 and R-94 to R-96 funded 100% by Flagler County. The County then intends to construct the reach of Phase 2 from R-46 to R-77 in 2025, for which permits currently exist from R-64.5 to R-80 and R-94 to R-101 (*FDEP 0379716-001-JC & SAJ-2019-02065 (SP-TMM).* This BA will support permitting of the remainder of the reach from R-46 to R-64.5 (contains FEMA Reach G-3 R-47 to R-65) in addition to including an analysis of the entirety of Phase 2 for a wholistic view of the project. The Phase 2 South reach from R-94 to R-101 will be constructed during a future project, not planned at this time.

Following Phase 2, the County intends to develop and construct a project for Phases 3 (contains FEMA Reach G-2) and 4 (contains FEMA Reach G-1) along the northern half of the Flagler County shoreline. The scope and scale of such projects have not been identified at this time but will require additional permitting and agency coordination for project development.

The USACE Hurricane and Storm Damage Reduction Project (Federal Project) is authorized 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 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 is incorporated by reference given the direct overlap of the project footprint with the present evaluation.

The proposed major modification evaluated herein will extend the permitted limits of the Local Project northward from R-64.5 to R-46. The Federal project evaluation included the reaches of the local County project; however, these reaches will 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. The proposed 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 is divided between the Federal and Local Projects. The portion of the borrow area for the Local Project is designated as the Phase 2 borrow area (FCBA in the previous BA) (**Figure 1**).

The existing permitted project is described in FDEP Permit No. 0379716-001-JC and USACE Permit No. SAJ-2019-02065 (SP-TMM). The Biological Assessment presented herein expands upon the previous Final Biological Assessment performed for the Flagler County Beach/Dune Restoration Project dated March 2020 (CEG, 2020).

The purpose of this BA is to analyze new listed species and critical habitats, project activities, and project-related effects not previously considered in the 2015 USACE Feasibility Study or 2020 Biological Assessment (e.g., extension of the Local Project sand placement footprint northward of R-64.5, 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 BA was prepared under contract to Flagler County for adoption by BOEM in support of its decision to authorize use of OCS sand resources.

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; 2023). The list of critically eroded shorelines is updated annually by FDEP. As of July 2023, there are three areas of shoreline, totaling 8.1 miles, that are designated as critically eroded in Flagler County: Marineland (R-1 to R-4, 0.6 miles); Painters Hill (R-50 to R-57, 1.1 miles); and Beverly Beach/Flagler Beach (R-65.2 to R-100.9, 6.4 miles) (FDEP, 2023).

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

Beach and Dune Fill. The Phase 2 project will consist of placement of approximately 1.8 million cubic yards (Mcy) of sand between R-46 and R-77 during the initial restoration with an expected nourishment interval of 6 to 8 years. It is noted that the shoreline between R-77 to R-80 and R-94 to R-96 was restored during the USACE project completed in September in 2024. Likewise, the Phase 2 area from R-96 to R-101 will not be restored at this time. This latter reach will be part of an FDOT wall construction project in 2025. Future renourishments of the Phase 2 reach will likely include all portions of the Phase 2 area, as needed. The initial restoration may require dredging up to about 2.6 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 project construction template includes both dune and beach berm features. The dune will be constructed along the landward limits of the beach berm and seaward of existing bulkheads, revetments, and/or established dune vegetation. The dune will have a crest elevation that typically varies between +15.0 ft and +22.0 ft (NAVD). The dune crest will have a variable width, depending on location, and will thence slope seaward at a slope of 1V:4H to an elevation of +9.0 ft (toe of dune). There will be a flat berm between the toe of dune and the landward edge of berm with a width of approximately 50 ft. The beach berm will have a crest elevation of +9.0 ft and slope gently from onshore to offshore at a slope of 1V:20H to an elevation of +5.0 feet before transitioning to the seaward berm slope of 1V:12H to intersect the existing beach profile at the time of construction. There will be an approximately 2,000-foot taper into the existing beach at the north end between R-48 and R-46, while the south end will tie-in to currently permitted project described in FDEP permit *0379716-001-JC* and USACE permit *SAJ-2019-02065 (SP-TMM)* at approximately R-77.

The scope of the Phase 2 project is based upon consideration of past sand losses, anticipated performance due to differences between the existing beach and borrow area sand, end losses, and the effects of future sea level rise. Future renourishment volumes will depend upon project performance and are expected to require between 600,000 and 700,000 cy. The actual required amount will be based upon project monitoring, and a separate non-competitive negotiated agreement (NNA) will be requested for each future nourishment event.

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 one to two years following construction. The seaward slopes of the equilibrated beach profile will generally replicate those along the existing beach.

Offshore Borrow Area. 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, 6472, and 6522 (**Figures 1**, **2a/b**). 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 an NNA authorizing use of the sand source areas at the request of Flagler County.

The study area for 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 study area for the Local borrow area, within Borrow Area 3A occupies roughly 1,545 acres (625 hectares) of seabed (**Figure 2a**). Existing water depths within the Phase 2 borrow area geotechnical study area typically range from -50 to -66 ft NAVD88. The complete Phase 2 borrow area is estimated to contain on the order of 18-21 Mcy of accessible, beach-compatible material.

Initial construction of the Phase 2 reach by Flagler County will utilize the Proposed Phase 2 Borrow Area as shown in **Figures 2a/b**. Excavation will begin with the "Primary" area, and then proceed to the "Secondary" area as necessary (shown in **Figures 2a/b**). It is anticipated only the Primary area will be needed for initial construction, and the Secondary area will be accessed if the Contractor has exhausted the Primary area. A maximum post-cut seabed elevation at -64.5 ft (NAVD88) has been established for both the Primary and Secondary areas. The Primary area is estimated to contain approximately 2.9 Mcy of beach-compatible material above -64.5 ft, and the Secondary area 500,000 cy, for a total of approximately 3.4 Mcy. The expected renourishment interval is six (6) years.

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

Geotechnical investigations have determined that the offshore borrow area sand is compatible with the existing beach and will provide suitable nesting substrate for marine turtles and shorebirds. Geological data used for borrow area selection and design will be provided to BOEM under separate cover (OAI, 2024).

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

For the purposes of this BA, the Project Action Area (PAA) is defined in this document 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 (Phase 2 borrow area) (320 acres of 2,466 total acres available in Borrow Area 3A as defined by the USACE in 2015), the 7.3-mile (11.6 km) long beach fill placement area from R-46 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. A portion of the beach fill area is currently permitted between R-64.5 and R-80, and from R-94 to R-101 (Flagler/Volusia County line) (USACE Permit No. SAJ-2019-02065 and FDEP Permit No. 0379716-001-JC).

The project will utilize staging and beach access areas at Varn Park (north end of the project, approximately R-48 to R-49) and Beverly Beach (south end of the project, R-65). Varn Park (**Image 1a/b**) will be the primary staging and access area for the project because of its size, and the Beverly Beach (**Image 2a/b**) access is anticipated to be a light access area for the southern end of the project. Both accesses are located in areas that have been previously disturbed during beach and dune restoration projects.

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 typically fronted by a line of dunes which range in height from 10 to 23 ft Mean Sea Level (MSL). The dunes have relatively steep faces and are composed primarily of coquina shell hash and fine quartz sand (USACE, 2015). There are 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.

There are no SAV habitats or hardbottom/reef resources in the PAA. The southern extent of hardbottom exposure north of the project fill area was mapped by marine scientists in May 2024. The closest exposed hardbottom to the north of the project is approximately 1,050 ft north of the ETOF around R-45 (**Figure 4**).

Intermittent exposure of beach outcrops has been reported north of R-50 along the Flagler County shoreline (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 5**). 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 DCA study. Georectified areas from the 2011 survey were resurveyed with higher resolution side scan sonar. No hardbottom features were found during this survey; however, ground-truthing of signatures by divers was not performed (USACE, 2015 and 2024).

A high-resolution aerial photography and nearshore side scan survey of the Flagler County shoreline was conducted in June 2019. The 2019 side scan survey included the four pipeline corridors. Divers from Coastal Eco Group Inc. (CEG) conducted fifteen (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 6**). 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, both 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 (**Image 3**), and sand and muck in the offshore areas in the pipeline corridors.

The April 2024 side scan sonar imagery by Arc Surveying, Inc./Sonagraphics Inc. has similar features to the 2019 side scan survey. These features continue north approximately 920 ft. and 2,100 ft. from shore through R-35. **Figure 7** shows several of these features in comparison to the July 2019 verification dives on similar side scan features from June 2019. No hardbottom was found during the July 2019 verification dives on similar signatures to the April 2024 side scan sonar survey (**Figures 7** and **8**). All features beyond 150 ft. in the April 2024 side scan survey do not represent consolidated hardbottom and likely consist of sand/shell hash mounds. Hardbottom was observed on verification dives in May 2024 near R-44 and R-45 in the nearshore environment in approximately 4 to 8 ft. of water. The side scan signature of this hardbottom is very different from the offshore signatures (**Figure 9**). The southern extent of this hardbottom was mapped by CEG marine scientists in May 2024 and is approximately 1,050 ft. north of the ETOF taper and 2,930 ft. north of the nearest full fill sand placement station at R-48. Observations of shoreline behavior suggest bi-modal transport with a moderate bias towards net southerly transport which places the project downdrift of the hardbottom resources. The proposed project has been designed to avoid potential impacts to nearshore hardbottom, and hardbottom impacts will be avoided in future phases.

While FDOT and private interests have significantly armored sections of the 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 north of the PAA which placed approximately 6 cy/ft of sand above the MHW line. Portions of the shoreline in the PAA contain coastal armoring (seawalls). Recent beach conditions at Varn Park and Beverly Beach are shown in **Images 4** and **5**.

The project fill area extends along 7.3 miles [6.0-miles (9.7 km) between R-46 to R-77 and 1.3 miles (2.1 km) between R-94 to R-101] 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). **Image 6** 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).

The proposed Flagler County Beach and Dune Nourishment Project fill area encompasses approximately 90 acres of dry, sandy beach; 83 acres of intertidal flat/surf zone; and 145 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 120 acres of shallow, subtidal habitat that may 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 84 acres (includes 17 additional acres proposed from R-64.5 to R-46) of intertidal habitat and 583 acres (includes 280 additional acres proposed from R-64.5 to R-46) of shallow subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 667-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. These acreages represent the total fill area for the previously permitted areas between R-64.5 and R-80, and from R-94 to R-101 as well as the additional proposed modification area from R-64.5 to R-46.

The proposed modification beach fill area from R-64.5 to R-46 encompasses approximately 40 acres of dry, sandy beach; 16 acres of intertidal flat/surf zone; and 77 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 54 acres of shallow, subtidal habitat that may be gradually affected by beach fill equilibration. The 150-m turbidity mixing zone at the beach fill site in the additional proposed modification fill area from R-64.5 to R-46 encompasses an overall total of approximately 17 acres of intertidal habitat and 280 acres (of shallow subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 297-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 320-acre offshore borrow area encompasses 553 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 and 2024). 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 and Section 3 of the Final Supplemental EA dated January 2024 (USACE, 2015 and 2024).

The alternatives analysis in the USACE Feasibility Study also showed that the unarmored sections of the beach with SR A-1-A 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-46 to R-80 and R-98 to R-101).

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 6.5 ft (2 m). Maximum dredged depths may be on the order of 8 ft to 10 ft. Relocation trawling is not currently proposed. 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 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 listed species and critical habitat with the potential to occur within the vicinity of the PAA. State imperiled shorebirds are included in this section due to overlapping requirements of many shorebirds and to simplify project review for FDEP/FWC. **Section 3.0** is limited to a review of project-related effects on federally listed species in compliance with the ESA.

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 2024. Review of the eBird database records from 2014 through 2024 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 and none since then through June 2024. 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 2024**,** 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 will 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 April 1, 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, 2019). 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.

<u>West Indian Manatee (*Trichechus manatus*)</u>
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.

<u>Giant Manta Ray (*Manta birostris*)</u>
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 project design criteria of the 2020 SARBO which covers the giant manta.

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. The Queen Conch (*Aliger gigas*) was listed as threatened under the ESA in February 2024 by NOAA Fisheries. This species is eliminated from further consideration as the northern range in Florida is considered the St. Lucie Inlet well south of the PAA (FWC, 2024). 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
- Proposed Terrestrial Critical Habitat Unit FL-02 for the green sea turtle
- Proposed Nearshore Marine Critical Habitat Unit FL-01 for the green sea turtle
- Proposed Sargassum Marine Critical Habitat Unit NA01 for the green 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*)
- Queen Conch (*Aliger gigas*)

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 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 PAA. 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 (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 State Recreation Area (SRA) at R-95 (USACE, 2015). **Figure 10** shows eBird records of piping plovers from January 1, 2014 through May 6, 2024 between R-46 and R-101 (this range includes the Federal nourishment project area being pursued under a separate permit by the USACE). There were only two years, 2015 and 2020 where piping plovers were recorded. In 2015, four birds were reported on February 8th, and one bird reported on September 28th. In 2020, sightings were reported on October 13th and December 27th. Of these sightings, three of them occurred at Gamble Rogers State Park. The typical wintering stopover for piping plover lasts from October to March (Doonan et. al, 2006).

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 10** shows eBird records of red knots from January 1, 2019 through May 2, 2024 between R-46 and R-101 in the project fill areas (this range includes a previously permitted federal project not a part of this project). There were three red knot sightings reported to the eBird database during this time, one on October 13, 2020, one on March 29, 2021, and one on December 19, 2021. 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 13,413 breeding adults based on surveys from 2019 through 2021 (FWC, 2022). 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 in the middle of April and continues through August (FNAI, 2010). Least tern only nest on rooftops in Flagler County. Rooftop nests reported to the Florida Shorebird Database (FSD) between 2011 and 2020 are presented in **Table 2**. There have been no active nests reported to the FSD since 2020. Least tern locations in the PAA from January 1, 2019 through May 2, 2024 are shown in **Figure 11**. Since these birds appear to nest only on rooftops near the PAA the least tern will not be impacted by project construction.

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. The Florida black skimmer population is estimated to have 6,832 breeding adults based on surveys from 2019 through 2021 (FWC, 2022).

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). 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 2011 through April 2024. Black skimmer sightings recorded in the eBird database from January 1, 2019 through May 2, 2024 are shown in **Figure 12**. Most sightings have occurred from January through March, outside of nesting season.

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 2023 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 three 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 County Beaches (South) starts at Jungle Hut Road to 23rd St. N at Beverly Beach/Flagler Beach Line and is approximately 9.7 km. The FWC index beach identified as Flagler Beach is 9.6 km and 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 3** and **Figure 13** present nesting data for the entire Flagler County shoreline.

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 PAA 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 14**).

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 439.9 (SE ± 17.7) nests/year (~20.8 nests/km) along 21.1 km of study area (Jungle Hut Road to the Flagler/Volusia County line) (**Table 4**). 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 County Beaches South, Flagler Beach and Gamble Rogers SRA) is variable over the 10-year period (**Table 4**). However, the 10-year average (61% nesting success) is slightly higher than the typical 1:1 ratio of nests to false crawls for loggerhead sea turtles. Nesting success is similar between Flagler County Beaches (South) and in Gamble Rogers SRA (65% and 66% respectively) than in Flagler Beach (55%). Of the 10-year monitoring period shown in **Table 4**, Gamble Rogers SRA had the highest nesting success in 2014 (91%) and the lowest in 2023 (50%). Flagler Beach had the highest nesting success in 2016 (76%) and lowest in 2020 (47%). Flagler County Beaches (South) had the highest nesting success in 2017 (80%) and the lowest in 2023 (42%).

Hatchling success data in Flagler County are shown in **Table 5**. Between 2011 and 2018, hatchling success ranged from 45% (2016) to 87% (2017).

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 from 56,016 nests in 2019, 26,656 nests in 2020, 32,680 in 2021, 37,028 in 2022, and in 2023 a record high in Florida with 77,040 nests [FWC/Florida Wildlife Research Institute (FWRI), 2024]. 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).

Green sea turtles in the Flagler County area are members of the North Atlantic DPS. 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). On July 19, 2023, NMFS proposed critical habitat for the green sea turtle in nearshore areas from the MHWL to 20 m depth along both coasts of Florida (Unit FL-01) (**Figure 15**, FR 2023-14109). These areas contain reproductive, migratory, and benthic foraging/resting essential features. Proposed critical habitat also includes *Sargassum* habitat (Unit NA-01) from 10 m depth to the outer boundary of the U.S. Exclusive Economic Zone in the Gulf of Mexico and Atlantic Ocean (**Figure 15**) (USFWS, 2023).

USFWS proposed specific areas in the terrestrial environment as critical habitat for the green sea turtle on July 19, 2023 (FR 2023-14225). Unit FL-02 consists of approximately 307 ac (124 ha) of Atlantic Ocean shoreline that includes beach, dune, and coastal vegetation (**Figure 15**). The unit extends from the northern boundary of Washington Oaks Gardens State Park in Flagler County to the southern boundary of North Peninsula State Park in Volusia County and includes lands from the MHWL to the toe of the secondary dune or developed structures. Lands within this unit include approximately 77 ac (31 ha) in State ownership, 61 ac (25 ha) in local government ownership, and 169 ac (68 ha) in private/other ownership.

The beach and nearshore areas in the PAA are located within the proposed nearshore and Sargassum critical habitat marine environments and the proposed terrestrial critical habitat Unit FL-02. The offshore borrow area is located within the proposed nearshore (FL01) and *Sargassum* (NA01) marine critical habitat units.

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 three index beaches, combined from 2014 through 2023, is approximately 110.2 (SE ± 9.0) nests/year (~5.2 nests/km) along the 21.1 km of study area (Jungle Hut Road to the Flagler/Volusia County line). Nesting success for *C. mydas* was highly variable over the 10-year period between 2014 and 2023. The lowest nesting success for Flagler County Beaches (South) was observed in 2018 (43%), and the highest was observed in 2015 (89%). The lowest nesting success for Flagler Beach was observed in 2014 (27%), and the highest was observed in 2016 (100%). The lowest nesting success for Gamble Rogers Memorial SRA was observed in 2018 (0%), and the highest was observed in 2015 (100%) (**Table 6**). Overall nesting success was equal between each FWC index beach (70% for Flagler County Beaches South and Flagler Beach and 71% for Gamble Rogers SRA). Hatching success from 2011 through 2018 ranged from 72% in 2011 to 95% in 2018 (**Table 7**).

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. Green sea turtles may also utilize the proposed nearshore and terrestrial critical habitat areas. 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.

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 2023, only one (1) Kemp's ridley sea turtle nest was laid in the PAA. 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. Swimming Kemp's ridley sea turtles might 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

Forty leatherback sea turtle nests were recorded by FWCC from 2014 through 2023 (**Table 8**). Between 2011and 2018, Volusia/Flagler turtle patrol documented the earliest nest on April 18 in 2011, and the latest nest on July 6, 2015. The high nesting success rates shown in **Table 8** are due to the low number of nests. Hatchling success for the leatherback sea turtle between 2011 and 2018 is shown in **Table 9;** it ranges from 13% in 2013 to 93% in 2017.

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 360 individuals in the Atlantic in 2024 (NOAA, 2024a). The eastern Atlantic population is nearly extinct (NMFS, 2005). In August 2017, an Unusual Mortality Event (UME) was declared by NMFS with 40 documented mortalities occurring since 2017. There has been one North Atlantic Right Whale mortality recorded in Florida since the declaration of the UME. The carcass was found near St. Augustine on February 13, 2021. Most mortalities recorded during the UME have occurred off the coast of New England and Canada (NOAA, 2024b).

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 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 northwestern 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 16**). The offshore borrow area for the project is not located within critical habitat for the North Atlantic right whale.

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 2021 are shown in **Figure 17**. 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 18**). The sightings span from December 7 through March 29 for the period of January 1, 2014 through March 6, 2024. 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.

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. The most recent piping plover sightings within the PAA as of May 2024 were reported to the eBird database in 2020 (see **Section 2.1.4**). Between 2014 and 2019, there are only two records with a total of five individuals reported to the eBird database, the first was on February 8, 2015 and the second was on September 28, 2015.

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.

The migratory and wintering period for piping plover in Florida is July 15^{th} through May 15^{th}. Construction for the proposed nourishment project may 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 a 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 7.3 miles of shoreline at the beach fill site during initial fill placement and subsequent nourishment events. 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). These impacts are expected to last one to years following nourishment. Softbottom monitoring following the 2011 South Amelia Island Beach Nourishment Project in northeast Florida documented full recovery of *Donax* spp. populations at approximately two years after nourishment with populations exceeding pre-construction abundances along high-density areas of the beach. 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 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 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 authorized Federal project area is located between the two County (Local) project area reaches from R-80 to R-94. The Phase 1 Federal Project, which included non-Federal tapers from R-77 to R-80 and R-94 to R-96, finished construction in September of 2024 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 (north of R-46) and immediately south of the south County reach (south of R-101).

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 6 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 County intends to construct the reach of Phase 2 from R-46 to R-77 in 2025; FDEP and USACE permits currently exist for the shoreline between R-64.5 and R-80 (FDEP Permit No. 0379716-001-JC and USACE Permit No. SAJ-2019-02065 (SP-TMM). Construction will last 3 to 5 months. The County agrees to implement the Conservation Measures agreed to by the Corps in the USFWS P^3BO for all projects located in non-optimal piping plover habitat including survey guidelines for non-breeding shorebirds

(USFWS, 2013). These measures include 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. 0379716-001-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 the Federal and Local Projects as permitted in 2015 [FDEP 0379716-001-JC & SAJ-2019-02065 (SP-TMM)] (USACE, 2015 and 2024).

3.2 RUFA RED KNOT

3.2.1 Direct Effects

The proposed major modification (USACE Permit No. SAJ-2019-02065 / FDEP Permit No. 0379716-001-JC) is expected to be constructed in 2025 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 foraging and/or roosting activities 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.

Most infaunal loss will be in the shallow waters of the surf zone. Prey items for red knot in wintering and stopover areas on sandy beaches include dwarf surf clams (*Mulinia lateralis*), coquina clams (*Donax* spp.) and amphipod crustaceans (*Emerita* spp.) found in the intertidal zone (USFWS, 2014a).

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^3BO 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^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 and 2024).

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) and the proposed terrestrial and marine critical habitat areas for the green sea turtle (Terrestrial Critical Habitat Unit F-02, Marine Nearshore Critical Habitat Unit FL-01, and Sargassum Critical Habitat Unit NA-01). 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 be constructed using a trailing suction hopper dredge. Flagler County agrees to adhere to all applicable Project Design Criteria (PDC), Terms and Conditions, and Reasonable and Prudent Measures in the 2020 NMFS SARBO.

3.3.1 Direct Effects

The initial proposed beach project is scheduled for 2025. Construction of the beach fill project is expected to last approximately 3 to 5 months and may be completed during 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 will be constructed using a hopper dredge. Dredged sand will travel through the dragheads into the dredge’s open hopper; most of the effluent will drain out the overflow structures, putting sea turtles at risk of entrainment. 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, where the material will be pumped directly from the hopper via submerged pipeline to the beach. The pipelines will only be deployed within approved pipeline corridors located perpendicular to the shoreline; therefore, it will not disrupt ingress and egress of nesting sea turtles to the beach.

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. 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 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.

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.

<u>Nest relocation</u>
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.

<u>Missed Nests</u>
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 10 and **Figure 19** show recent sediment grain characteristics of the proposed Phase 2 borrow area 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 sand 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 area 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 composite borrow area sediments exhibit a mean grain size of 0.27 mm, a median grain size of 0.22 mm and a sorting value (σ) of 1.03 Φ. 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 poorly graded (or well sorted) samples in which the sediment grains are similarly sized; while σ>1.0 is well graded (poorly sorted), in which sediment grains tend to vary more in size.

Visual shell content between the native beach (17.3%) and borrow area (24.3%) sediment are relatively similar. Shell content is greater along both the subaerial beach and intertidal zone than the offshore profile portions (as described above) since the shell hash tends to be deposited along the beach face. The native beach color can be described with a Munsell color as having Hue of 10YR, Value that ranges from 7 to 8, and Chroma of 1. The borrow area Munsell color (moist) is generally described as a Hue of 10Y, with Values that ranges from 5 to 7, and Chroma of 1. Some samples with a Value of 6 were dried and found to have a Value of 7 after drying. Accordingly, as is typical with most beach fill projects where borrow are sediments are darker when moist and first placed on the beach, the materials lighten through weathering and mixing with the native beach sediment.

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).

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 PAA appears to be higher than average for Florida’s beaches with nesting success exceeding 50% at Gamble Rogers SRA from 2014 through 2023 (see **Table 3**). The lowest nesting success in Gamble Rogers SRA (52%) was in 2023, and the lowest nest abundance (30 nests) occurred in 2014 and 2018 while the highest nesting success was in 2014 (91%). Nesting success on Flagler Beach is generally lower than Gamble Rogers but is still higher than average with only one year between 2014 and 2023 lower than 50% (2018). The lowest nesting success on Flagler Beach (49%) was in 2018, and the highest nesting success was in 2017 (71%). Geotechnical evaluation of the Phase 2 borrow area 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 projects 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. To minimize potential impacts to nesting females and sea turtle hatchlings, the proposed beach fill design incorporates a dipping 1:20 slope over the seaward 80 feet of the berm. 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.

<u>Swimming</u>

Flagler County shall comply with the *NMFS Sea Turtle and Smalltooth Sawfish Construction Conditions (***Appendix 2**), NOAA Vessel Strike Avoidance Measures (**Appendix 3**), and Terms and Conditions of the 2020 SARBO (NMFS, 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).

<u>Nesting</u>

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.

<u>Sand Compaction/Mechanical Tilling</u>

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 FWC 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.

<u>Escarpments</u>

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 FWC 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 FWC 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 (FWC) marine turtle permit holder for the project area.

3.3.5 Recommended Determination

Incidental take of nesting sea turtles may occur on up to 38,500 linear feet (7.3 linear miles) 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 and 2024). The proposed project may also affect terrestrial critical nesting habitat for the loggerhead sea turtle within Critical Habitat Unit LOGG-T-FL-03, and the proposed terrestrial critical habitat for the green sea turtle within Critical Habitat Unit Fl-02.

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 (USFWS, 2013). 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 turtles to nest (USACE, 2015 and 2024).

The project will be constructed using a hopper dredge. Dredged sand will travel through the dragheads into the dredge's open hopper; most of the effluent will drain out the overflow structures, putting sea turtles at risk of entrainment. 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, where the material will be pumped directly from the hopper via submerged pipeline to the beach. The pipelines will only be deployed within approved pipeline corridors located perpendicular to the shoreline; therefore, it will not disrupt ingress and egress of nesting sea turtles to the beach. 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. 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 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.

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 2020 SARBO (NMFS, 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, and the proposed marine nearshore and Sargassum critical habitat areas, Units FL-01 and NA-01 for the North Atlantic DPS. 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). The proposed nearshore critical habitat for the green sea turtle consists of all nearshore areas from the MHWL to 20 m depth and contain reproductive, migratory, and benthic foraging/resting essential features. The proposed *Sargassum* habitat contain surface-pelagic areas from 10 m depth to the outer boundary of the U.S. EEZ and contain surface-pelagic foraging/resting essential features. Given the large size of designated critical habitat and temporary nature of short-term turbidity elevations during dredging of 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 and the proposed marine nearshore and Sargassum critical habitat units FL-01 and NA-01.

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. Project construction may 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 a minimum distance of 1,500 ft. between a hopper dredge and 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 broadband, 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

Construction may overlap female right whale migration to and from calving grounds. Right whales may be present while the dredge is transiting to and from the borrow area to the pipeline pump out sites. Dredging operations are not expected to impact the primary biological features of the critical habitat designation but do present a strike risk to migrating females and their calves. This risk will be mitigated through adherence to the 2020 SARBO PDCs. Conservation measures for sea turtles will also benefit the North Atlantic right whale. The Contractor will be required to implement the NOAA Vessel Strike Avoidance Measures (**Appendix 3**). 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 30.

In addition to all other applicable avoidance PDCs outlined in the 2020 SARBO, the PSO PDCs in Appendix H of the 2020 SARBO will be implemented, including minimum vessel distances from right whales, PSO observer coverage for 100% monitoring on hopper dredging and relocation trawling, and reporting requirements. The 2020 SARBO requires a minimum distance of 1,500 ft. between a hopper dredge and right whale. Flagler County will implement the avoidance measurements in the North Atlantic Right Whale Conservation Plan during the migration and calving season from November 1 through April 30. This plan includes systems to detect the presence of whales, alert vessels operating in the area, and avoidance and minimization measures for projects covered under the 2020 SARBO that reduce the risk of a vessel strike if a whale is detected in the area.

For vessels over 65 ft in length, when a whale is observed or reported within 38 NM of dredge or support vessels, vessels must slow to 10 knots or slowest safe navigable speed for 36 hours or until the next North Atlantic right whale survey when no whales are observed, whichever is shorter. For vessels 33 to 65 ft in length, vessels must slow to 10 knots or slowest safe navigable speed until the next North Atlantic right whale survey when no whales are observed.

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*), Proposed Green sea turtle Critical Habitat FL-02, 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 2020 SARBO 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^3BO 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
- Proposed Nearshore and *Sargassum* Critical Habitat Units FL-01 and NA-01 for the green sea turtle

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BA APPENDIX 1

FIGURES, TABLES, AND IMAGES

LIST OF FIGURES, TABLES AND IMAGES

FIGURES

TABLES

IMAGES

Flagler County Dune/Beach Nourishment Project Biological Assessment figures, tables, and images in order of appearance.

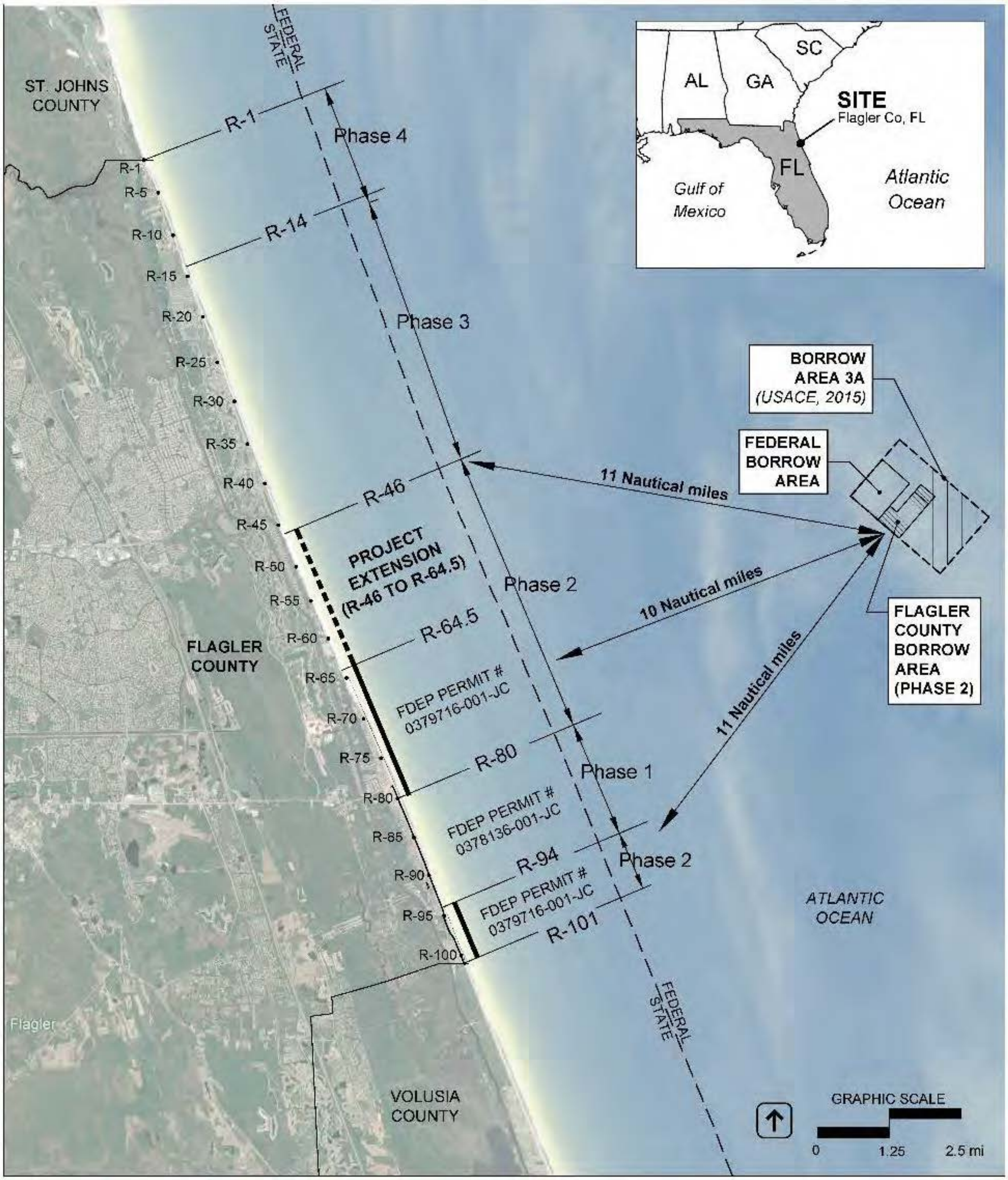


Figure 1. Project location map – Flagler County Beach and Dune Restoration Project. Shown are the limits of the four Flagler County beach management Phases.

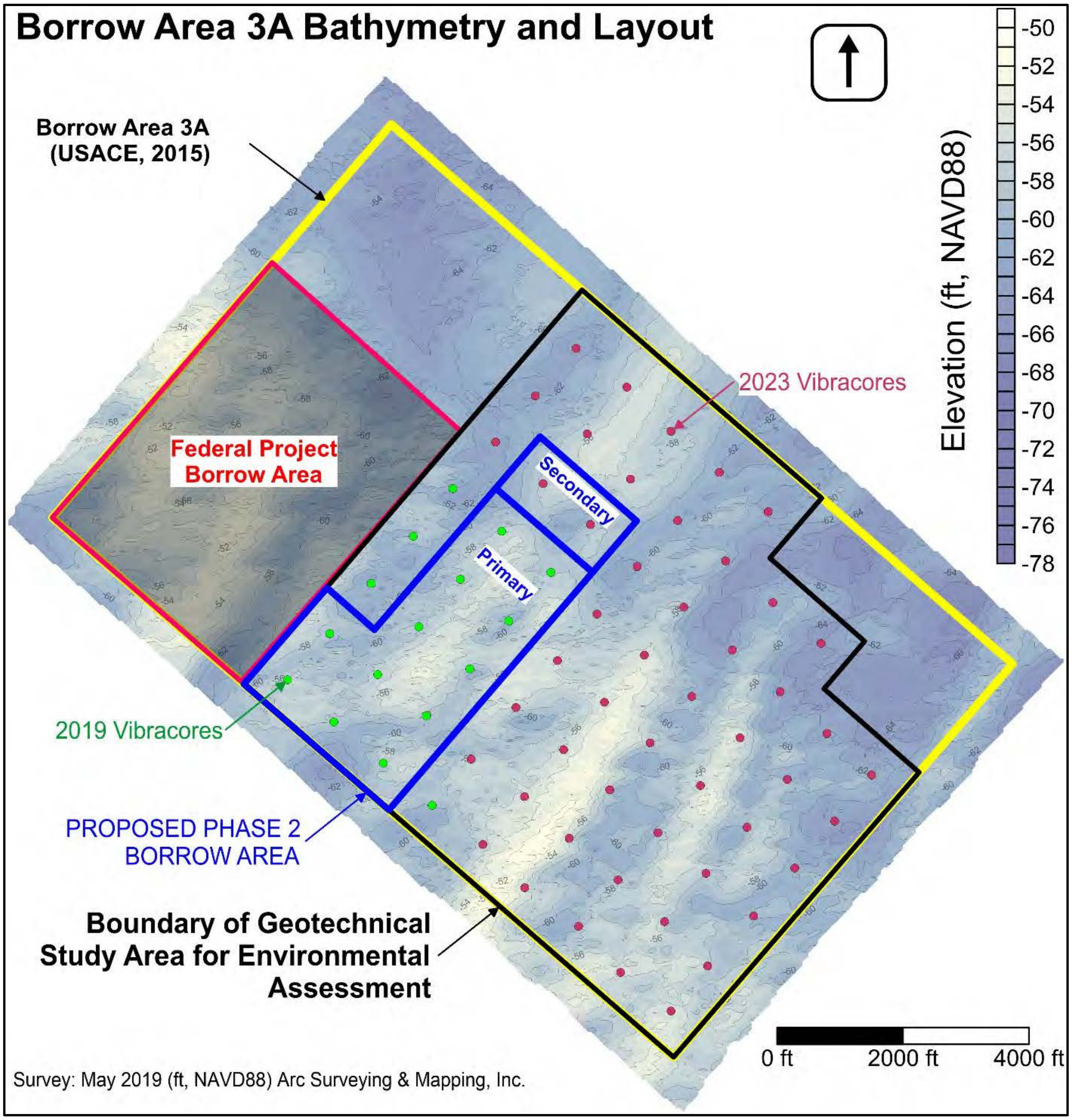


Figure 2a. Proposed Phase 2 Borrow Area location within 3A and relative to Federal borrow area. Seafloor elevations and 2019 and 2023 vibracore locations shown. The proposed Phase 2 Borrow Area occupies about 320 acres, the Federal borrow area occupies roughly 490 acres, and the overall Borrow Area 3A occupies about 2,465 acres. The Phase 2 borrow area is comprised of PRIMARY and SECONDARY areas.

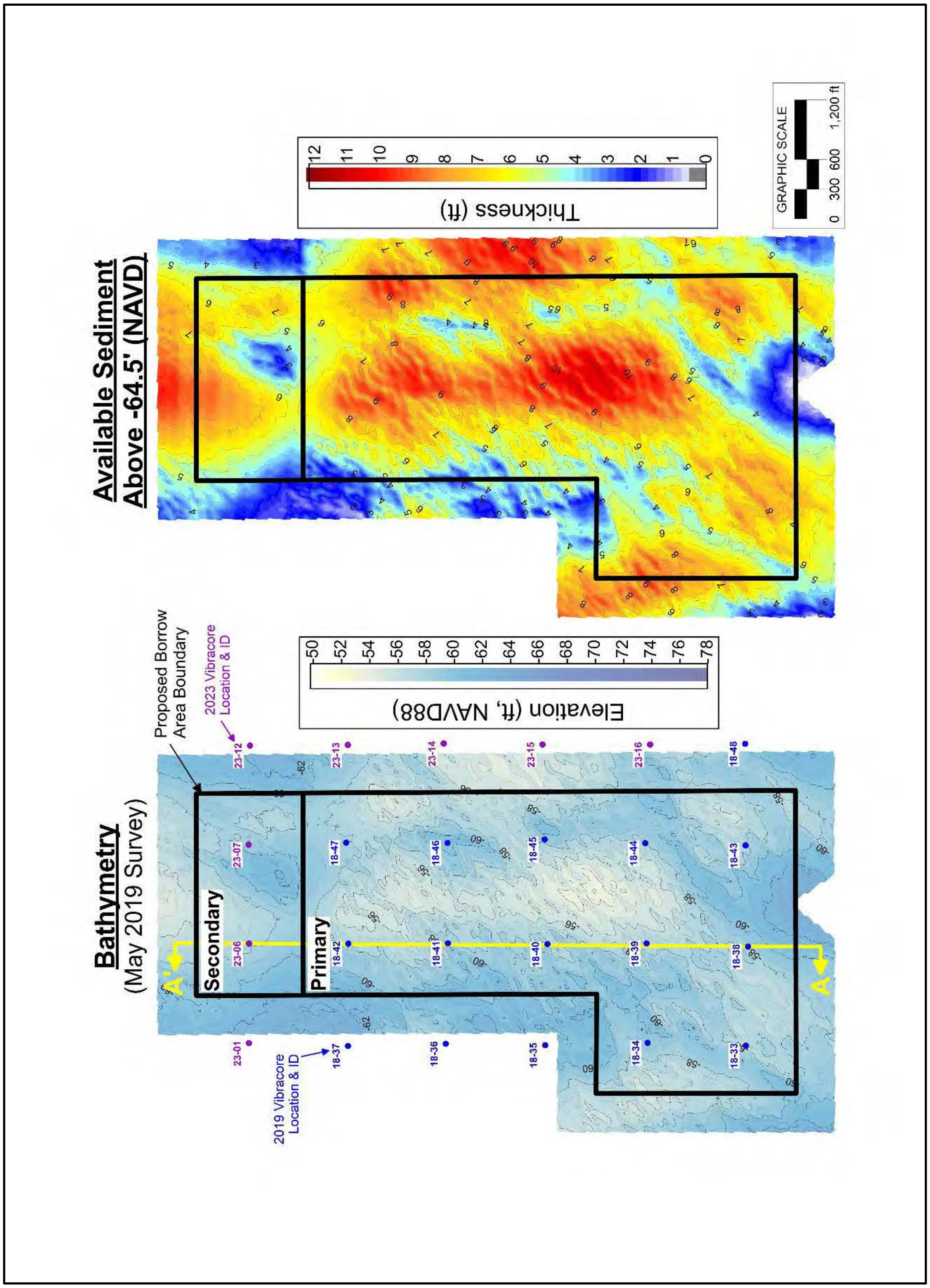


Figure 2b. Bathymetry of the proposed Phase 2 borrow area (left) and sediment layer thickness in feet above -64.5 ft, NAVD88 (right). Bathymetric contours are represented by the May 2019 multibeam survey (Arc Surveying & Mapping, Inc.).

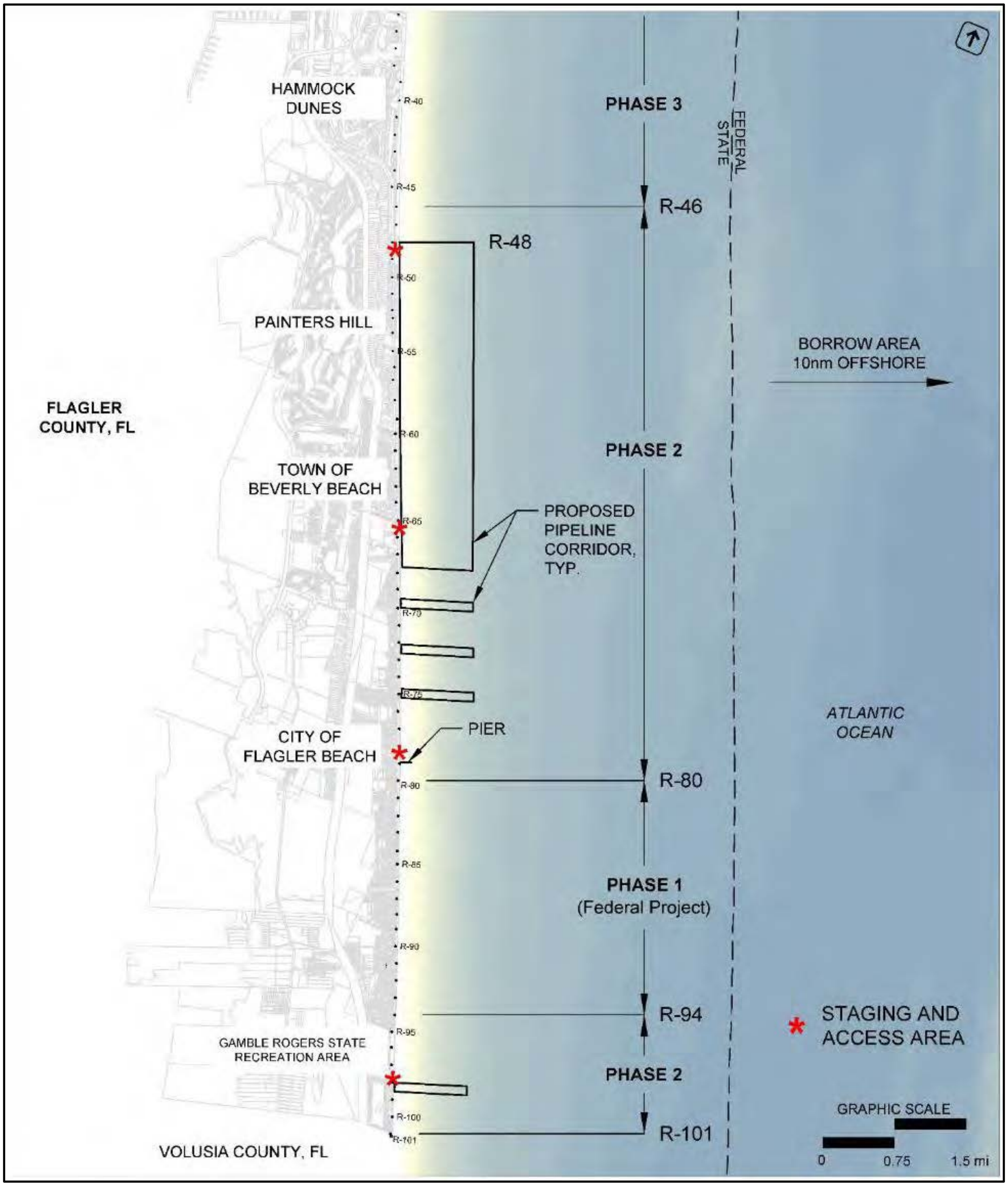


Figure 3. Pipeline corridors and staging and access areas for the Flagler County Local project.

Image 1a. Primary construction staging and access area at Varn Park along the north end of Painters Hill.

Image 1b. Varn Park approximate construction staging and access area, looking north. Photo date: 26 April 2024.

Image 2a. Construction staging and access along the southern end of Beverly Beach.

Image 2b. Beverly Beach approximate construction staging and access area, looking north. Photo date: 26 April 2024.

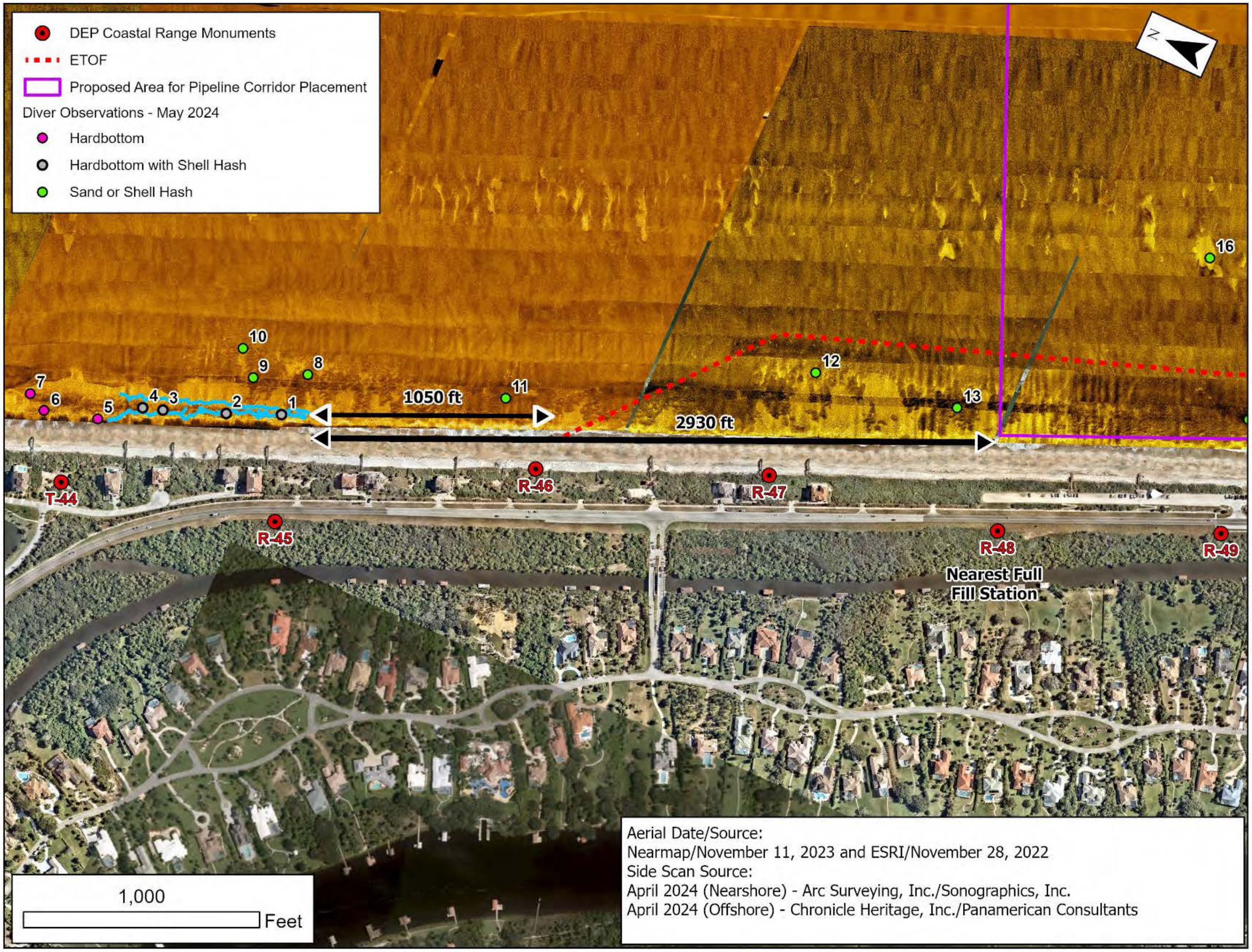


Figure 4. Southernmost extent of exposed nearshore hardbottom mapped by CEG divers in May 2024 and overlaid on April 2024 side scan imagery.

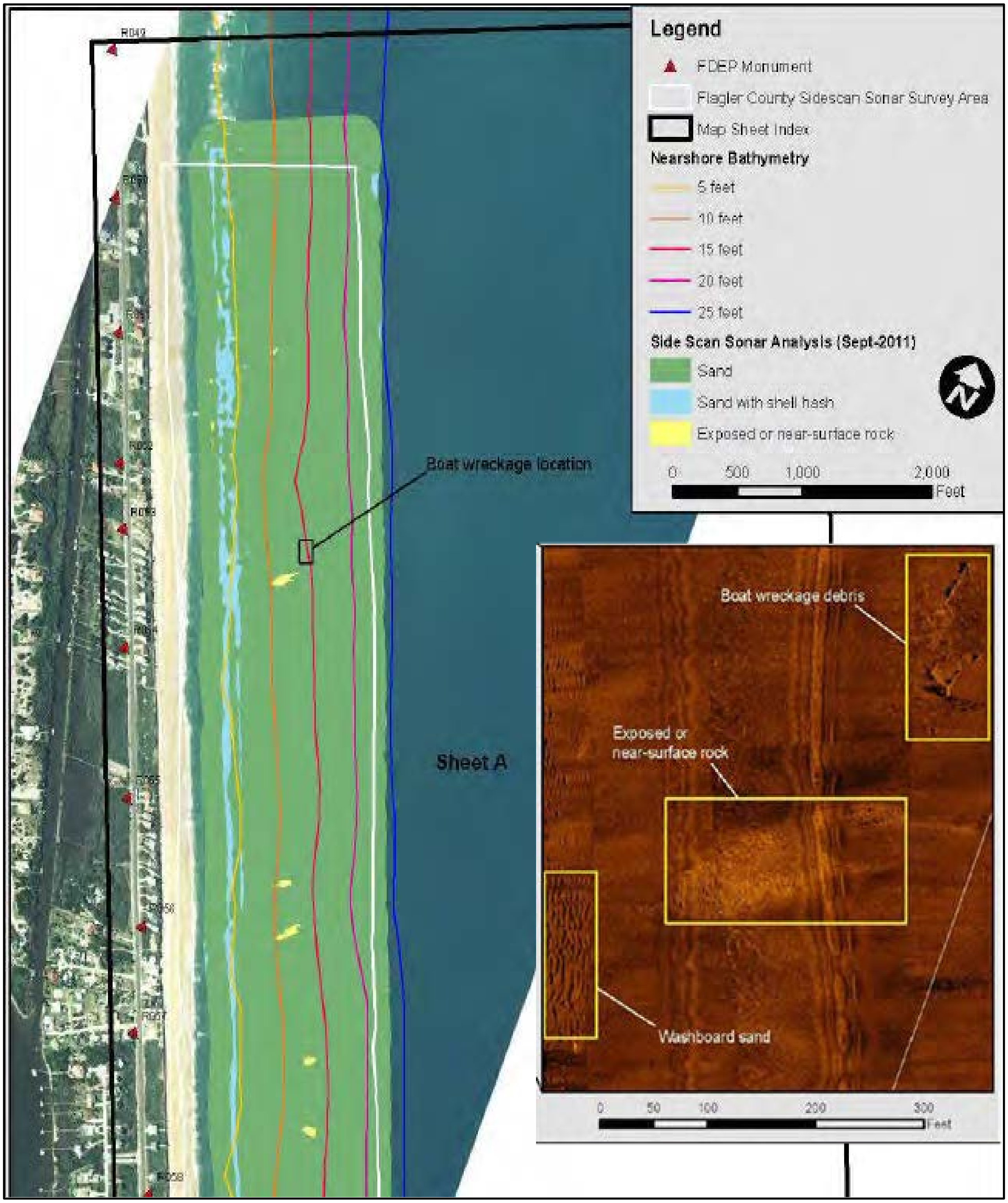


Figure 5. Left: Map of "presumed rock" features from 2011 side scan sonar (isolated, shore-perpendicular yellow features). Right: Close-up of 2011 side scan sonar showing boat wreckage and feature interpreted as "presumed exposed rock" (Source: Dial Cordy and Associates, 2011).

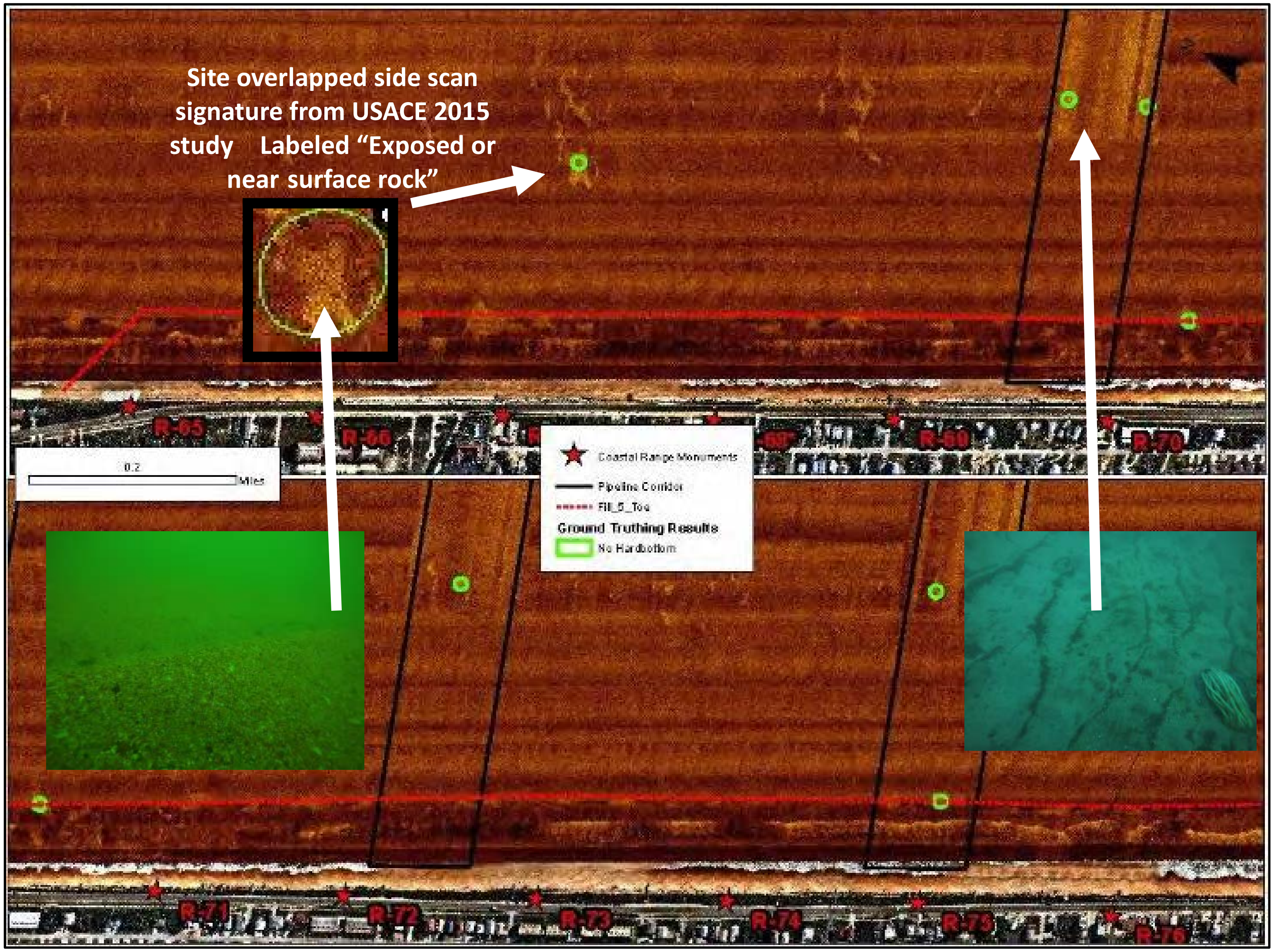


Figure 6. 2019 side scan sonar imagery in the project area showing one signature that overlapped with the 2011 survey (zoom of this feature show in black frame and green circle). No hardbottom was found in 2019.

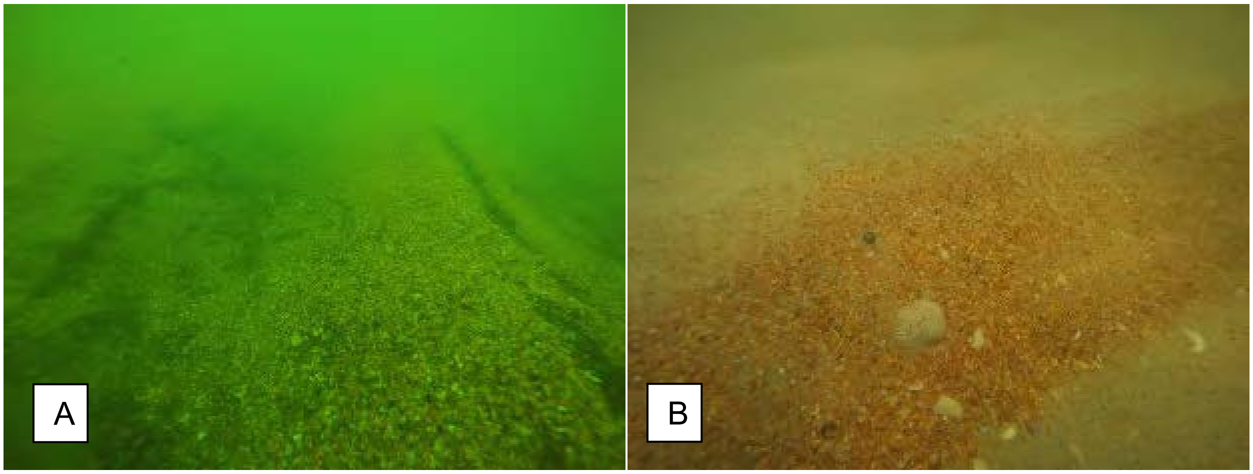


Image 3. Representative images of ground-truthed side scan sonar signatures from verification dives on July 16, 2019. A) Southern pipeline corridor, B) Landward of the ETOF at R-95.

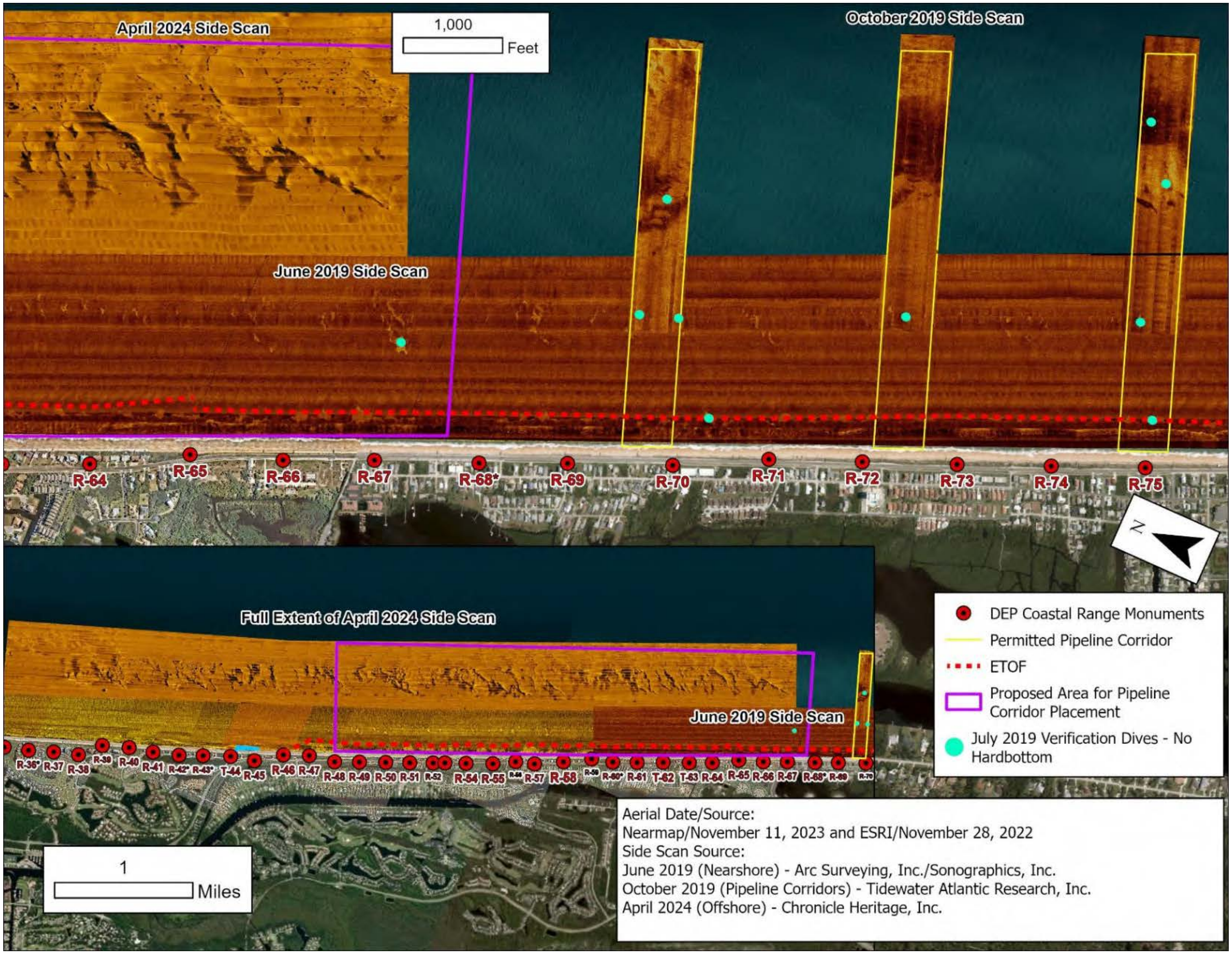


Figure 7. April 2024 side scan imagery signature comparison with July 2019 verification dives and 2019 side scan imagery.

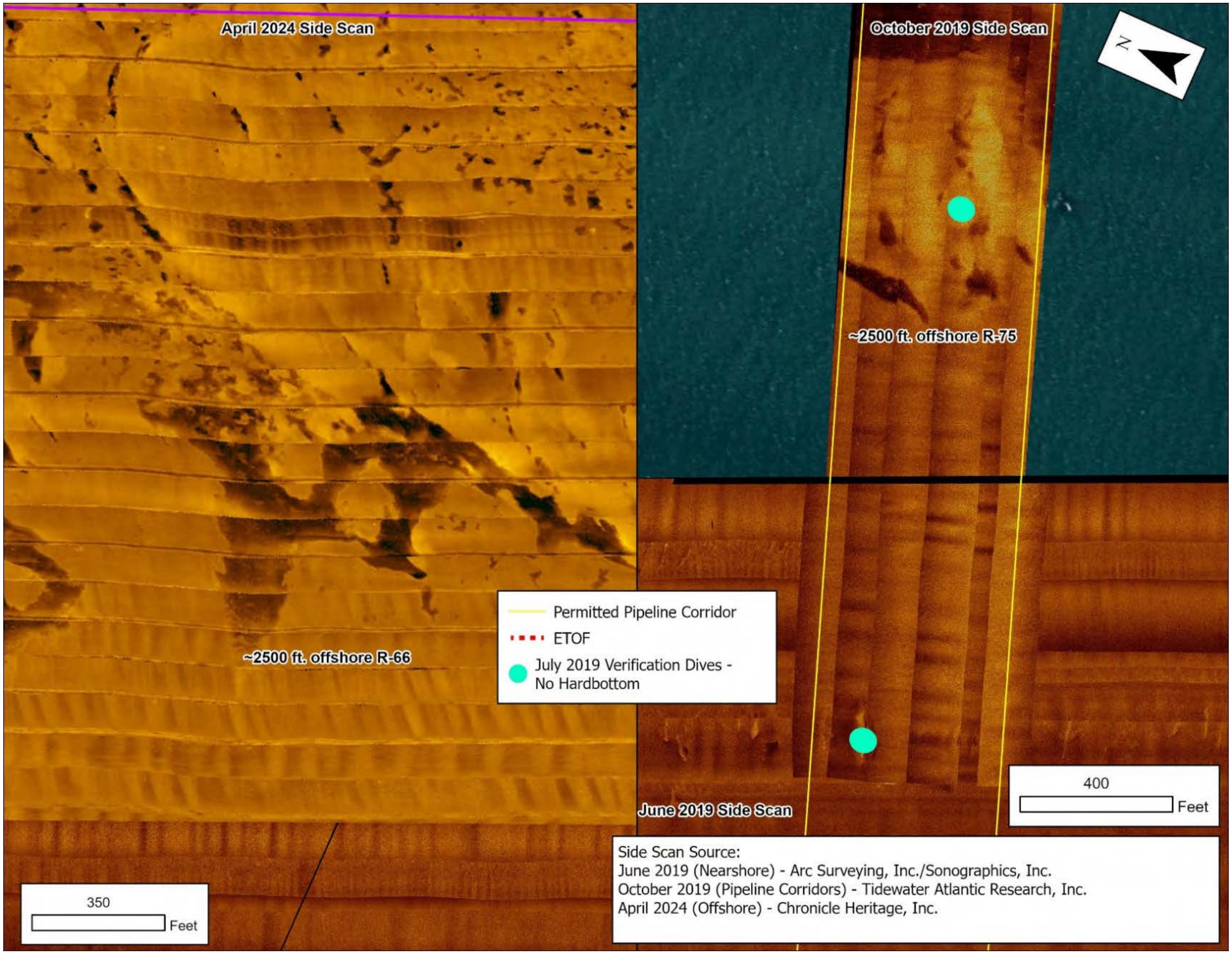


Figure 8. Close up of April 2024 side scan imagery signature comparison with July 2019 verification dives and 2019 side scan imagery.

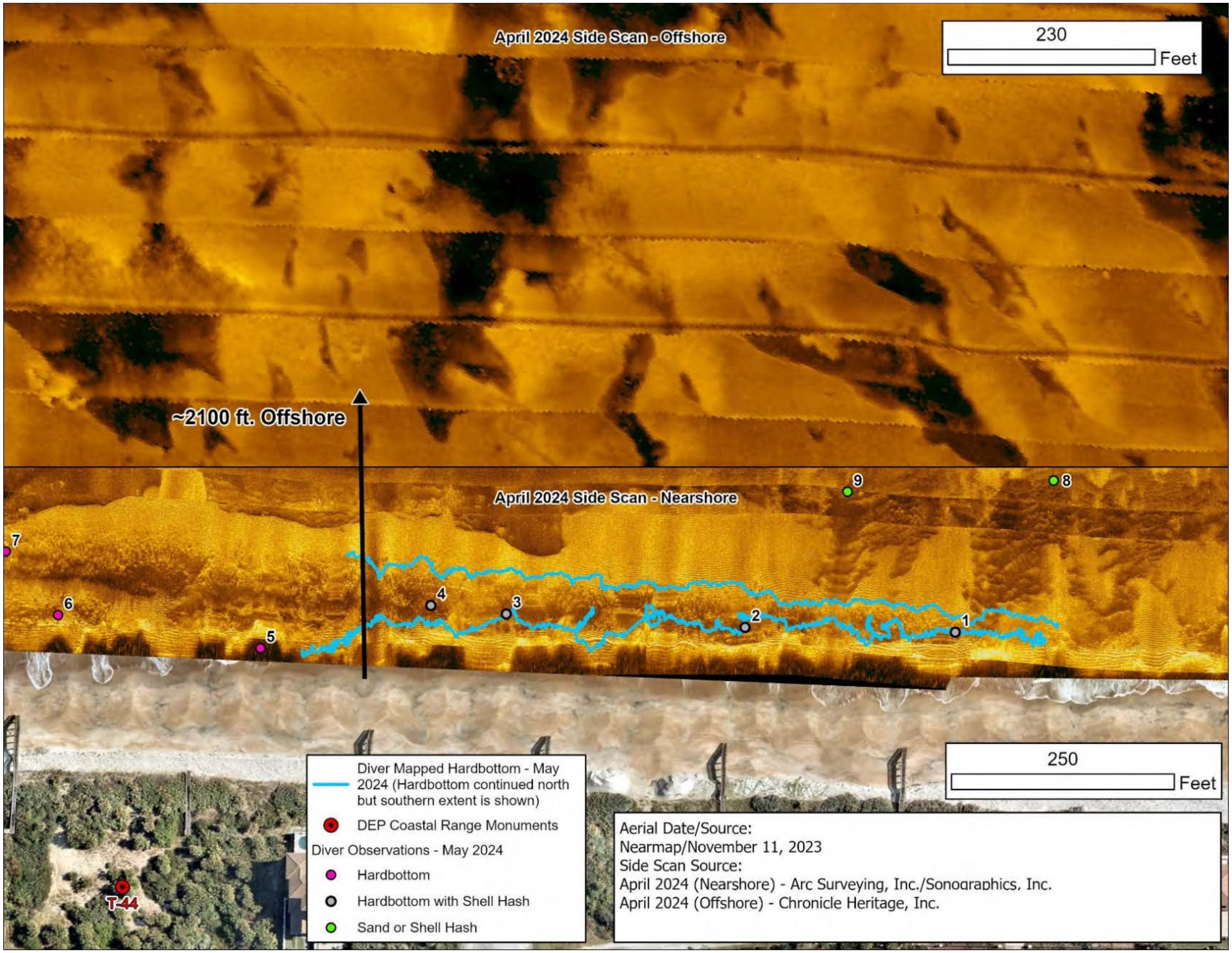


Figure 9. April 2024 side scan imagery with May 2024 diver verified hardbottom signature and comparison to features approximately 2,100 ft. offshore.

Image 4. Beach conditions at Varn Park on April 26, 2024. Source: Olsen Associates, Inc.

Image 5. Existing beach conditions at Beverly Beach on April 26, 2024. Source: Olsen Associates, Inc.

Image 6. Existing dune vegetation and beach face between R-70 and R-71 Beverly Beach on April 26, 2024. Source: Olsen Associates, Inc.

Table 1. Federally listed species and critical habitat 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)

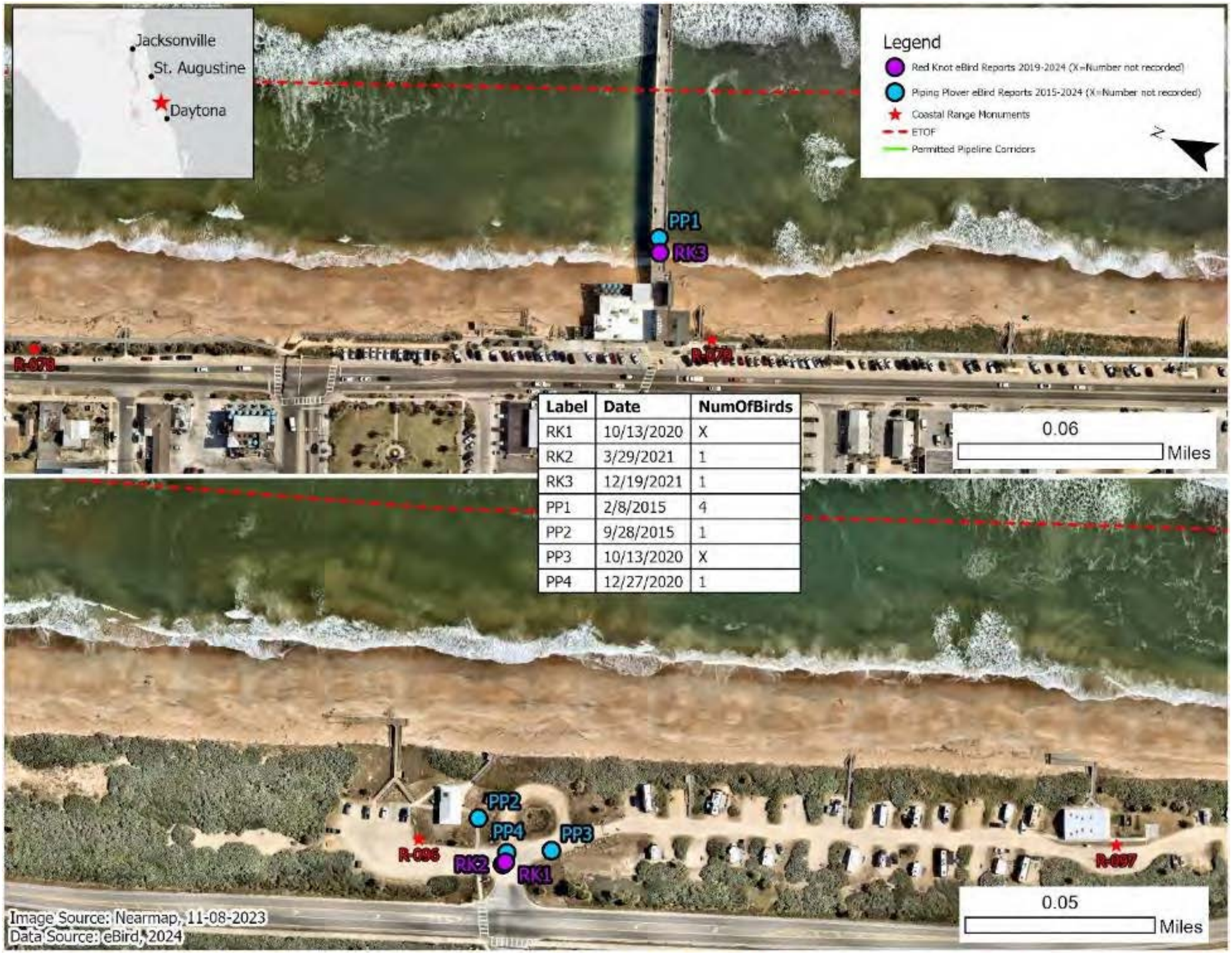
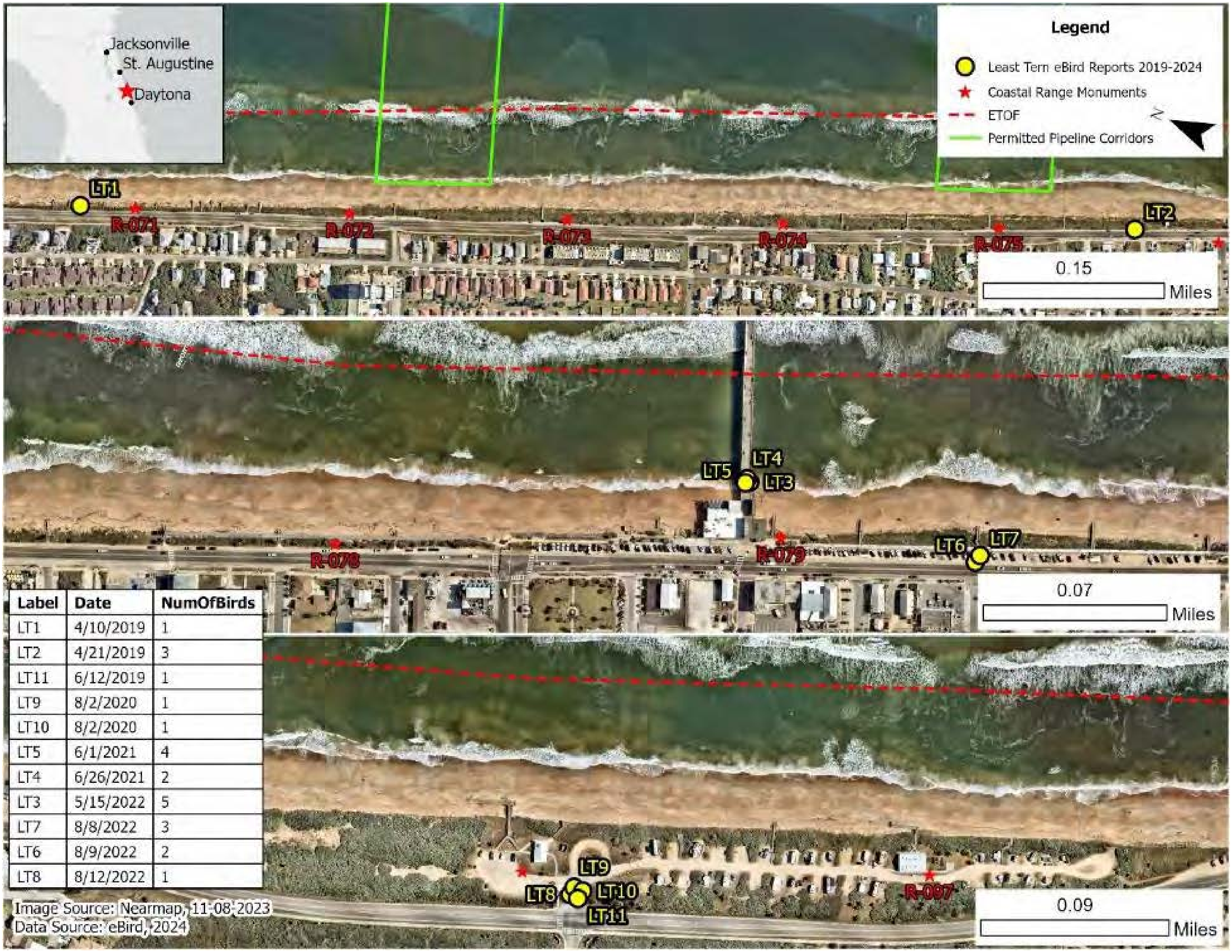


Figure 10. Wintering Piping Plover reported locations in the Flagler County PAA, January 1, 2014 through May 6, 2024 and Red Knot reported locations in the Flagler County PAA, January 1, 2019 through May 2, 2024 (Source: eBird).

Table 2. Least tern rooftop active and complete nests and total number of adults reported in Flagler County between 2011 and 2020. Note – no active or complete nests from 2021-2023.

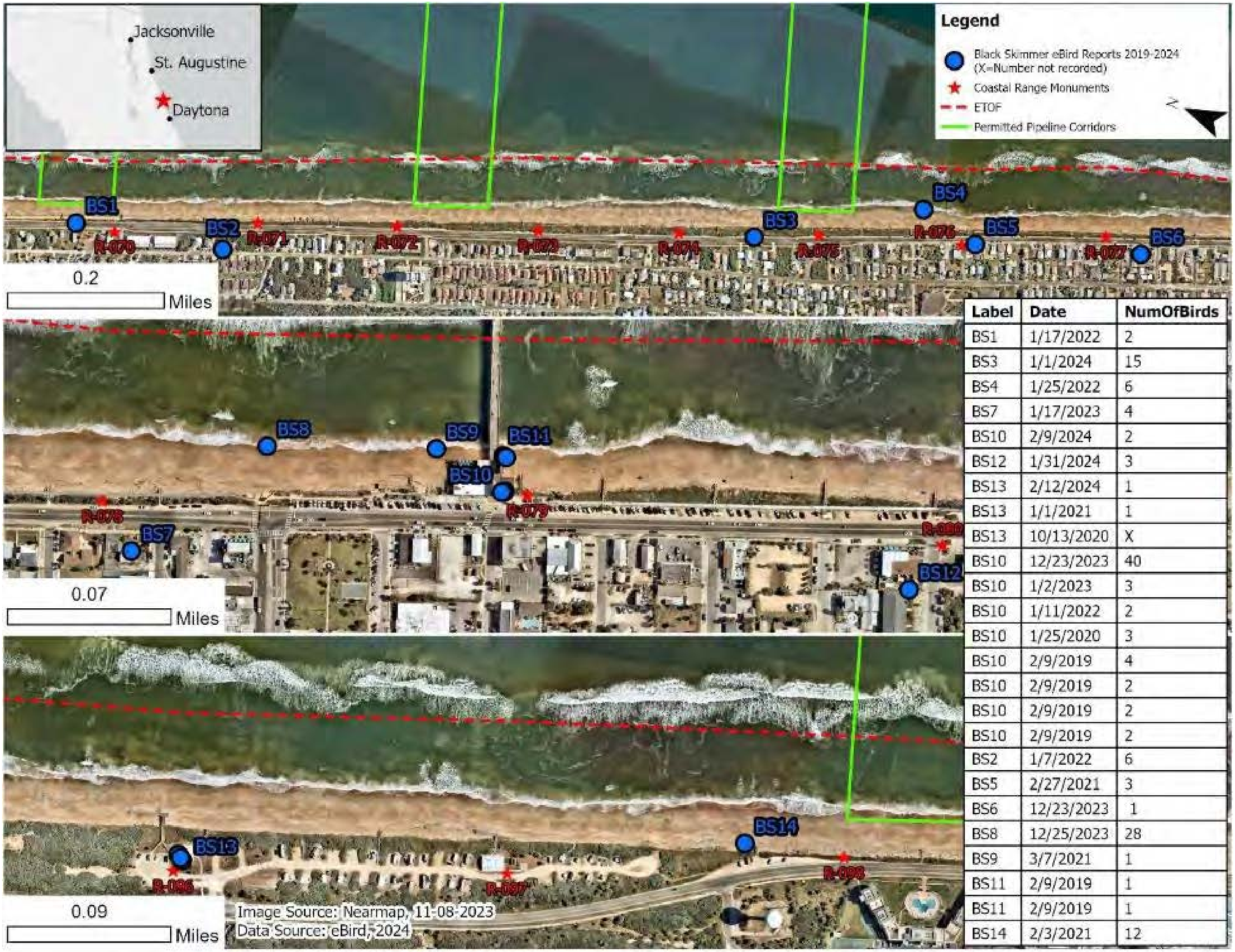
Year	Number of Active or Compete Rooftop Nests	Total No. of Adults Counted at all Nests
2011	2	5
2012	6	25
2013	3	13
2014	5	5
2015	22	26
2016	6	12
2017	14	12
2018	5	26
2019	2	5
2020	2	29

Source: Florida Shorebird Database (FSD)



Label	Date	NumOfBirds
LT1	4/10/2019	1
LT2	4/21/2019	3
LT11	6/12/2019	1
LT9	8/2/2020	1
LT10	8/2/2020	1
LT5	6/1/2021	4
LT4	6/26/2021	2
LT3	5/15/2022	5
LT7	8/8/2022	3
LT6	8/9/2022	2
LT8	8/12/2022	1

Figure 11. Least tern reported locations in the Flagler County PAA, January 1, 2019 through May 6, 2024 (Source: eBird).



Label	Date	NumOfBirds
BS1	1/17/2022	2
BS3	1/1/2024	15
BS4	1/25/2022	6
BS7	1/17/2023	4
BS10	2/9/2024	2
BS12	1/31/2024	3
BS13	2/12/2024	1
BS13	1/1/2021	1
BS13	10/13/2020	X
BS10	12/23/2023	40
BS10	1/2/2023	3
BS10	1/11/2022	2
BS10	1/25/2020	3
BS10	2/9/2019	4
BS10	2/9/2019	2
BS10	2/9/2019	2
BS10	2/9/2019	2
BS2	1/7/2022	6
BS5	2/27/2021	3
BS6	12/23/2023	1
BS8	12/25/2023	28
BS9	3/7/2021	1
BS11	2/9/2019	1
BS11	2/9/2019	1
BS14	2/3/2021	12

Figure 12. Black skimmer reported locations in the Flagler County PAA, January 1, 2019 through May 2, 2024 (Source: eBird).

Table 3. Sea turtle nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Nests	False Crawls	Density of Nests per km	Nesting Success	Total # of Nests Relocated	Reasons for Relocation
2014	Flagler Beach	9.6	86	85	9.0	50%	18	High Tide Line, Storm water runoff
2014	Flagler County Beaches (South)	9.7	167	66	17.2	72%	3	High Tide Line
2014	Gamble Rogers Memorial SRA	1.8	30	3	16.7	91%	0	
2015	Flagler Beach	9.6	129	65	13.4	66%	32	High Tide Line
2015	Flagler County Beaches (South)	9.7	252	71	26.0	78%	8	High Tide Line
2015	Gamble Rogers Memorial SRA	1.8	32	19	17.8	63%	1	Washing out, remaining eggs relocated (not initial nest treatment)
2016	Flagler Beach	9.6	192	115	20.0	63%	44	Inundation
2016	Flagler County Beaches (South)	9.7	294	95	30.3	76%	4	High Tide Line
2016	Gamble Rogers Memorial SRA	1.8	46	30	25.6	61%	1	High Tide Line
2017	Flagler Beach	9.6	168	68	17.5	71%	41	High Tide Line
2017	Flagler County Beaches (South)	9.7	335	84	34.5	80%	20	High Tide Line
2017	Gamble Rogers Memorial SRA	1.8	63	13	35.0	83%	0	
2018	Flagler Beach	9.6	92	95	9.6	49%	34	Inundation
2018	Flagler County Beaches (South)	9.7	158	109	16.3	59%	60	3 due to High Tide Line; 57 due to Beach Renourishment Project
2018	Gamble Rogers Memorial SRA	1.8	30	20	16.7	60%	2	Nests washing away, exposed eggs relocated (Not initial nest treatment)

Table 3 continued. Sea turtle nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Nests	False Crawls	Density of Nests per km	Nesting Success	Total # of Nests Relocated	Reasons for Relocation
2019	Flagler Beach	9.6	228	217	23.8	51%	26	imminent tidal inundation
2019	Flagler County Beaches (South)	9.7	482	179	49.7	73%	1	High Tide Line
2019	Gamble Rogers Memorial SRA	1.8	81	26	45.0	76%	2	Both nests were partially exposed as a result of high tides - not initial nest treatment
2020	Flagler County Beaches (South)	9.7	264	195	27.2	58%	0	
2020	Flagler Beach	9.6	161	159	16.8	50%	28	storm water runoff, imminent tidal inundation
2020	Gamble Rogers Memorial SRA	1.8	50	30	27.8	63%	0	
2021	Flagler Beach	9.6	144	122	15.0	54%	14	Imminent tidal inundation
2021	Flagler County Beaches (South)	9.7	290	116	29.9	71%	0	
2021	Gamble Rogers Memorial SRA	1.8	46	26	25.6	64%	2	The nests were being exposed and washing away.
2022	Flagler Beach	9.6	330	205	34.4	62%	24	Laid below tide line and storm water runoff
2022	Flagler County Beaches (South)	9.7	510	188	52.6	73%	7	1 due to High Tide Line, 6 due to beach renourishment project
2022	Gamble Rogers Memorial SRA	1.8	105	44	58.3	70%	2	1-At or near hightide line; 1-Eggs exposed, not the initial nest treatment.
2023	Flagler Beach	9.6	267	212	27.8	56%	9	Imminent tidal inundation
2023	Flagler County Beaches (South)	9.7	440	524	45.4	46%	109	Beach Renourishment Project
2023	Gamble Rogers Memorial SRA	1.8	69	63	38.3	52%	0	

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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).

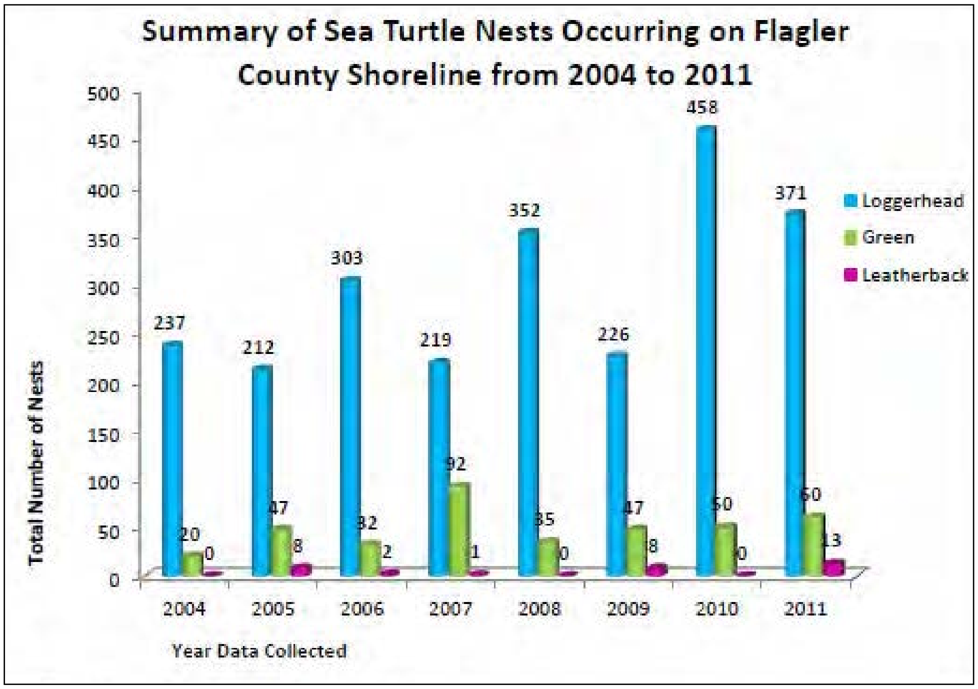


Figure 13. Historic sea turtle nesting data for the entire Flagler County shoreline, 2004 through 2011 (Source: USACE, 2015).

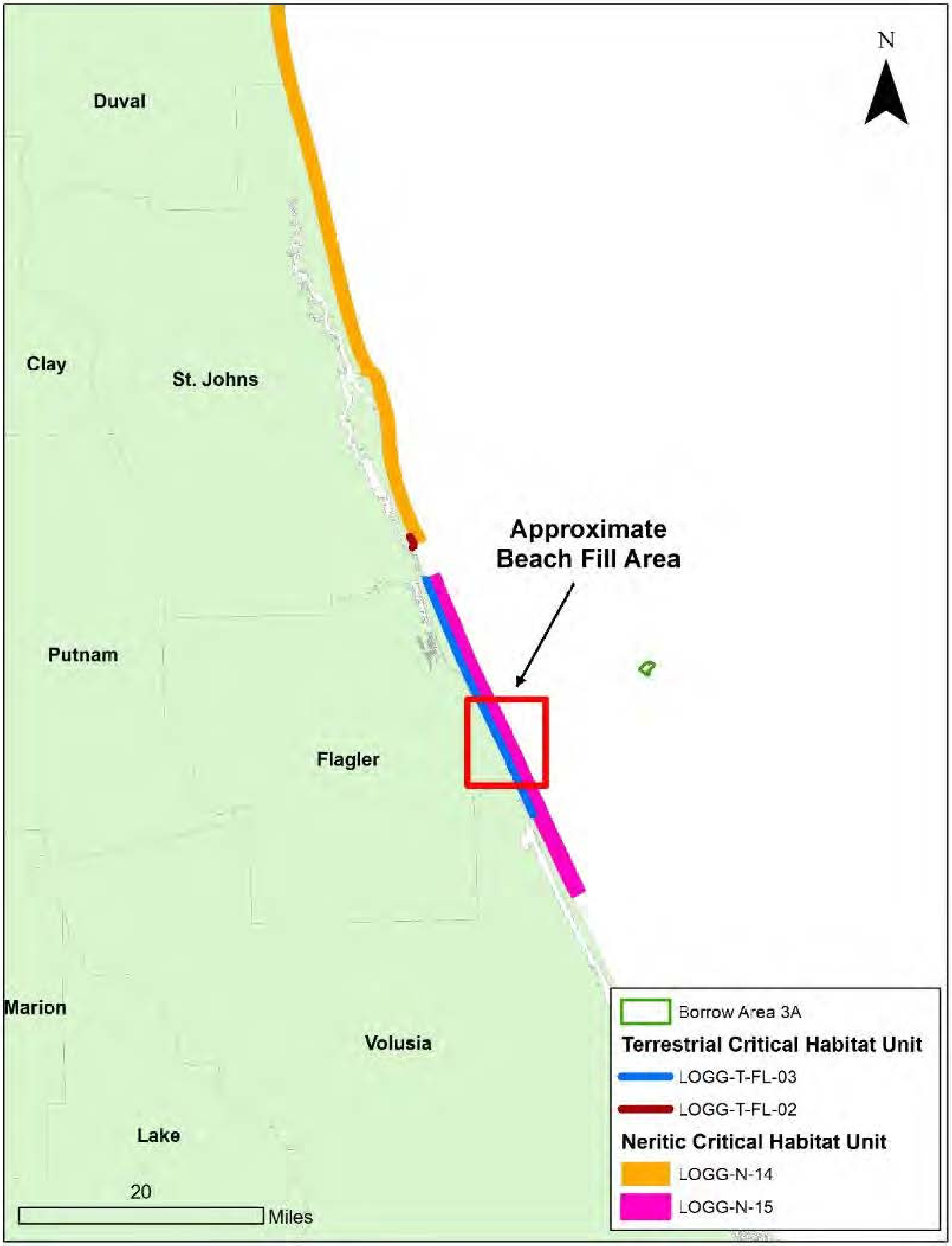


Figure 14. Loggerhead sea turtle critical habitat in the PAA for the Flagler County Beach and Dune Restoration Project.

Table 4. Loggerhead nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Loggerhead Nest	Loggerhead False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	83	77	8.6	52%
2014	Flagler County Beaches (South)	9.7	150	62	15.5	71%
2014	Gamble Rogers Memorial SRA	1.8	30	3	16.7	91%
2015	Flagler Beach	9.6	116	64	12.1	64%
2015	Flagler County Beaches (South)	9.7	189	63	19.5	75%
2015	Gamble Rogers Memorial SRA	1.8	26	19	14.4	58%
2016	Flagler Beach	9.6	188	115	19.6	62%
2016	Flagler County Beaches (South)	9.7	285	89	29.4	76%
2016	Gamble Rogers Memorial SRA	1.8	46	30	25.6	61%
2017	Flagler Beach	9.6	122	53	12.7	70%
2017	Flagler County Beaches (South)	9.7	213	53	22.0	80%
2017	Gamble Rogers Memorial SRA	1.8	54	10	30.0	84%
2018	Flagler Beach	9.6	88	92	9.2	49%
2018	Flagler County Beaches (South)	9.7	152	105	15.7	59%
2018	Gamble Rogers Memorial SRA	1.8	30	19	16.7	61%
2019	Flagler Beach	9.6	191	209	19.9	48%
2019	Flagler County Beaches (South)	9.7	329	139	33.9	70%
2019	Gamble Rogers Memorial SRA	1.8	67	23	37.2	74%
2020	Flagler Beach	9.6	135	153	14.1	47%
2020	Flagler County Beaches (South)	9.7	213	185	22.0	54%
2020	Gamble Rogers Memorial SRA	1.8	43	29	23.9	60%
2021	Flagler Beach	9.6	125	108	13.0	54%
2021	Flagler County Beaches (South)	9.7	214	96	22.1	69%
2021	Gamble Rogers Memorial SRA	1.8	45	24	25.0	65%
2022	Flagler Beach	9.6	277	189	28.9	59%
2022	Flagler County Beaches (South)	9.7	395	168	40.7	70%
2022	Gamble Rogers Memorial SRA	1.8	89	37	49.4	71%
2023	Flagler Beach	9.6	207	176	21.6	54%
2023	Flagler County Beaches (South)	9.7	242	332	24.9	42%
2023	Gamble Rogers Memorial SRA	1.8	55	56	30.6	50%

Table 5. Loggerhead sea turtle hatchling success (2011-2018) in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Dead Hatchlings	Success Rate
2011	94	10409	8295	304	240	83%
2012	141	14928	12226	387	279	84%
2013	138	14690	11877	490	175	46%
2014	93	9987	8237	494	132	47%
2015	125	13904	11122	372	219	46%
2016	188	19935	15748	607	334	45%
2017	126	13447	11249	413	158	87%
2018	111	11483	9141	477	122	84%

Source: Volusia/Flagler Turtle Patrol

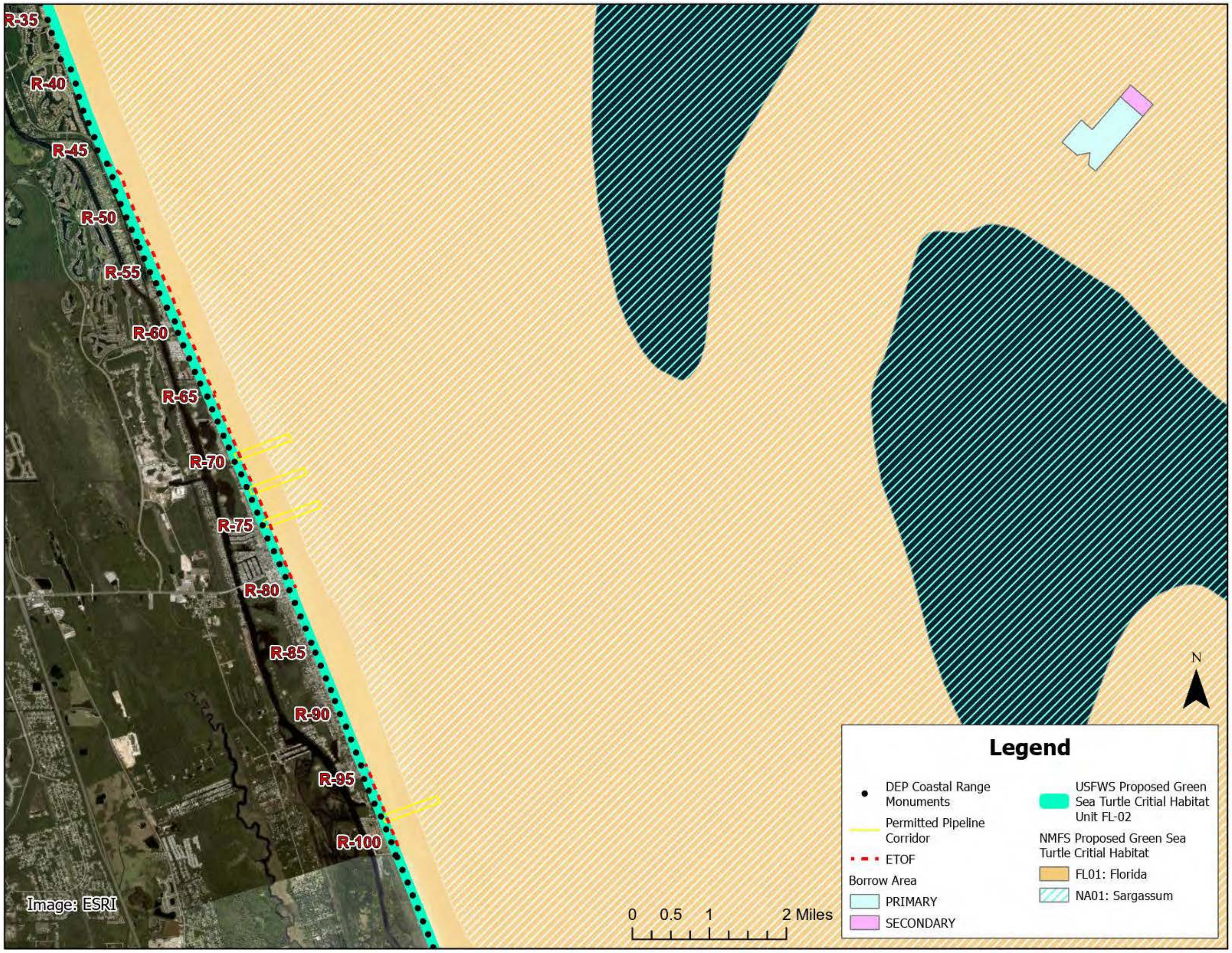


Figure 15. Proposed green sea turtle critical habitat in the PAA for the Flagler County Beach and Dune Restoration Project.

Table 6. Green sea turtle nesting and false crawl data within Flagler County, 2014 through 2023.

Year	Beach	Length (km)	Green Turtle Nest	Green Turtle False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	3	8	0.3	27%
2014	Flagler County Beaches (South)	9.7	15	4	1.5	79%
2014	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2015	Flagler Beach	9.6	12	1	1.3	92%
2015	Flagler County Beaches (South)	9.7	62	8	6.4	89%
2015	Gamble Rogers Memorial SRA	1.8	5	0	2.8	100%
2016	Flagler Beach	9.6	3	0	0.3	100%
2016	Flagler County Beaches (South)	9.7	7	6	0.7	54%
2016	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2017	Flagler Beach	9.6	45	15	4.7	75%
2017	Flagler County Beaches (South)	9.7	120	31	12.4	79%
2017	Gamble Rogers Memorial SRA	1.8	9	3	5.0	75%
2018	Flagler Beach	9.6	3	3	0.3	50%
2018	Flagler County Beaches (South)	9.7	3	4	0.3	43%
2018	Gamble Rogers Memorial SRA	1.8	0	1	0.0	0%
2019	Flagler Beach	9.6	34	8	3.5	81%
2019	Flagler County Beaches (South)	9.7	152	40	15.7	79%
2019	Gamble Rogers Memorial SRA	1.8	11	3	6.1	79%
2020	Flagler Beach	9.6	25	6	2.6	81%
2020	Flagler County Beaches (South)	9.7	49	10	5.1	83%
2020	Gamble Rogers Memorial SRA	1.8	7	1	3.9	88%
2021	Flagler Beach	9.6	19	14	2.0	58%
2021	Flagler County Beaches (South)	9.7	75	20	7.7	79%
2021	Gamble Rogers Memorial SRA	1.8	1	2	0.6	33%
2022	Flagler Beach	9.6	51	16	5.3	76%
2022	Flagler County Beaches (South)	9.7	113	20	11.6	85%
2022	Gamble Rogers Memorial SRA	1.8	12	7	6.7	63%
2023	Flagler Beach	9.6	58	36	6.0	62%
2023	Flagler County Beaches (South)	9.7	195	191	20.1	51%
2023	Gamble Rogers Memorial SRA	1.8	13	7	7.2	65%

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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 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 nesting and false crawl data within Flagler County, 2014 through 2023.

Year	Beach	Length (km)	Leatherback Nest	Leatherback False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	0	0	0.0	n/a
2014	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2014	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2015	Flagler Beach	9.6	1	0	0.1	100%
2015	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2015	Gamble Rogers Memorial SRA	1.8	1	0	0.6	100%
2016	Flagler Beach	9.6	1	0	0.1	100%
2016	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2016	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2017	Flagler Beach	9.6	1	0	0.1	100%
2017	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2017	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2018	Flagler Beach	9.6	1	0	0.1	100%
2018	Flagler County Beaches (South)	9.7	3	0	0.3	100%
2018	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2019	Flagler Beach	9.6	3	0	0.3	100%
2019	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2019	Gamble Rogers Memorial SRA	1.8	3	0	1.7	100%
2020	Flagler Beach	9.6	1	0	0.1	100%
2020	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2020	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2021	Flagler Beach	9.6	0	0	0.0	n/a
2021	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2021	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2022	Flagler Beach	9.6	2	0	0.2	100%
2022	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2022	Gamble Rogers Memorial SRA	1.8	4	0	2.2	100%
2023	Flagler Beach	9.6	2	0	0.2	100%
2023	Flagler County Beaches (South)	9.7	3	1	0.3	75%
2023	Gamble Rogers Memorial SRA	1.8	1	0	0.6	100%

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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 9. 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

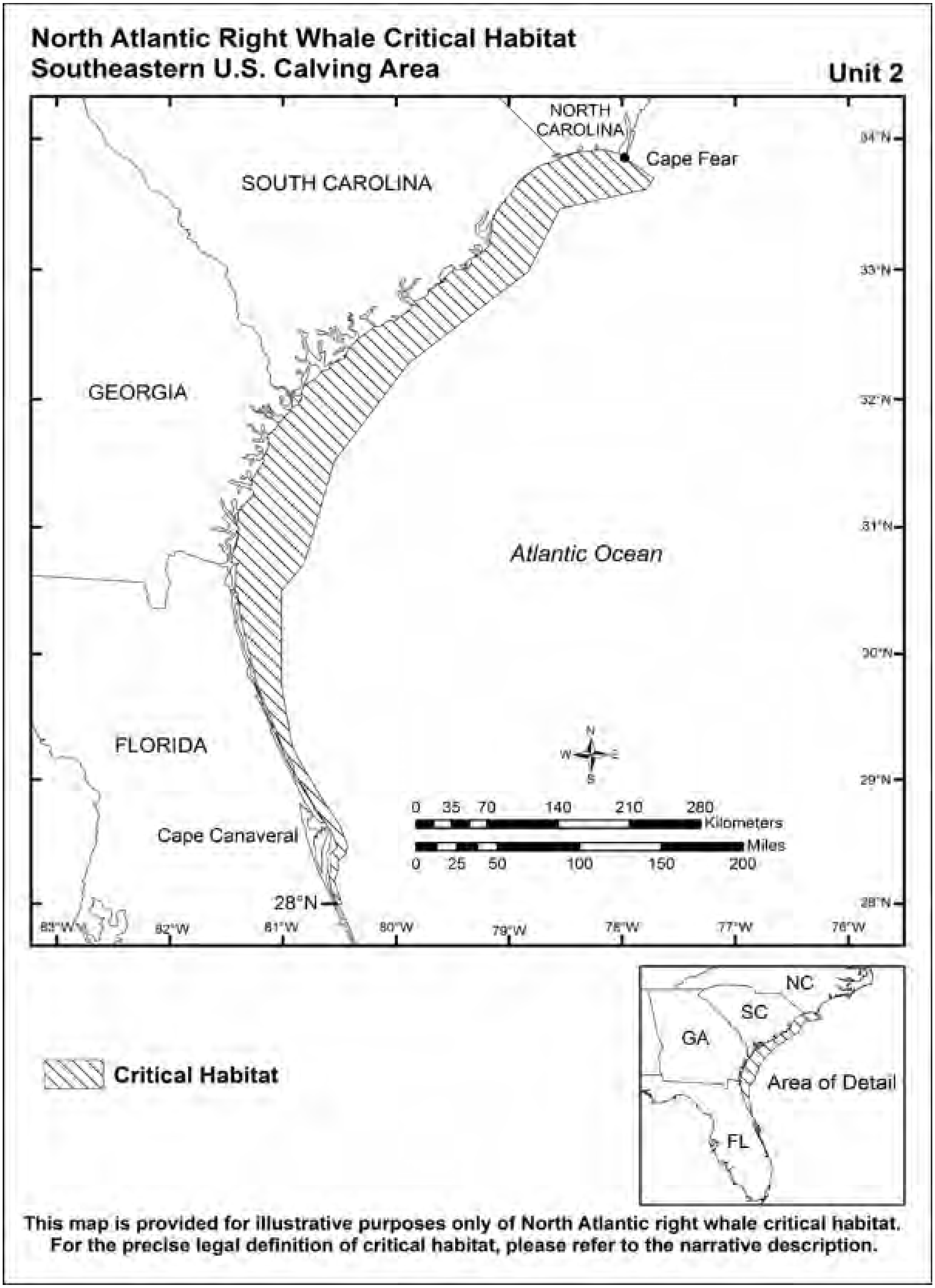


Figure 16. North Atlantic Right Whale Critical Habitat Unit 2. Source: NMFS, 2016.

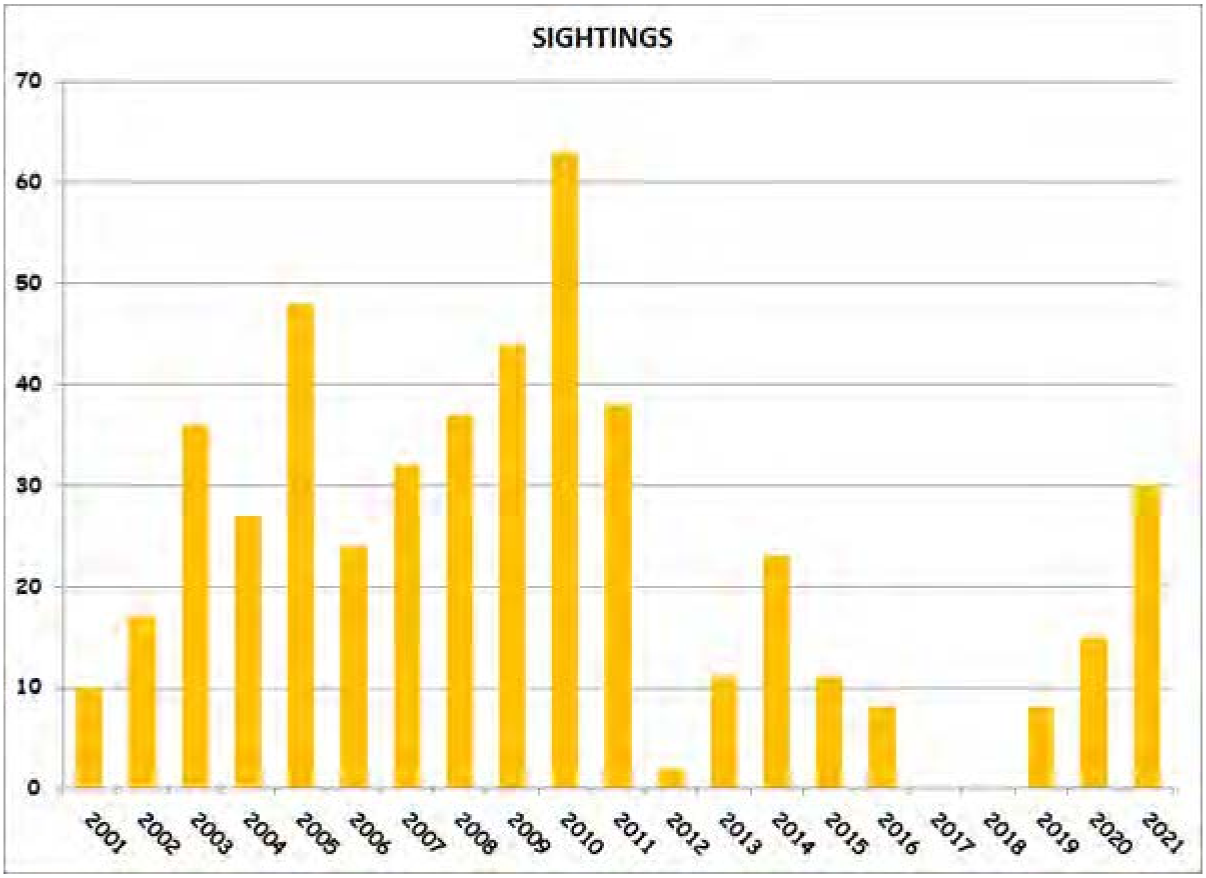


Figure 17. Marineland Right Whale Project Data, 2001 through 2021: total right whale sightings per year. Source: Marineland Right Whale Project, 2021.

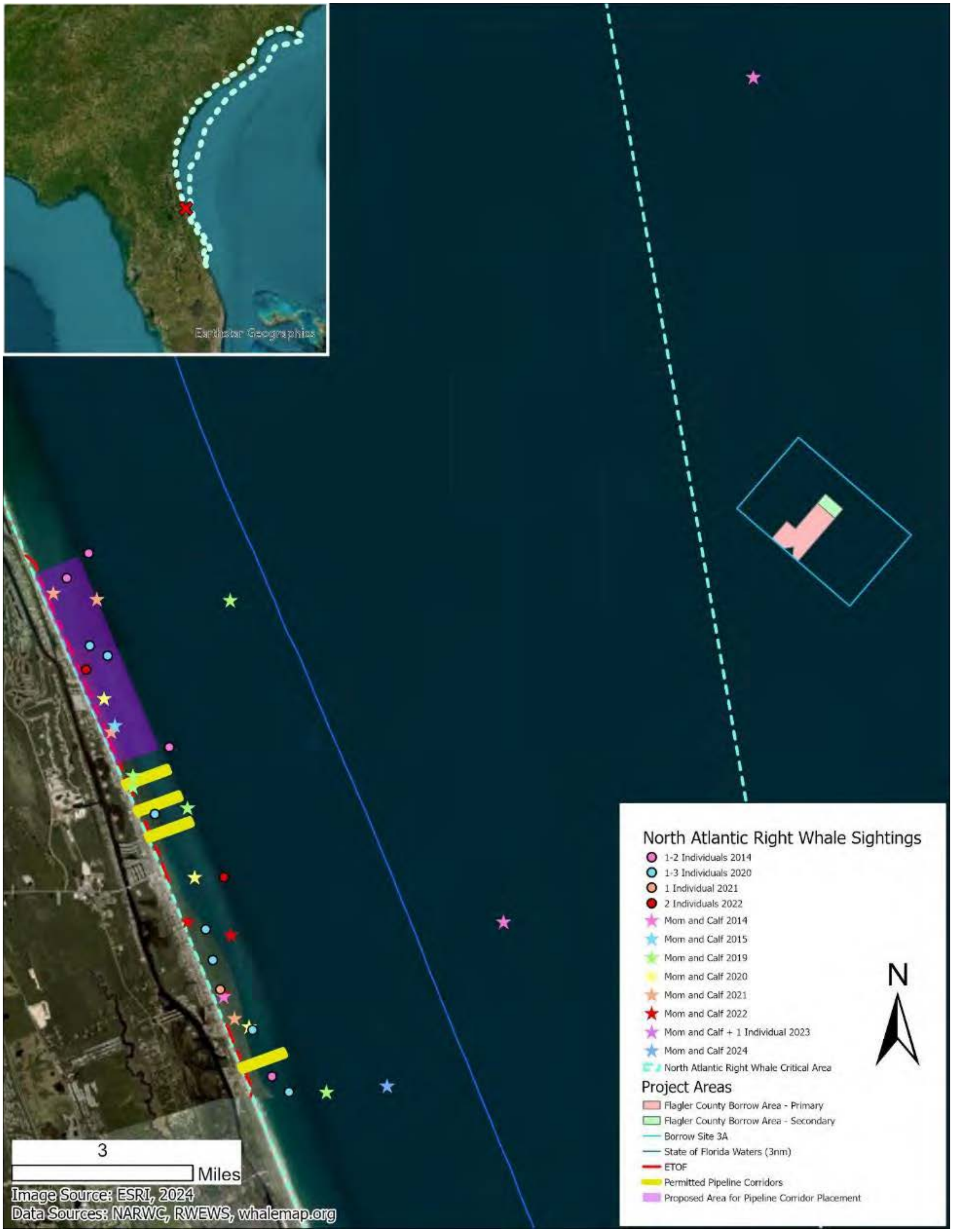


Figure 18. North Atlantic right whale sightings, January 1, 2014 through March 6, 2024. Source: Whalemap.org (2024).

Table 10. Summary comparison of native beach sediment to the proposed Phase 2 borrow area composite sediment with overfill ratios.

Parameter	Borrow Area Composite	Native Beach Composite
Mean (mm)	0.27	0.24
Median (mm)	0.22	0.17
Sorting (phi)	1.03	1.28
% Retained #4	0.91%	0.71%
% Passing #200	1.91%	1.36%
% Passing #230	1.86%	1.16%
% Shell Content	24.3%	17.3%
Munsell Value	5.9	7.2
Overfill (James, 1974)	-	1.03
Overfill (Dean, 2000)	-	1.00

Notes: Fines are percent material passing No. 230 sieve. Percent shell determined from visual shell content analysis. Source: OAI, 2024.

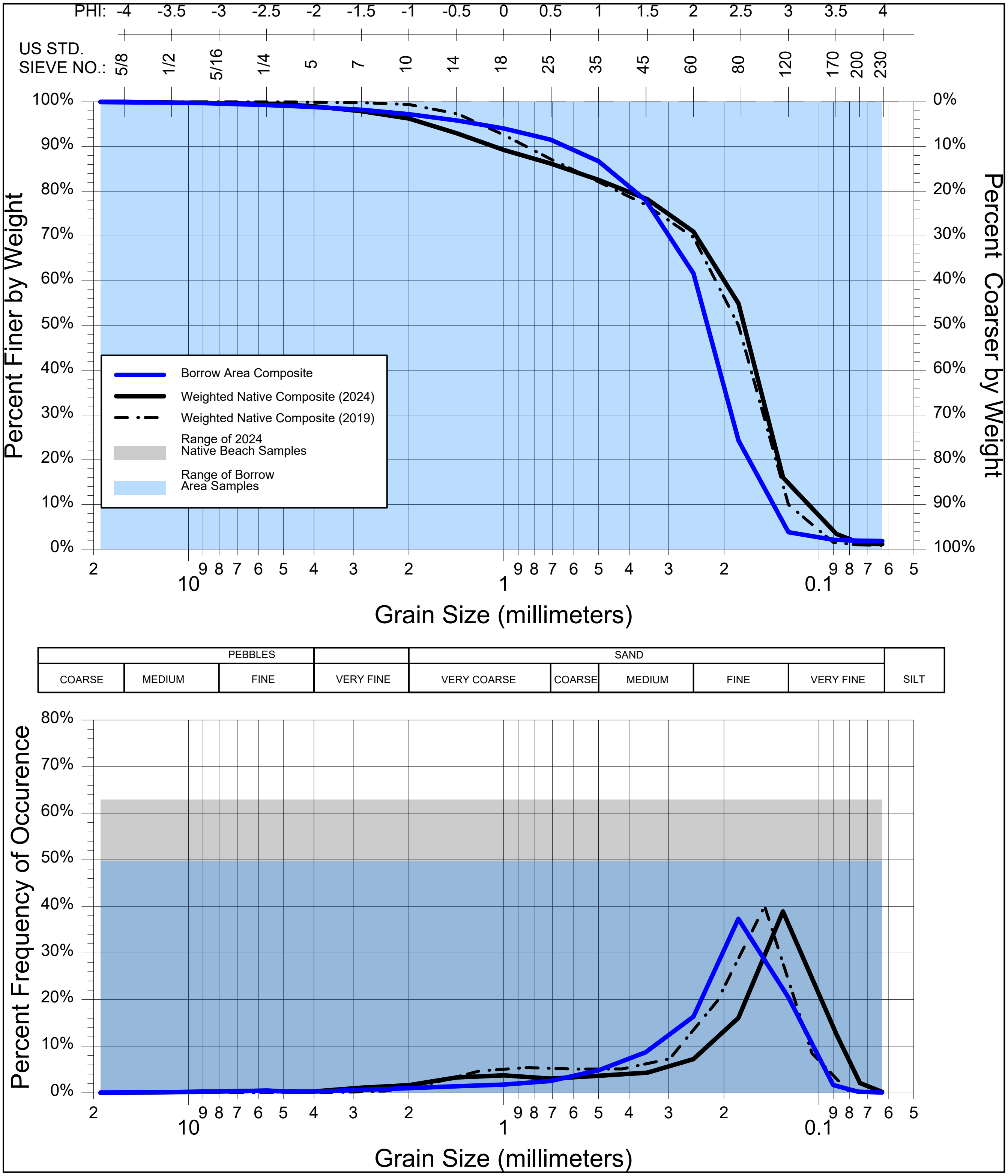


Figure 19. Cumulative grain size curves for the borrow area and existing beach sediments.

BA APPENDIX 2

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 3

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

ESSENTIAL FISH HABITAT ASSESSMENT

FLAGLER COUNTY DUNE/BEACH NOURISHMENT PROJECT

ESSENTIAL FISH HABITAT ASSESSMENT
FLAGLER COUNTY DUNE/BEACH NOURISHMENT PROJECT
FLAGLER COUNTY, FL

USACE PERMIT FILE NO. SAJ-2019-02065 (SP-PWB)
FDEP PERMIT FILE NO. 0379716-001-JC

Prepared for:
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665 SE 10th St. Suite 104
Deerfield Beach, 33441

April 2025

TABLE OF CONTENTS

FIGURES

TABLES

IMAGES

1.0 INTRODUCTION

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 fishery resources within federal waters ranging from 3 to 200 miles 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). Due to the mixed nature of the 55 species within the Snapper-Grouper complex, management of this large fishery is very challenging. Thus, recreational and commercial Snapper-Grouper fisheries are highly regulated, and progress continues to rebuild and maintain fishery resources and adapt to regional differences. In September 2022, the SAFMC approved adopting their Vison Blueprint’s management objectives as the objectives of the Snapper Grouper Fishery Management Plan (SAFMC, 2024). The SAFMC EFH designations for all managed fisheries are described in their EFH User Guide which contains life-stage based EFH information for each managed species (SAFMC, 1998; 2024a). The SAFMC developed two habitat-based FMPs: Coral Reefs and Live Hardbottom Habitat FMP and Pelagic Sargassum Habitat FMP.

2.0 EFH AND HAPC DESIGNATION

EFH identified in FMP Amendments of the SAFMC are summarized in **Table 1**. The project borrow area and surrounding 150-m turbidity mixing zone are located within EFH for Spiny Lobster and Snapper/Grouper (**Figure 1**). The marine water column (ocean side waters) and soft bottom (subtidal) habitats are located within the PAA.

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 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. The nearest charted fish havens are located approximately 6 miles to the east, and 4 miles to the south, while the locally known 'Flagler rock' and “Flagler original bottom” areas are situated about 3 miles to the south.

The SAFMC also developed policy statements to address non-fishing activities that have the potential to impact EFH and HAPCs impacted by beach renourishment (dredge and fill activities) and related large-scale coastal engineering projects (e.g., beach scraping) (SAFMC, 2024b).

Table 2 outlines general habitat types identified as EFH or HAPC for the fisheries managed by the SAFMC (SAFMC, 2017). The PAA encompasses marine/offshore habitats associated with the Water Column EFH and soft bottom habitat EFH. The softbottom EFH within the Phase 2 borrow area consists of elongated, unconsolidated sand ridges in water depths of -50 ft to -66 ft NAVD88 (**Figure 1**). The total area of Borrow Area 3A covers approximately 2,465 acres (998 hectares). The study area for the Local borrow area, Phase 2 borrow area (320 acres), lies within the entirety of Borrow Area 3A (1,545 acres (625 hectares)) of seabed (**Figure 2**).

Table 1. South Atlantic Fisheries Management Council EFH.

Estuarine and Inshore Habitats	Marine/Offshore Habitats
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 Reefs Artificial / Manmade Reefs Sargassum Water Column

Table 2. South Atlantic Fisheries Management Council general habitat types identified as EFH or HAPC. Project area habitats are starred. Source: SAFMC, 2017.

Habitat Category	Essential Fish Habitat	Fisheries/Species	HAPC's
Wetlands	Estuarine and marine emergent wetlands	Shrimp, Snapper-Grouper	Shrimp: state designated nursery habitats and mangrove wetlands
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
Coral and Hardbottom	Rock overhangs, rock outcrops, manganese phosphorite rock slab formations, and rocky reefs		Blueline Tilefish (in Snapper- Grouper)
Coral and Hardbottom	Artificial reefs	Snapper-Grouper	Special Management Zones
Soft Bottom	Subtidal, intertidal non-vegetated flats*	Shrimp	
Soft Bottom	Offshore marine habitats used for spawning and growth to maturity	Shrimp	
Soft Bottom	Sandy shoals of capes and offshore bars	Coastal Migratory Pelagics	Sandy shoals; Cape Lookout; Cape Fear; Cape Hatteras and Hurl Rocks
Soft Bottom	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	
Water Column	All coastal inlets	Coastal Migratory Pelagics	Shrimp, Snapper-Grouper
Water Column	All state-designated nursery habitats of particular importance	Coastal Migratory Pelagics	Shrimp, Snapper-Grouper
Water Column	High salinity bays, estuaries	Cobia (in Coastal Migratory Pelagics)	Spanish mackerel: Bogue Sound, New River, NC; Broad River, SC
Water Column	Pelagic Sargassum	Dolphin	
Water Column	Gulf Stream	Shrimp, Snapper-Grouper, Coastal Migratory Pelagics, Spiny Lobster, Dolphin-Wahoo	
Water Column	Spawning area in the water column above the adult habitat and the additional pelagic environment	Snapper-Grouper	

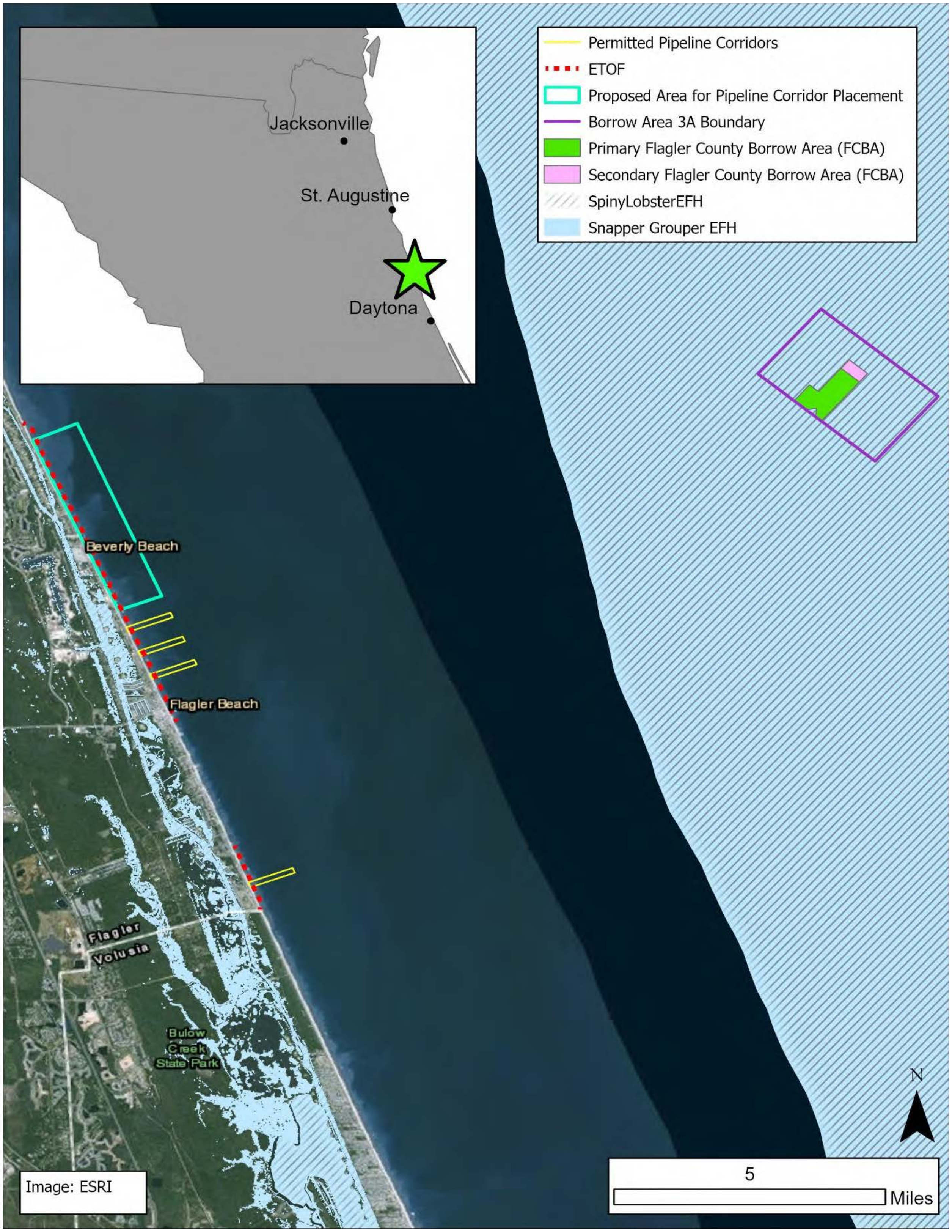

Figure 1. EFH within the PAA for the Local project.

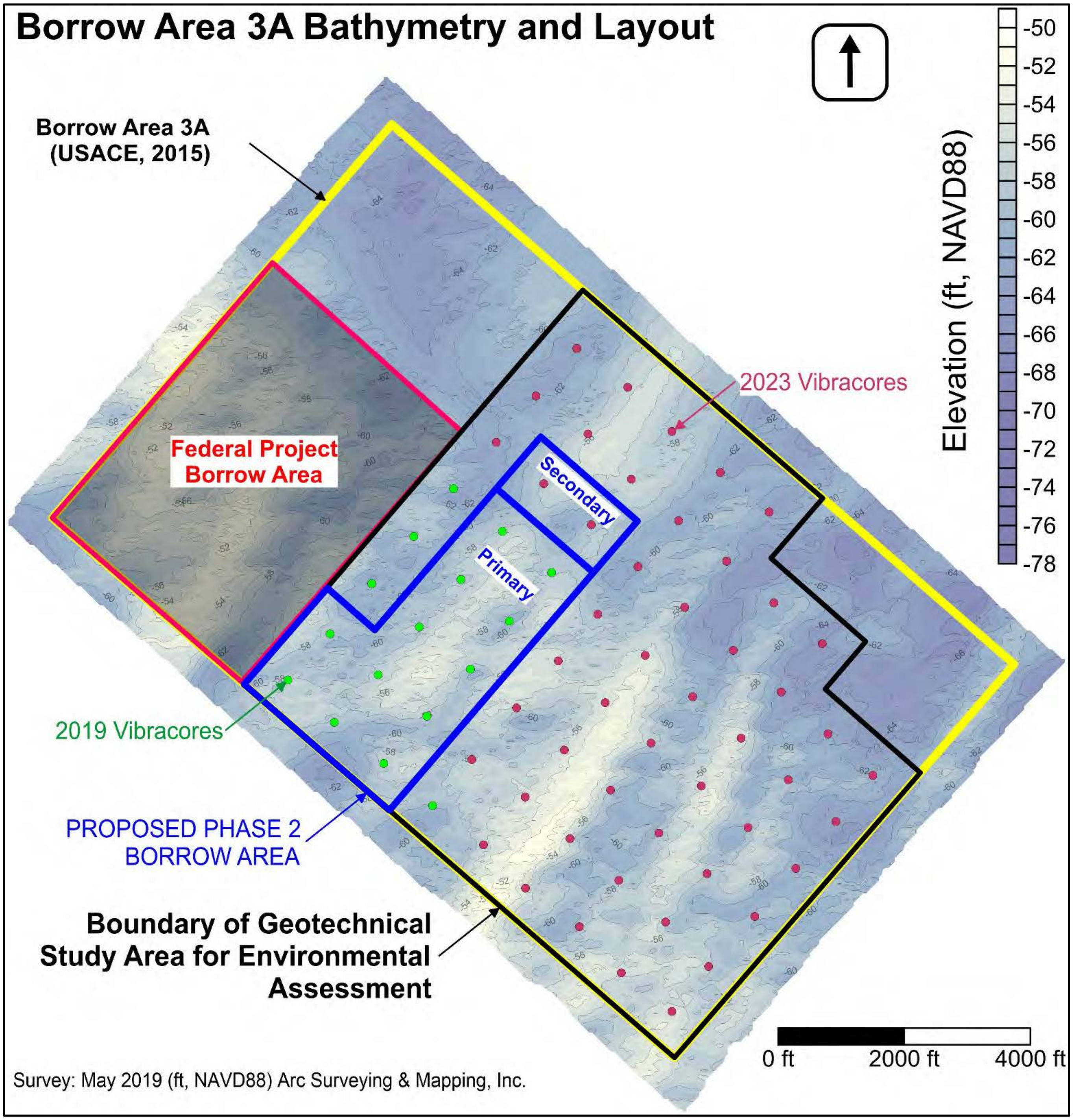

Figure 2. Proposed Phase 2 Borrow Area location within 3A and relative to Federal borrow area. Seafloor elevations and 2019 and 2023 vibracore locations shown. The proposed Phase 2 Borrow Area occupies about 320 acres, the Federal borrow area occupies roughly 490 acres, and the overall Borrow Area 3A occupies about 2,465 acres. The Phase 2 borrow area is comprised of PRIMARY and SECONDARY areas.

In addition to SAFMC designations, the PAA is habitat for 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. Additionally, the Atlantic States Marine Fisheries Commission (ASMFC) manages two species that may occur in the PAA: Bluefish (*Pomatomus saltatrix*) and Summer Flounder (*Paralichthys dentatus*).

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 consolidated hardbottom resources in these areas. The side-scan results were diver-verified by CEG marine scientists in July 2019. No hardbottom resources were found in the nearshore or pipeline corridors for the Local project. The bottom consisted of unconsolidated sand and shell hash in the nearshore areas (**Image 1**) and muck in the areas further offshore in the pipeline corridors. Additional side scan imagery was collected in April 2024 by Arc Surveying, Inc. with verification dives conducted by CEG scientific divers in May 2024. All features more than 150 ft. offshore of mean high water (MHW) in the April 2024 side scan survey do not represent consolidated hardbottom; these areas are likely sand/shell hash mounds. Hardbottom was observed on verification dives in May 2024 near R-44 and R-45 in the very shallow nearshore environment in water depths of approximately 4 to8 ft. The southern extent of nearshore hardbottom betweenR-46 and R-44 was mapped by CEG scientific divers in May 2024 and is approximately 1,050 ft. north of the ETOF taper and 2,930 ft. north of the nearest full fill sand placement station at R-48. Observations of shoreline behavior suggest bi-modal transport with a moderate bias towards net southerly transport which places the project downdrift of the hardbottom resources (See **Section 3.2.1** of the EA).

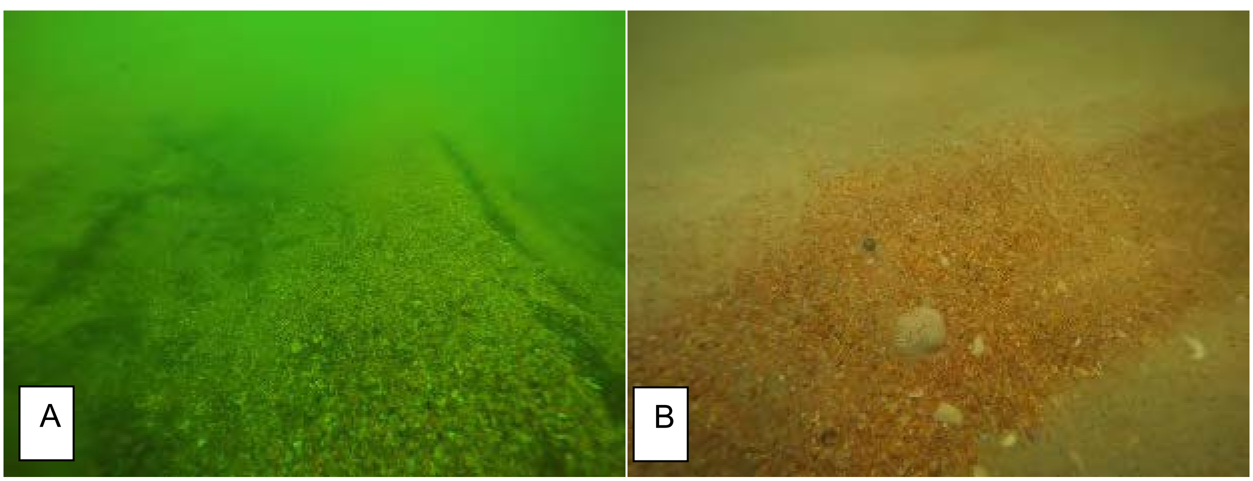

Image 1. Representative images of ground-truthed side scan sonar signatures from verification dives on July 16, 2019. A) Southern pipeline corridor, B) Landward of the ETOF at R-95.

2.1 EFH within the PAA

2.1.1 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, 1998). 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.

2.1.2 Soft Bottom (Subtidal and Intertidal Non-Vegetated Habitat)

Intertidal surf zone habitats 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 the intertidal area is the ebb and flood of the tide; the flooding tide brings food and predators onto the flat while the ebbing tide provides residents 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 paralichthid flounders, Red Drum, Spotted Sea Trout, Mullet, Gray Snapper, blue crab, and Penaeid shrimp, utilize the intertidal area as a nursery. The 150-m mixing zone around the 320-acre offshore borrow area encompasses 553 acres of unvegetated, unconsolidated sandy seabed of the Atlantic Ocean.

Research has indicated that the surf zone is an important nursery habitat for some fish species and that these fish have high site fidelities (Ross and Lancaster, 1996). Surf zone fishes use similar 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 surf zone habitat.

The proposed project includes fill activities that will temporarily impact EFH. The proposed Flagler County Beach and Dune Nourishment Project fill area encompasses approximately 90 acres of dry, sandy beach; 83 acres of intertidal/surf zone; and 145 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 120 acres of shallow, subtidal habitat that may 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 84 acres (includes 17 additional acres between R-64.5 and R-46) of intertidal habitat and 583 acres (includes 280 additional acres proposed betweenR-64.5 and R-46) of shallow, subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 667-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. These acreages represent the total fill area for the previously permitted areas between R-64.5 and R-80, and from R-94 to R-101, as well as the proposed modification area from R-64.5 to R-46.

The proposed modification fill area from R-64.5 to R-46 encompasses approximately 40 acres of dry, sandy beach; 16 acres of intertidal/surf zone; and 77 acres of shallow, subtidal habitat within the area of direct fill placement. There are an additional 54 acres of shallow, subtidal habitat that may be gradually affected by beach fill equilibration. The 150-m turbidity mixing zone at the beach fill site in the proposed modification fill area from R-64.5 to R-46 encompasses an overall total of approximately 17 acres of intertidal habitat and 280 acres of shallow subtidal unvegetated habitat. The 150-m mixing zone around the 320-acre offshore borrow area encompasses 553 acres of unvegetated, unconsolidated sandy seabed of the Atlantic Ocean.

3.0 MANAGED SPECIES

Table 3 shows the Fishery Management Plans (FMP) and managed species for the SAFMC.

Table 3. FMP and managed species for the SAFMC (revised 5/2024). NOAA= managed by NOAA Fisheries / A= managed by the ASMFC.

Fishery Management Plan Name	Family	Managed Species
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Bank sea bass *Centropristis ocyurus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Black grouper *Mycteroperca bonaci*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Black sea bass *Centropristis striata*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Coney *Cephalopholis fulva*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Gag *Mycteroperca microlepis*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Goliath grouper *Epinephelus itajara*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Graysby *Cephalopholis cruentata*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Misty grouper *Epinephelus mystacinus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Nassau grouper *Epinephelus striatus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Red grouper *Epinephelus morio*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Red hind *Epinephelus guttatus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Rock hind *Epinephelus adcensionis*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Rock sea bass *Centropristis philadelphica*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Scamp *Mycteroperca phenax*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Snowy grouper *Epinephelus niveatus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Speckled hind *Epinephelus drummondhayi*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Warsaw grouper *Epinephelus nigritus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Yellowedge grouper *Epinephelus flavolimbatus*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Yellowfin grouper *Mycteroperca venenosa*
Snapper Grouper	Sea Basses/Groupers (Serranidae)	Yellowmouth grouper *Mycteroperca interstitialis*
Snapper Grouper	Snappers (Lutjanidae)	Black snapper *Apsilus dentatus*
Snapper Grouper	Snappers (Lutjanidae)	Blackfin snapper *Lutjanus buccanella*
Snapper Grouper	Snappers (Lutjanidae)	Cubera snapper *Lutjanus cyanopterus*
Snapper Grouper	Snappers (Lutjanidae)	Gray snapper *Lutjanus griseus*
Snapper Grouper	Snappers (Lutjanidae)	Lane snapper *Lutjanus synagris*
Snapper Grouper	Snappers (Lutjanidae)	Mutton snapper *Lutjanus analis*
Snapper Grouper	Snappers (Lutjanidae)	Queen snapper *Etelis oculatus*
Snapper Grouper	Snappers (Lutjanidae)	Red snapper *Lutjanus campechanus*
Snapper Grouper	Snappers (Lutjanidae)	Silk snapper *Lutjanus vivanus*

Table 3 Continued - Fishery Management Plan Name	Family	Managed Species
Snapper Grouper	Snappers (Lutjanidae)	Vermilion snapper *Rhomboplites aurorubens*
Snapper Grouper	Snappers (Lutjanidae)	Yellowtail snapper *Ocyurus chrysurus*
Snapper Grouper	Triggerfishes (Balistidae)	Gray triggerfish *Balistes capriscus*
Snapper Grouper	Triggerfishes (Balistidae)	Ocean triggerfish *Canthidermis sufflamen*
Snapper Grouper	Wrasses (Labridae)	Hogfish *Lachnolaimus maximus*
Snapper Grouper	Spadefishes (Eppiphidae)	Atlantic spadefish *Chaetodipterus faber*
Snapper Grouper	Wreckfish (Polyprionidae)	Wreckfish *Polyprion americanus*
Snapper Grouper	Porgies (Sparidae)	Jolthead porgy *Calamus bajonado*
Snapper Grouper	Porgies (Sparidae)	Knobbed porgy *Calamus nodosus*
Snapper Grouper	Porgies (Sparidae)	Longspine porgy *Stenotomus caprinus*
Snapper Grouper	Porgies (Sparidae)	Red porgy *Pagrus pagrus*
Snapper Grouper	Porgies (Sparidae)	Saucereye porgy *Calamus calamus*
Snapper Grouper	Porgies (Sparidae)	Scup *Stenotomus chrysops*
Snapper Grouper	Porgies (Sparidae)	Whitebone porgy *Calamus leucosteus*
Snapper Grouper	Grunts (Haemulidae)	Cottonwick *Haemulon melanurum*
Snapper Grouper	Grunts (Haemulidae)	Margate *Haemulon album*
Snapper Grouper	Grunts (Haemulidae)	Sailor’s choice *Haemulon parra*
Snapper Grouper	Grunts (Haemulidae)	Tomtate *Haemulon aurolineatum*
Snapper Grouper	Grunts (Haemulidae)	White grunt *Haemulon plumieri*
Snapper Grouper	Jacks (Carangidae)	Almaco jack *Seriola rivoliana*
Snapper Grouper	Jacks (Carangidae)	Banded rudderfish *Seriola zonanta*
Snapper Grouper	Jacks (Carangidae)	Bar jack *Caranx ruber*
Snapper Grouper	Jacks (Carangidae)	Greater amberjack *Seriola dumerili*
Snapper Grouper	Jacks (Carangidae)	Lesser amberjack *Seriola fasciata*
Snapper Grouper	Tilefishes (Malacanthidae)	Blueline tilefish *Caulolatilus microps*
Snapper Grouper	Tilefishes (Malacanthidae)	Sand tilefish *Malacanthus plumier*
Snapper Grouper	Tilefishes (Malacanthidae)	Golden Tilefish *Lopholatilus chamaeleonticeps*
Shrimp	Penaeid (Penaeidae)	Brown shrimp *Farfantepenaeus aztecus*
Shrimp	Penaeid (Penaeidae)	Pink shrimp *Farfantepenaeus duorarum*
Shrimp	Rock Shrimp (Sicyoniidae)	Rock shrimp *Sicyonia brevirostris*
Shrimp	Penaeid (Penaeidae)	White shrimp *Litopenaeus setiferus*
Coastal Migratory Pelagics	Cobia (Rachycentribae)	Cobia *Rachycentron canadum*
Coastal Migratory Pelagics	Mackerel (Scombridae)	King Mackerel *Scomberomorus cavalla*
Coastal Migratory Pelagics	Mackerel (Scombridae)	Spanish Mackerel *Scomberomorus maculatus*
Dolphin Wahoo	Dolphin (Coryphaenidae)	Dolphin *Coryphaena hippurus*
Dolphin Wahoo	Mackerel (Scombridae)	Bullet Mackerel *Auxis rochei*
Dolphin Wahoo	Mackerel (Scombridae)	Frigate Mackerel *Auxis thazard*
Dolphin Wahoo	Wahoo (Scombridae)	Wahoo *Acanthocybium solandri*
Golden Crab	Golden Crab (Geryonidae)	Golden Crab *Chaceon fenneri*
Spiny Lobster	Spiny Lobster (Palinuridae)	Spiny Lobster *Panulirus argus*
Atlantic States Marine Fisheries Commission - Fishery Management Plan	Bluefish (Pomatomidae)	Bluefish *Pomatomus saltatrix*
Atlantic States Marine Fisheries Commission - Fishery Management Plan	Summer Flounder (Paralichthyidae)	Summer flounder *Paralichthys dentatus*

3.1 Coastal Migratory Pelagics

Gilmore et al. (1981) reported 91 species from the surf zone habitat of the south Atlantic region; 62 of these species are 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.

Due to their distribution throughout the Atlantic Ocean, Caribbean Sea, and Gulf of Mexico, Highly Migratory Species (HMS) such as Atlantic tunas, swordfish, sharks, and billfish 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 is ongoing with the latest Amendment 14 final rule published January 24, 2023 regarding Shark Quota Management (NMFS, 2023). 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 temporarily 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 travel to shallow water areas before releasing live pups or depositing eggs away from waters inhabited by adults (NMFS, 2006). Often these nursery areas are in highly productive coastal or estuarine waters where abundant small fish and crustaceans provide food for growing pups. Sharks are opportunistic scavengers for much of their lives, feeding in both the water column and on the bottom. Ideal EFH identified by NMFS (1999) for shark species include coastal waters within the study area of less than 82-foot (25 meter) depths (SAFMC, 1998). EFH is identified for each life stage for each federally managed species. Many shark species have EFH in state waters of Florida, and EFH can cover large areas due to the migratory nature of some shark species.

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 waters 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, such as juvenile and adult Pompano, feed mostly on benthic organisms including clams, mole crabs, and other crustaceans. Coastal pelagic species managed by SAFMC include Cobia (*Rachycentron canadum*), King Mackerel (*Scomberomorus cavalla*), and Spanish Mackerel (*S. maculates*) (SAFMC, 2024b). 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, and from the Gulf Stream shoreward, including *Sargassum*. In addition, all coastal inlets and state designated nursery habitats are of particular importance to coastal migratory pelagics. Cobia EFH also includes high salinity bays, estuaries, and seagrass habitat. In addition, the Gulf Stream is an EFH as it provides a mechanism to disperse coastal migratory pelagic larvae. For King and Spanish mackerel and Cobia, EFH occurs in the South Atlantic and Mid-Atlantic Bights (SAFMC, 1998).

King Mackerel (*Scomberomorus cavalla*)

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 including snappers, grunts and halfbeaks, 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. The Gulf of Mexico and Atlantic populations migrate separately, with the division lines being in Volusia-Flagler counties of southeast Florida in November through March and in Monroe-Collier counties of southwest Florida during April through October. (FLMNH, 2024). It is an important species for recreational and commercial fisheries throughout its range and is valued as a sport fish year-round in Florida. (SAFMC, 2024c).

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, 2024a). Florida is considered to be the area with the highest abundance of Spanish mackerel. 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. Migrating over large distances close to shore, Spanish mackerel in the Atlantic Ocean follow the coastline northward during the warmer summer months and return in the autumn and winter months to waters off Florida. While the King Mackerel is valued in sport fishing all year long, the Spanish Mackerel is fished primarily in the winter months although the commercial fishery is open year-round (SAFMC, 2024c).

Cobia (*Rachycentron canadum*)
Cobia, often mistaken for a shark or shark sucker, are pelagic fish found worldwide in tropical, subtropical and warm-temperate waters over the continental shelf and offshore reefs. Inhabiting both inshore and nearshore waters, cobia are frequently observed around buoys, pilings and wrecks. Cobia consume small fish including mullet, eels, jacks, snappers, grunts and herring but the majority of their diet is crustaceans. Seeking shelter in harbors, around wrecks and reefs, the cobia is often found off south Florida and the Florida Keys. In early spring, migration occurs northward along the Atlantic coast. Cobia is considered an excellent game fish and highly prized by recreational fishers. Cobia are caught commercially in pound nets, gill nets, and seines within required regulations and permits. (FLMNH, 2024b; SAFMC, 2024c)

3.2 Snapper-Grouper Complex

The Snapper/Grouper Management Complex has the greatest species richness of the eight managed fisheries (**Table 3**). 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 the inshore area 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 (**Table 2**). The EFH that occurs in the proposed project area supports various life stages of species in the snapper-grouper complex. Because the Snapper-Grouper Complex is highly diverse and most species 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.

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 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 utilize hardbottom habitat during all or a portion of their life cycles. 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 cycles. 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. There are no SAV habitats or hardbottom/reef resources in the PAA. Hardbottom was observed by CEG scientific divers on verification dives in May 2024 near R-44 and R-45 in the very nearshore environment in approximately 4-8 ft. of water. The southern extent of the nearshore hardbottom offshore R-46 and R-44 was mapped by divers in May 2024 and is approximately 1,050 ft. north of the ETOF taper and 2,930 ft. north of the nearest full fill sand placement station at R-48. Observations of shoreline behavior suggest bi-modal transport with a moderate bias towards net southerly transport which places the project downdrift of the hardbottom resources. (**Figure 3**). Exposed hardbottom has not been detected within the nearshore zone offshore of the project fill area or within the submerged pipeline corridors (See **Section 3.1.2** of the EA).

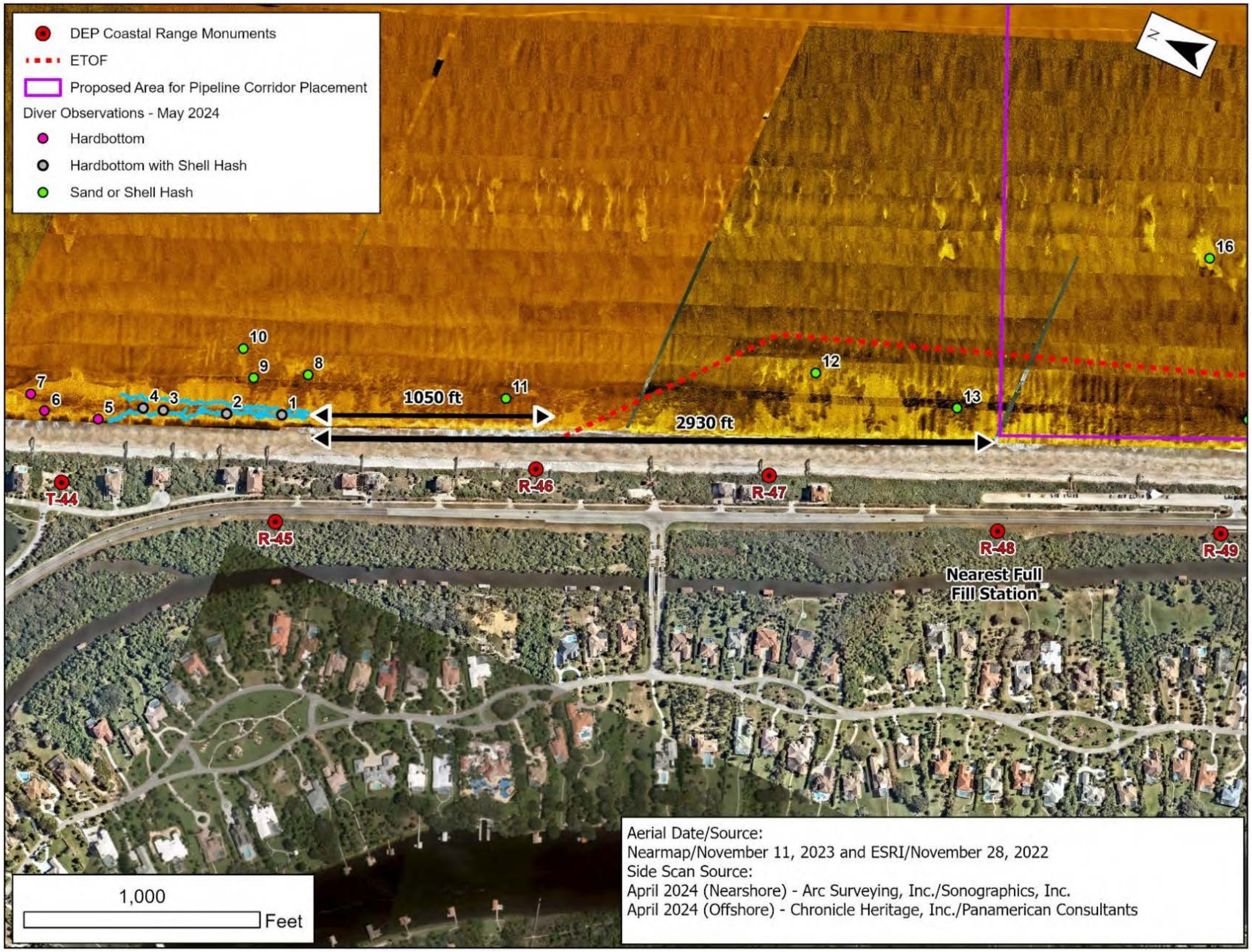

Figure 3. Southernmost extent of exposed nearshore hardbottom mapped by CEG divers in May 2024 and overlaid on April 2024 side scan imagery.

3.3 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, 2024d). These three shrimp species are found throughout the region with pink shrimp primarily harvested off the coast of Florida (**Table 3**). 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.

White Shrimp (*Litopenaeus setiferus*)
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, 2024).

Brown Shrimp (*Farfantepenaeus aztecus*)
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, 2024).

Pink Shrimp (*Farfanepenaeus duorarum*)
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, 2024).

3.4 Atlantic Highly Migratory Species

Highly migratory species (HMS) are managed by NOAA Fisheries and the HMS advisory panel. These species travel long distances and often cross international boundaries. Atlantic HMS have their own fisheries management plan and amendments (NOAA, 2024). The Atlantic HMS likely to occur in Flagler County are presented below and in **Table 4**.

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 to deeper water and return inshore in the spring to mate and give birth (FLMNH, 2023). 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, 2023). 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 feet. Maturity is reached at approximately two years of age for both males and females and life expectancy ranges from 10 to16 years for females and 4 to 9 years for males. Mating typically occurs in late May/early June with a 10-11 month gestation period. Juveniles are typically found in shallow water. The blacknose shark is somewhat targeted for sport fishing as it is still able to be fished when the season for larger sharks is closed (FLMNH, 2023a).

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, 2021). 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 neonate blacktips remain in very shallow inshore waters for the first year of their lives. Juvenile blacktip sharks inhabit a variety of coastal habitats. The blacktip shark is targeted in multiple commercial fisheries, including the longline fishery off the U.S. southeast coast, where it is the second most important fishery species behind the Sandbar Shark. Blacktip sharks compromised about 9% of the shark catch in the Southeastern U.S. from 1994-2005 (FLMNH, 2021).

Bonnethead Shark (*Sphyrna tiburo*)
Limited to warm waters in the Northern Hemisphere, the Bonnethead Shark range is from New England south to the Gulf of Mexico and common 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 spring and summer, moving south to 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. This species has been reported burrowing under coral heads in search of small fishes and invertebrates in the waters of southern Florida. Prey items appear to be correlated with seasonality as well as habitat. The gestation period is approximately four to five months, the shortest among all shark species. The Bonnethead is considered a species of "Least Concern" due to its high population numbers by the World Conservation Union (IUCN) (FLMNH, 2024c).

Bull Shark (*Carcharhinus leucas*)
The Bull Shark is a large, shallow water species that inhabits temperate seas and estuaries. The bull shark prefers to live in shallow coastal waters less than 100 feet deep (30 m), but ranges from 3-450 feet deep (1-150 m). It commonly enters estuaries, bays, harbors, lagoons, and river mouths. Bull Sharks prey on a variety of ray-finned fishes and other elasmobranchs as well as turtles, birds and dolphins. Very little is known about their 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, 2018). Although rare, gravid females and juvenile Bull Sharks have been documented in South Carolina estuaries (Castro, 1993). In the commercial shark fishery in the southeastern U.S., in the 1990's, the Bull shark comprised 1-6% of the large coastal shark catch (FLMNH, 2018). Bull Sharks are vulnerable to overfishing because of their slow growth and limited reproductive potential. The Bull shark is considered "Near Threatened" by the World Conservation Union (IUCN) due to lack of species and nurseries protection and routinely being caught for sport (FLMNH, 2018).

Dusky Shark (*Carcharhinus obscurus*)
The Dusky Shark, listed as a "vulnerable species" by ICUN 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 (FLMNH, 2023b). Dusky sharks grow to maximum length of 3.7m (12ft) with a maximum life span of 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, like many other shark populations, the Dusky Shark continues to decline due to illegal, longline, and bycatch fisheries (FLMNH, 2023b; NMFS, 2024).

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. Sightings 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, 2023c). Finetooth Sharks are coastal species, typically found inshore in shallow depths less than 6 m (20ft). 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. Gillnet bans in Florida, Georgia, South Carolina, and Texas have proved to be helping the population of these sharks however Finetooth sharks are considered to be of least concern according to the IUCN (FLMNH, 2023c; NMFS, 2024).

Great Hammerhead Shark (*Sphyrna mokarran*)
Great Hammerhead Sharks are circumtropical and the western Atlantic range is from North Carolina south to Brazil, including the Gulf of Mexico and Caribbean Sea. Found in both coastal and offshore waters to depths of 76 m (250 ft), the Great Hammerhead migrates seasonally moving to cooler waters during the summer months (NMFS, 2024). 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. Juveniles utilize shallow bays and coastal waters as nursery areas. Fished both commercially and recreationally, Great Hammerheads are highly valued for their fins. The population is vulnerable to overfishing in part due to their biennial reproductive cycle, coastal longline fishing, and as bycatch (FLMNH, 2018a). Currently, this species is prohibited from recreational and commercial possession in state waters off Florida as they are included on the state prohibited species list (FWC, 2021).

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 in depths to 90 m (300 ft), 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 and grass flats off Florida and the Bahamas (NMFS, 2022; 2024). 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, 2018b).

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, 2022; 2024). However, Nurse Sharks are nocturnal and 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, 2023d). 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, 2022).

Sand Tiger Shark (*Carcharias taurus*)
Sand Tiger Sharks are found worldwide, apart from the eastern Pacific Ocean. In the Western Atlantic Ocean this species is found from the Gulf of Maine south to Argentina (FLMNH, 2018c). 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. EFH is from Massachusetts to Florida and Florida waters have been identified as a critical nursery area. Sand Tiger Sharks are protected and prohibited from commercial and recreational harvest in Florida state waters. (FWC, 2021).

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, 2023e). 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. The sandbar shark favors a smooth substrate and will avoid coral reefs and other rough-bottom areas. 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). Off southeastern Florida, mating takes place primarily in June (FWC, 2021). Prohibited in state and federal waters, Sandbar sharks can be commercially harvested but only with a Shark Research Permit.

Scalloped Hammerhead (*Sphyrna lewini*)
The Scalloped Hammerhead is a circumglobal coastal pelagic species 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, 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. The IUCN lists Scalloped Hammerheads as “Critically Endangered”. (FLMNH, 2024d). As scalloped hammerhead sharks migrate to EFH in Florida state waters throughout their life cycle, they are particularly susceptible to overexploitation due to fishing pressure in Florida inshore and nearshore, thus catch is prohibited in Florida state waters (FWC, 2021).

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, 2018d). 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, 2018d; FWC, 2021).

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, 2018e). 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, 2018e). 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. Historically, Tiger Sharks are year-round residents throughout much of the Florida coast, but today are relatively rare in Florida coastal waters due to past exploitation, thus catch is prohibited in Florida state waters. In Florida, EFH has been identified for newborns, juveniles and adults, in the Atlantic along the entire east coast of Florida (FWC, 2021).

Table 4. Atlantic Highly Migratory species expected to occur within or offshore of the Flagler County Project Action Area (NMFS 2023, 2022, 1999 (revised 8/04))

Common Name	**Scientific Name**	**EFH**	**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

*Prohibited species. N=neonate, J=juvenile; A=adult.

3.5 Atlantic States Marine Fisheries Commission Managed Species

Bluefish (*Pomatomus saltatrix*)
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. 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. The majority of Bluefish were landed in North Carolina, New York, and Massachusetts in 2022 (ASMFC, 2024)

Summer Flounder (*Paralichthys dentatus*)
The Summer Flounder's range spans from Nova Scotia, Canada 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. 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. 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 are also highly prized in the recreational fishery. Recreational harvest in 2022 was 8.6 million pounds. (ASMFC, 2024a)

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 four years 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. Florida commercial harvest has been prohibited since January 1988. Florida, followed by Georgia, had the most recreational landings in 2022. (ASMFC, 2024b).

4.0 ESSENTIAL FISH HABITAT ASSESSMENT

4.1 No-Action Alternative (Status Quo)

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

4.2 Preferred Alternative: Dune and Beach Nourishment

The proposed project includes activities which have the potential to temporarily impact EFH. Temporary impacts to EFH include immediate 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 Phase 2 borrow area.

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. The southern extent of the nearshore hardbottom offshore R-46 and R-44 was mapped by divers in May 2024 and is approximately 1,050 ft. north of the PAA (ETOF). Borrow Area 3A is located within Snapper-Grouper EFH and Spiny Lobster EFH (**Figure 1**). 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. The study area for the Local borrow area, Phase 2 borrow area, within Borrow Area 3A occupies roughly 1,545 acres (625 hectares) of seabed (**Figure 2**). The larger shoal area identified by the USACE as Borrow Area 3 in the 2015 Feasibility Study, which contains Borrow Area 3A (approx. 2,465 ac.), spans about 12,000 acres (USACE, 2015).

Basic biological research 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. The Phase 2 borrow area 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.

Construction is expected to begin in 2025 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 timeline could minimize impacts to EFH by avoiding or minimizing overlap with peak recruitment windows in the spring for benthic infaunal assemblages and federally managed fisheries. Should construction overlap with peak recruitment windows, it is expected that effects to the infaunal community will be temporary. There are no submerged aquatic vegetation (SAV) or hardbottom/reef resources present in the PPA (See **Section 3.2.1** of the EA); therefore, these EFH resources will not be impacted and no mitigation or consultation is required.

4.2.1 Impacts to the Water Column

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 are able 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., (1984) 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 noise, 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).

4.2.2 Impacts to Soft Bottom Habitat

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 of dry beach. Restoration of this area through placement of beach compatible-sand will result in the temporary loss of surf zone habitat as the placed sand equilibrates.

Direct placement of sand on the project area shoreline will result in the burial and nearly complete mortality of benthic infauna along the 7.3 miles of project shoreline. Most infaunal loss will be in the shallow waters of the surf zone. Several studies have indicated that the loss of benthic infauna at the sand placement site is temporary, lasting no longer than two years (Van Dolah et al., 1984; Peterson et al., 2006; CEG, 2014). 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 sand placement site. These factors include size and type of 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 sand placement, size and type of fill, and compatibility of the fill material to native sediments are 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 native beach. The sand source utilized in the

Bogue Banks project contained a very high shell content that was not comparable to the native beach (Peterson et al., 2000).

Shorebird use of beaches can be an indicator of the presence of intertidal 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. 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 sand 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 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 area 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 averaging 1.92% and a mean grain size of 0.27 mm. Repopulation of benthic macrofauna at the sand 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 sand placement site in the proposed modification fill area from R-64.5 to R-46 encompasses an overall total of approximately 17 acres of intertidal habitat and 280 acres of shallow, subtidal unvegetated habitat. During active sand placement at the beach site, less than 5% of the 297-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.

4.2.3 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 should 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 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 dredging activities and beach fill equilibration. These impacts will be short term and minor. As Coastal Migratory Pelagics are highly mobile, any species present in the PAA should be able to avoid the area of disturbance. Although some prey associated with these species may be temporarily displaced, they should 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 3** 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 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.

Pelagic Highly Migratory Species

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 utilize the nearshore habitats are highly mobile and able to avoid the area of disturbance. Additionally, the project area is small in relation to the oceanic area utilized by these species. It is unlikely that these species will be adversely affected by project activities.

Snapper-Grouper Complex

The borrow area is located within EFH for the Snapper-Grouper complex; however remote sensing surveys confirmed the absence of hardbottom and other benthic resources (**Figure 1**). Many species included in the Snapper-Grouper complex utilize habitat within the project area during different stages of their life cycle. The intertidal 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

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 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 years.

Spiny Lobster

The 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 adult, juvenile and larval stages of the Summer Flounder and Red Drum are common in the coastal and estuarine waters of Florida. The water column within and adjacent to the project area provide EFH for the two ASMFC fish species that occur in the area. These species are predatory feeders; common prey items are typical of habitats within the project area. Loss of habitat and reduction in the availability of prey items will temporarily impact all life stages of the Bluefish, Red Drum, and Summer Flounder.

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EA APPENDIX 3

FIGURES, TABLES, AND IMAGES

LIST OF FIGURES, TABLES AND IMAGES

FIGURES

<u>TABLES</u>

<u>IMAGES</u>

Flagler County Dune/Beach Nourishment Project Environmental Assessment figures, tables, and images in order of appearance.

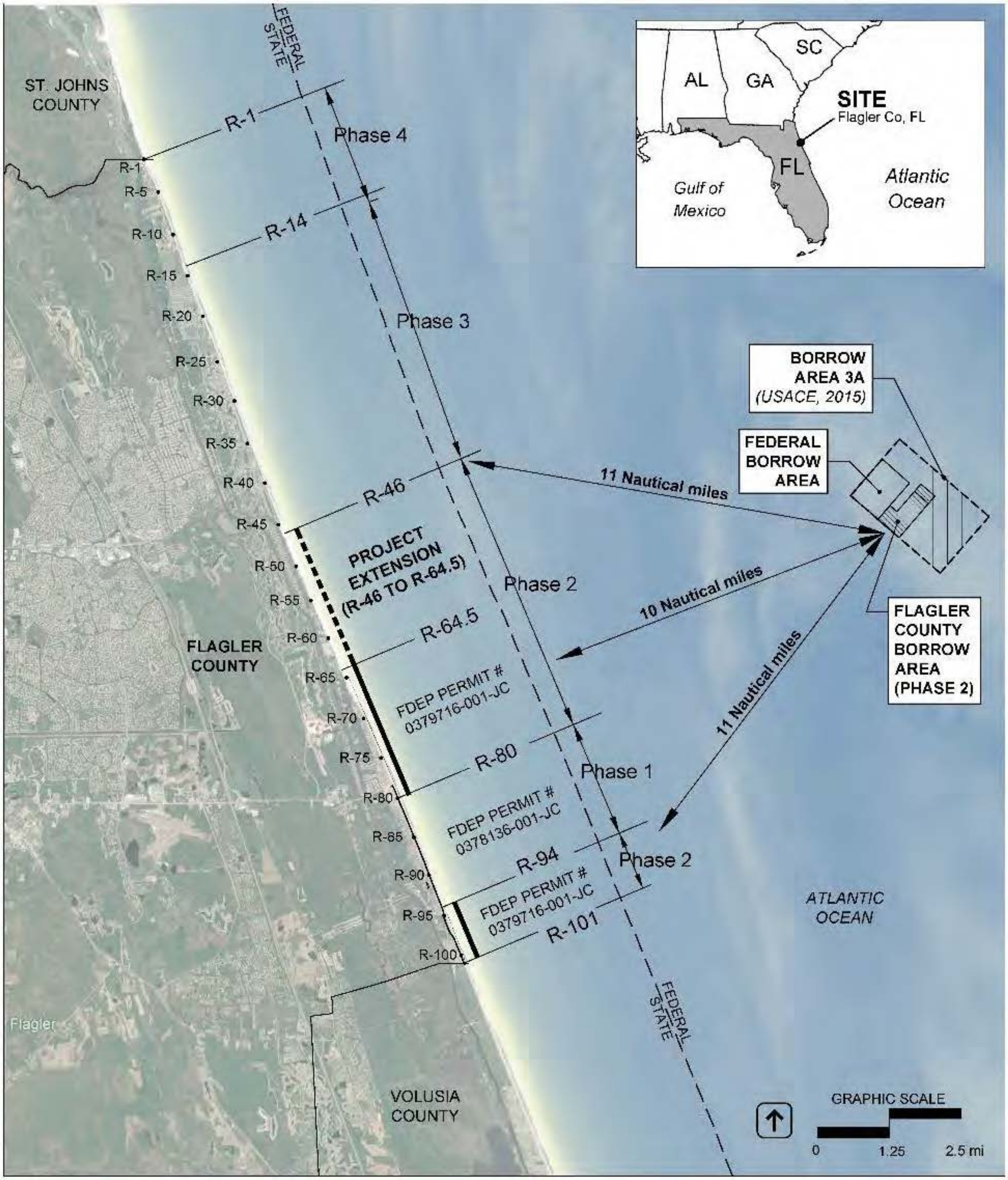


Figure 1. Project location map – Flagler County Beach and Dune Restoration Project. Shown are the limits of the four Flagler County beach management Phases.

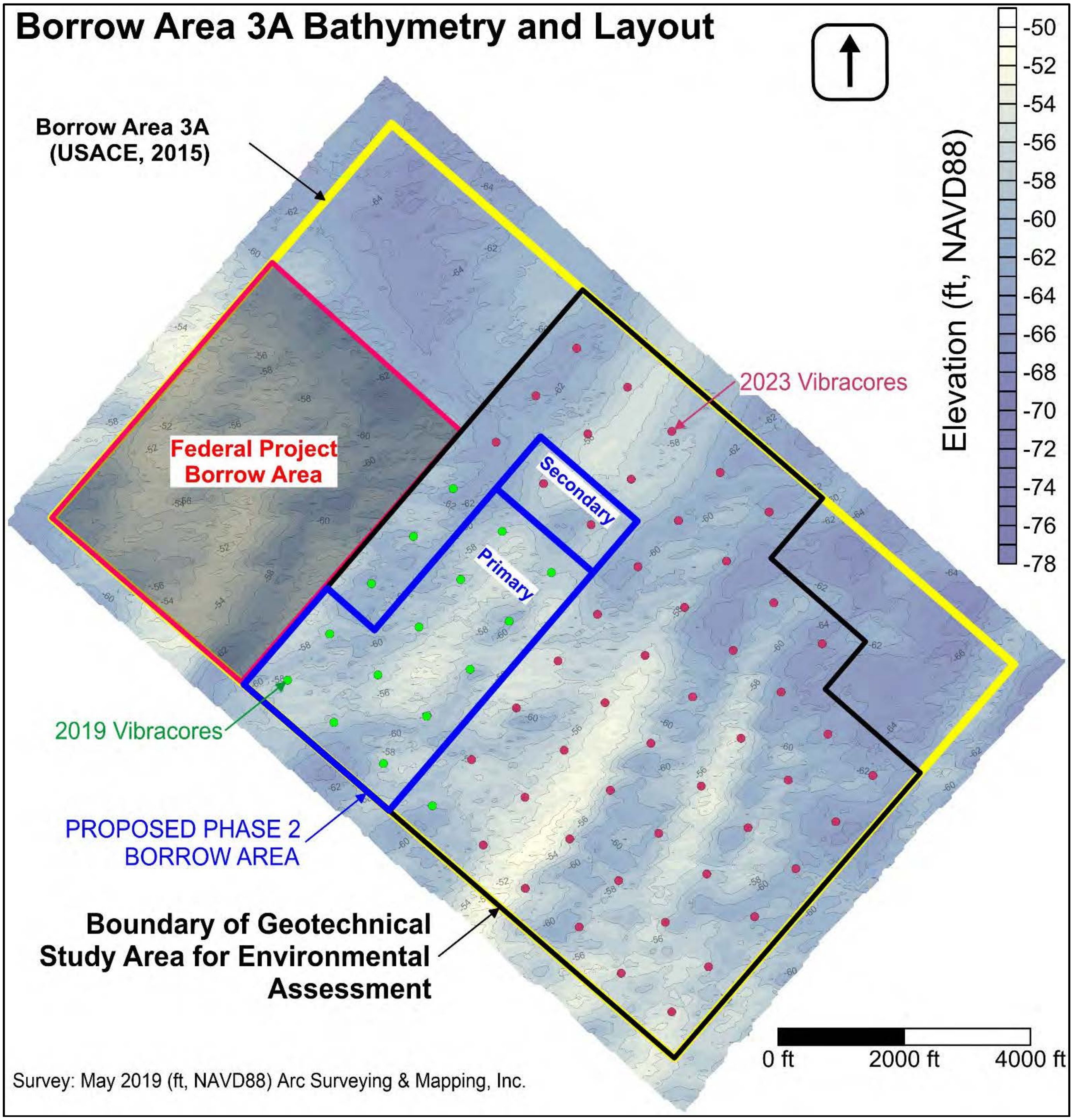


Figure 2a. Proposed Phase 2 Borrow Area location within 3A and relative to Federal borrow area. Seafloor elevations and 2019 and 2023 vibracore locations shown. The proposed Phase 2 Borrow Area occupies about 320 acres, the Federal borrow area occupies roughly 490 acres, and the overall Borrow Area 3A occupies about 2,465 acres. The Phase 2 borrow area is comprised of PRIMARY and SECONDARY areas.

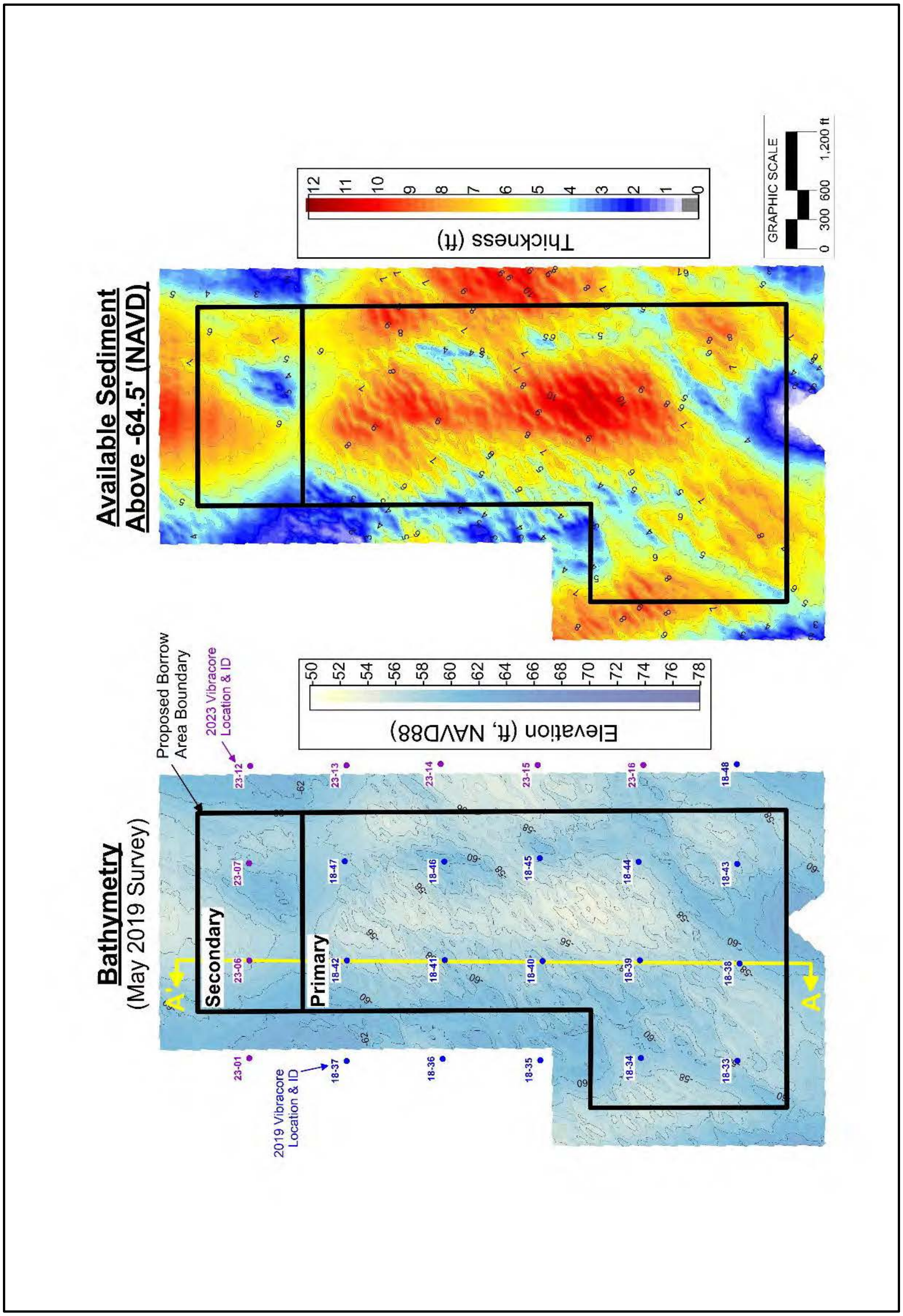


Figure 2b. Bathymetry of the proposed Phase 2 borrow area (left) and sediment layer thickness in feet above -64.5 ft, NAVD88 (right). Bathymetric contours are represented by the May 2019 multibeam survey (Arc Surveying & Mapping, Inc.).

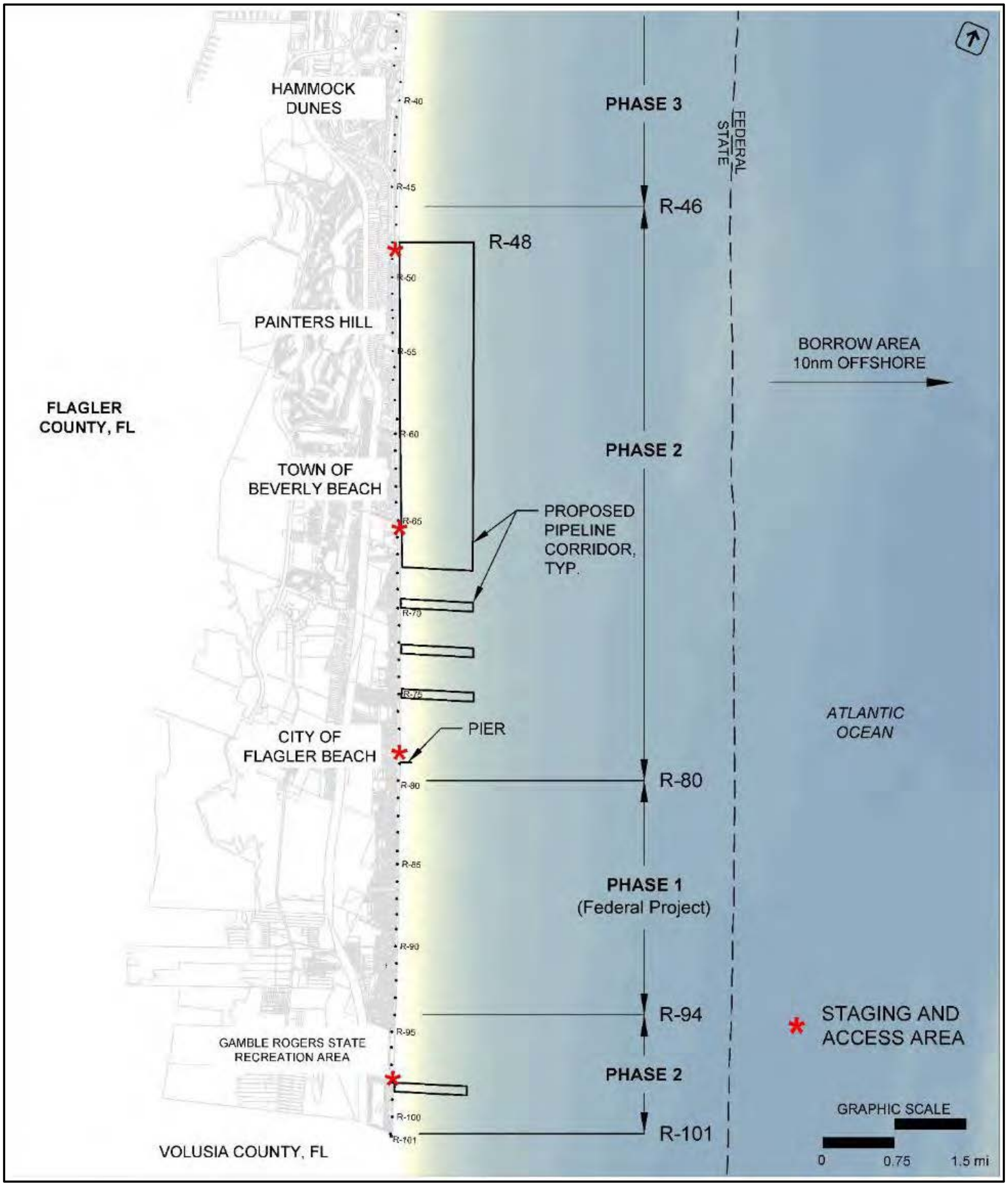


Figure 3. Pipeline corridors and staging and access areas for the Flagler County Local project.

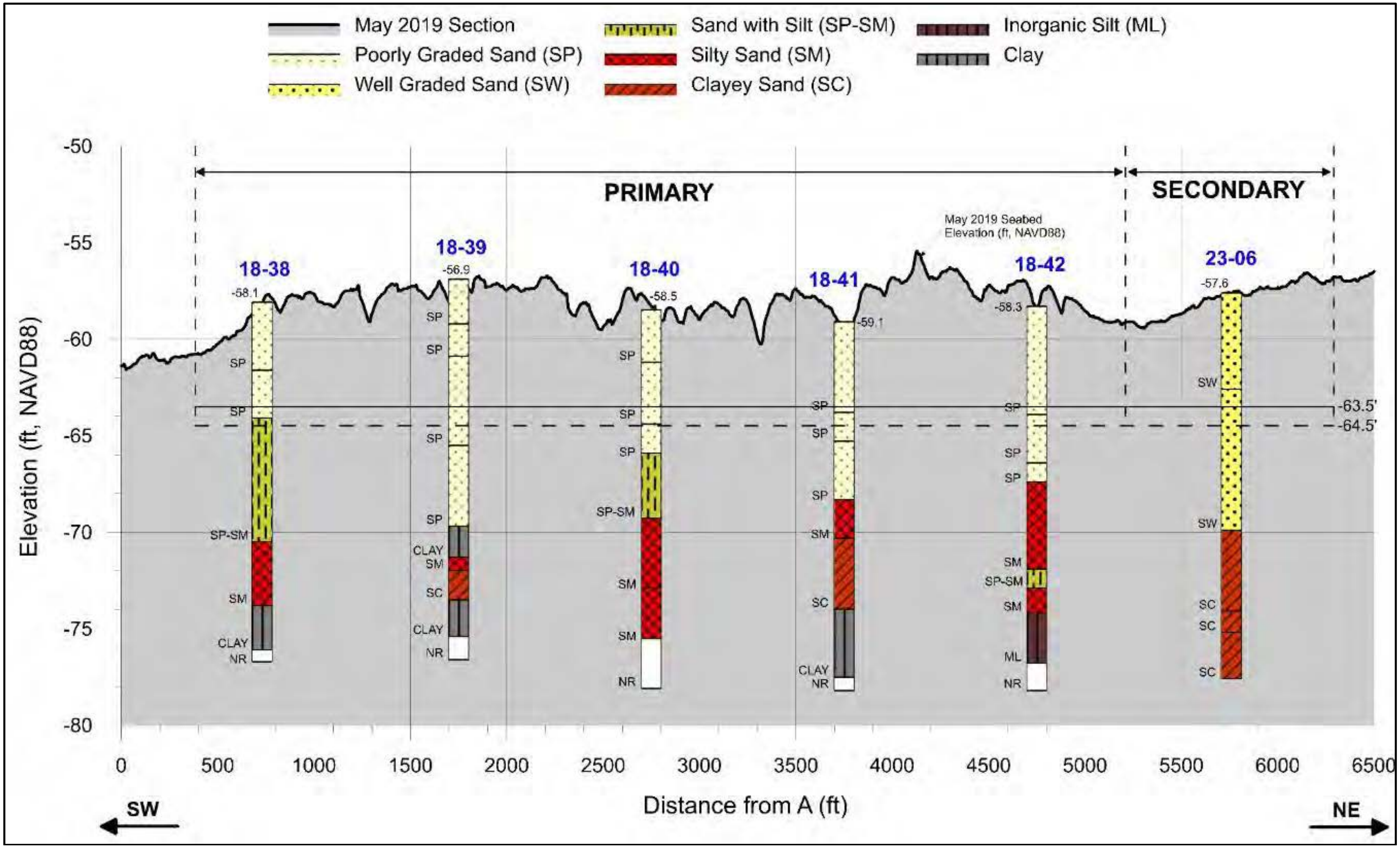


Figure 4. Fence plot of vibracore detail demonstrating the makeup of the Phase 2 Borrow Area material based on the record provided in the vibracore logs.

Image 1a. Primary construction staging and access area at Varn Park along the north end of Painters Hill.

Image 1b. Varn Park approximate construction staging and access area, looking north. Photo date: 26 April 2024.

Image 2a. Construction staging and access along the southern end of Beverly Beach.

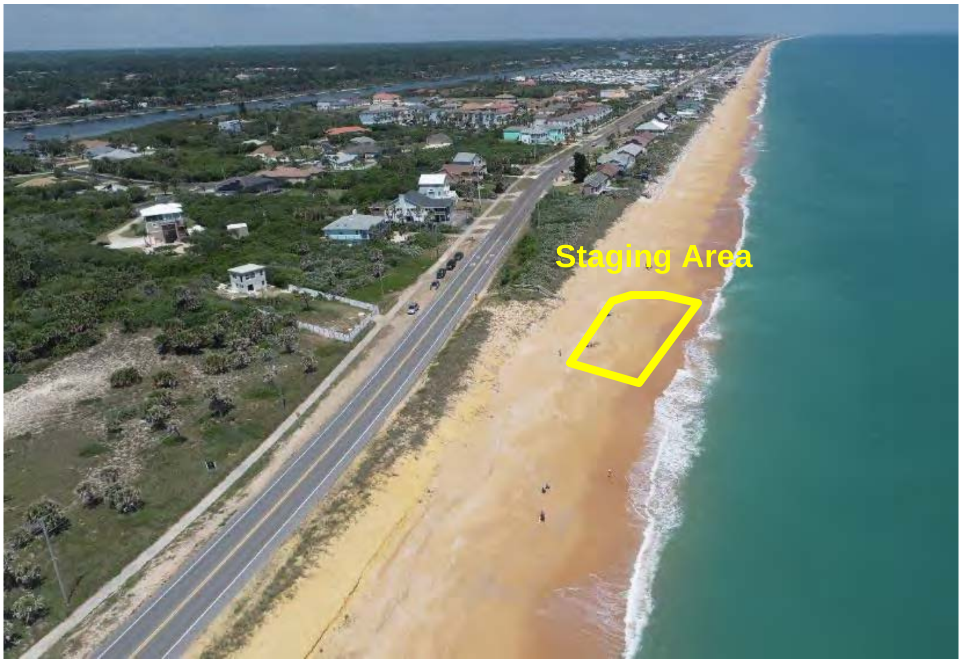


Image 2b. Beverly Beach approximate construction staging and access area, looking north. Photo date: 26 April 2024.

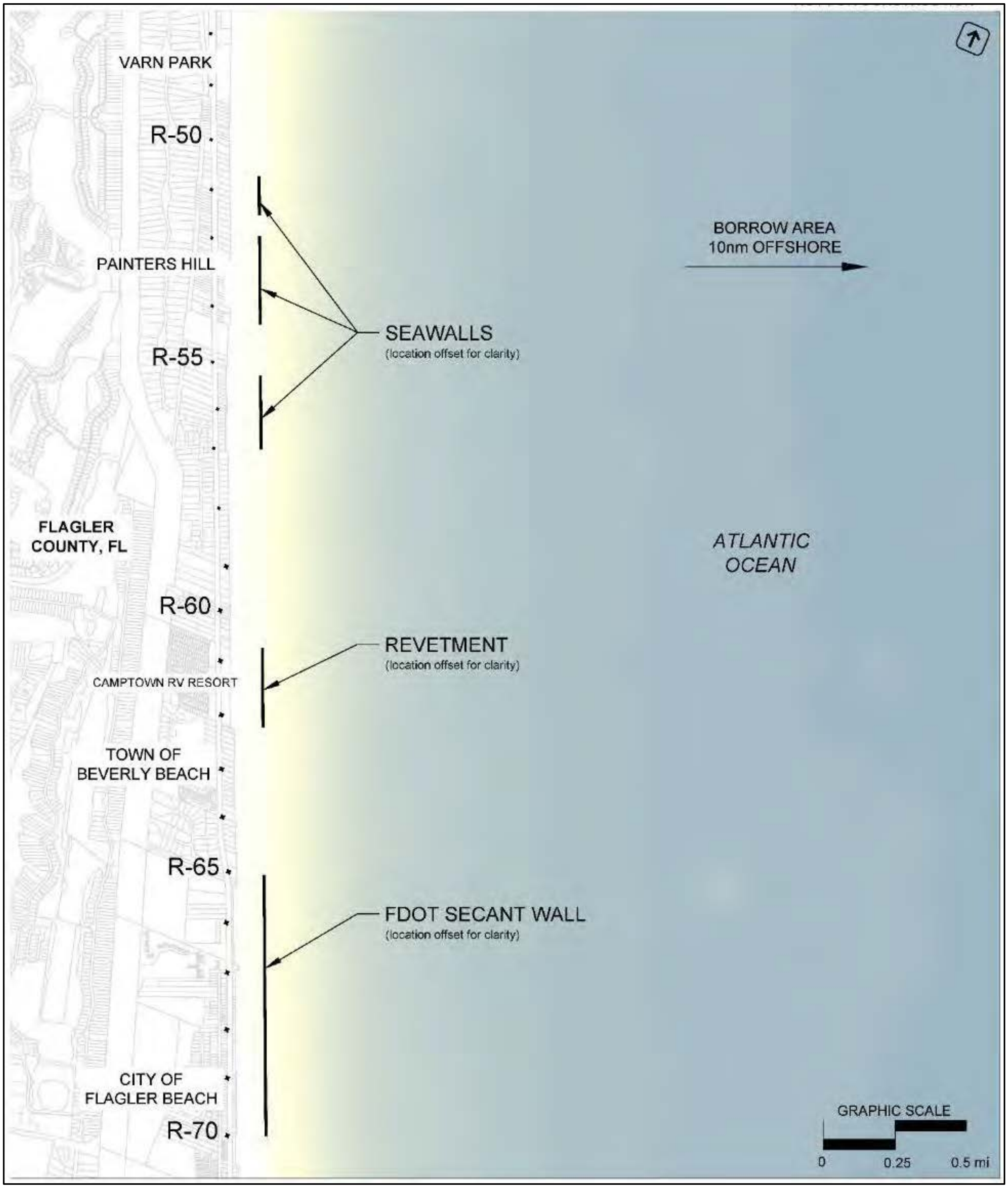


Figure 5. Alongshore extent and location of existing coastal armoring along the Phase 2 project area.

Table 1. FDEP critically eroded designated beach reaches in Flagler County (July 2023).

Location	FDEP Control Monument	Approximate Extent	Phase
Marineland	R-01 - R-04	0.6 miles	Future Phase 4
Painters Hill	R-50 - R-57	1.1 miles	Phase 2
Beverly Beach and Flagler Beach	R-65.2 - R-100.9	6.4 miles	Phase 2
Total		**8.1 miles**	

Table 2. Summary comparison of impacts for the Preferred Alternative and No-Action Alternative for the Local project.

EXISTING ENVIRONMENTAL FACTOR	PREFERRED ALTERNATIVE: Dune and Beach Nourishment	NO ACTION ALTERNATIVE
VEGETATION	Temporary impact to dune and upper beachface vegetation will occur from construction activities. 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 (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 to occur. Direct positive impacts: • Nesting area along project reach would increase with nourishment activities	Continued loss of sea turtle nesting habitat on the beach.
HARDBOTTOM RESOURCES	No hardbottom resources are known to be present within or adjacent to the project limits or borrow area based on project-specific surveys. Resources that may exist outside of the project or borrow area will be avoided. No effects are expected to occur.	No impacts would occur. Known hardbottom resources occur within the study area but do not occur within the borrow area or project limits.
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 impact 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. No hardbottom resources were identified to be present in the borrow area during the subsurface resource survey; therefore, no impact would occur to this resource. No placement of material will occur 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 with this project.	Continued loss of beach habitat associated with CBRA Units FL-P07P and P05A.
WATER QUALITY	Direct adverse impacts include a temporary increase in turbidity adjacent to the borrow site and beach fill area. 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 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 plant.	No impacts would occur.
NOISE	Temporary increase in noise at the borrow area and at the placement sites.	No impacts would occur.
AESTHETIC RESOURCES	Temporary decrease in the aesthetic appeal of the beach while placement activities occur; 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 to recreational interests using the beach. Minor temporary impact to recreational boaters required to avoid the dredge and associated vessels during construction activities.	Long-term decline in beach available for use by recreational interests.
NAVIGATION	Temporary impacts to vessels utilizing the Atlantic Ocean near the Borrow Area 3A sub-areas and utilizing the nearshore areas during sand pump-out.	No impacts would occur.
HISTORIC AND CULTURAL RESOURCES	Adverse effects to potentially significant historic properties in the nearshore and borrow areas. Buffer of 200-ft around any identified significant historic properties if encountered. May require use of borrow area 3A to meet sand volume needs.	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.

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

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

Tidal Datum - Elevation Relative to Mean Lower Low Water	State Road A1A	Smith Creek
Mean High Water (MHW)	3.8 ft.	0.94 ft.
North American Vertical Data (NACD 88)	2.28 ft.	0.78 ft.
Mean Tide Level (MSL)	1.95 ft.	0.52 ft.
Mean Low Water (MLW)	0.16 ft.	0.07 ft.
Mean Lower Low Water (MLLW)	0	0

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

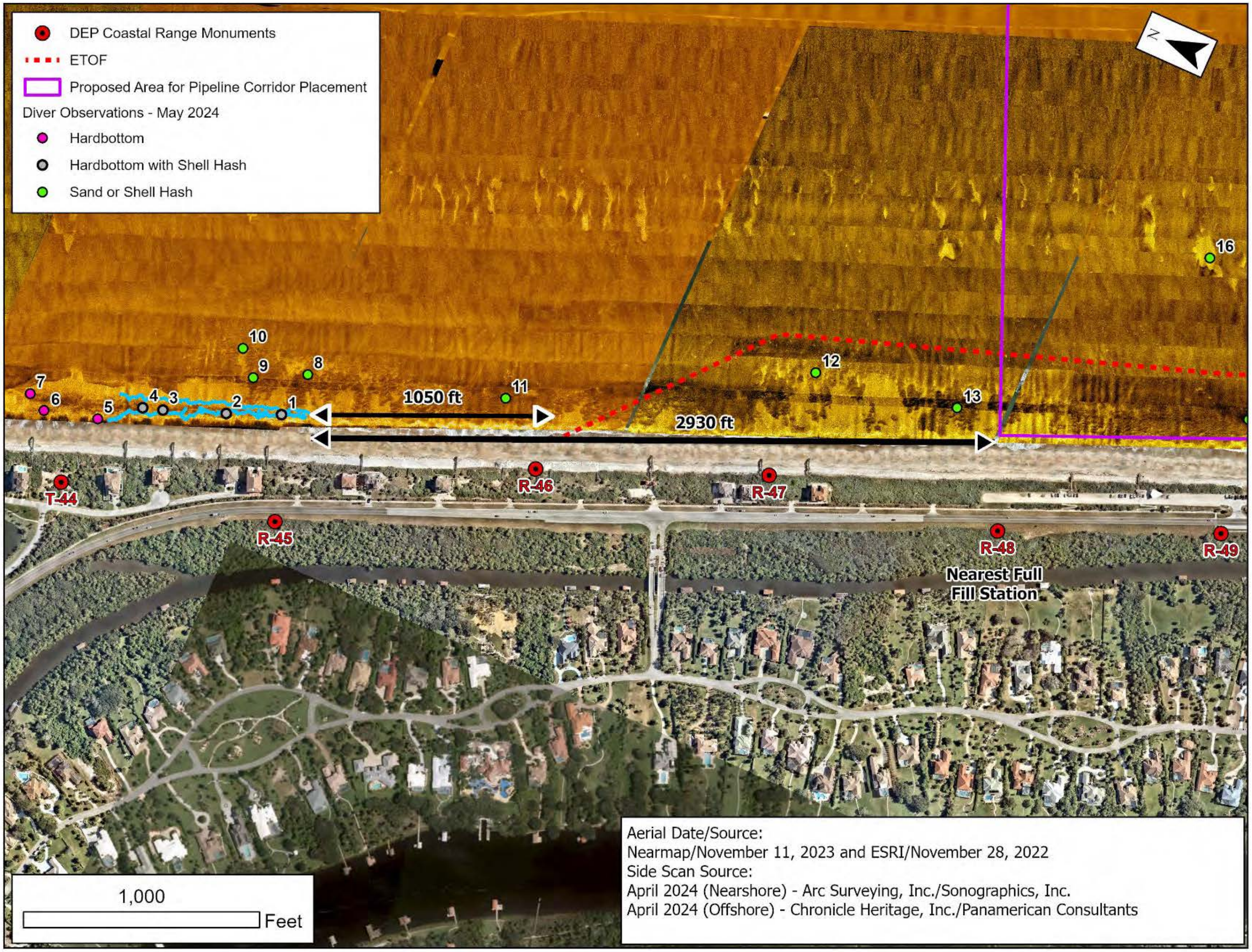


Figure 6. Southernmost extent of exposed nearshore hardbottom mapped by CEG divers in May 2024 and overlaid on April 2024 side scan imagery.

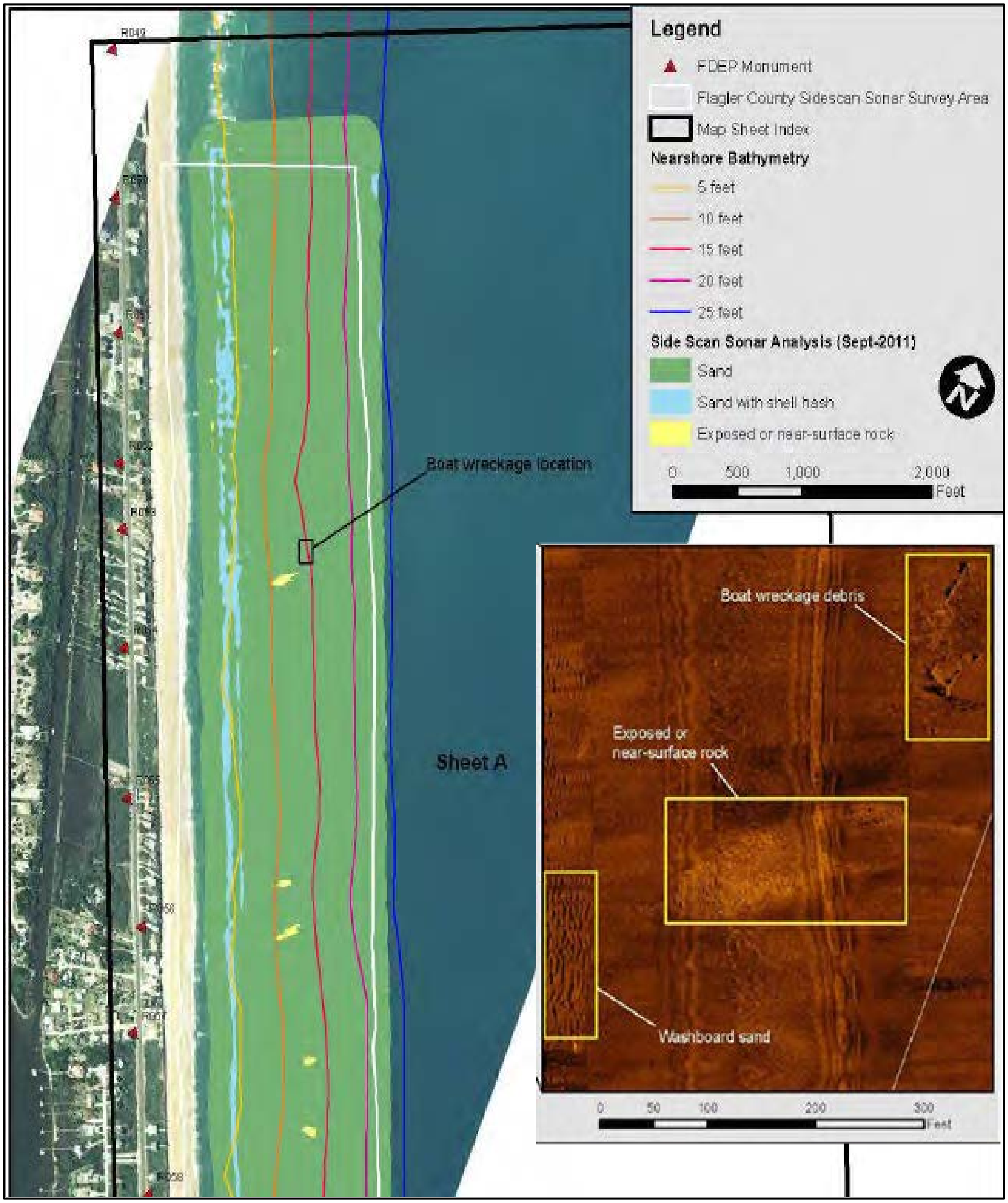


Figure 7. Left: Map of “presumed rock” features from 2011 side scan sonar (isolated, shore-perpendicular yellow features). Right: Close-up of 2011 side scan sonar showing boat wreckage and feature interpreted as “presumed exposed rock” (Source: Dial Cordy and Associates, 2011).

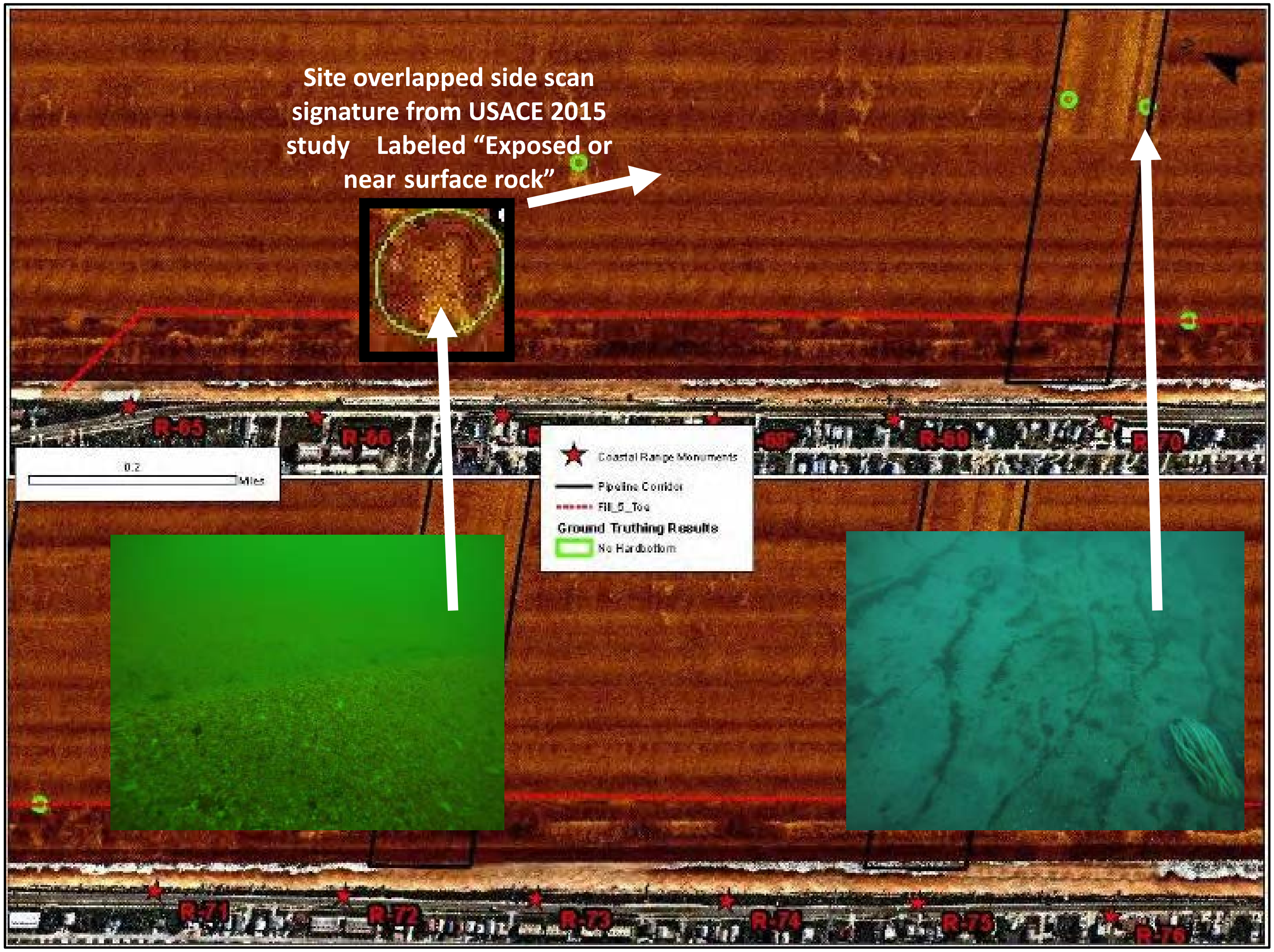


Figure 8. 2019 side scan sonar imagery in the project area showing one signature that overlapped with the 2011 survey (zoom of this feature show in black frame and green circle). No hardbottom was found in 2019.

Figure 9. 2019 side scan sonar imagery in the PAA with images of representative ground-truthing sites. No Hardbottom was found in the 2019 field investigations.

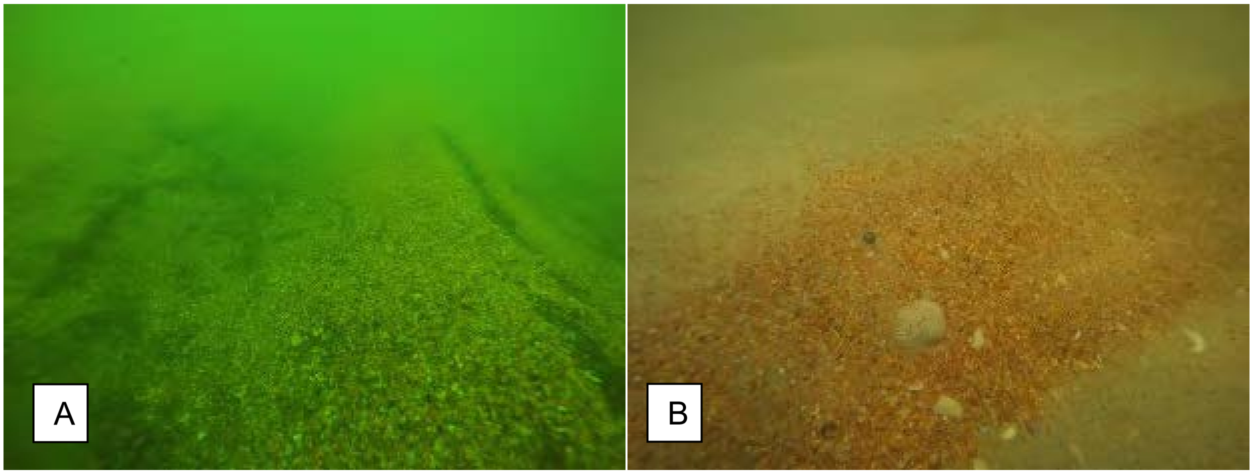


Image 3. Representative images of ground-truthed side scan sonar signatures from verification dives on July 16, 2019. A) Southern pipeline corridor, B) Landward of the ETOF at R-95.

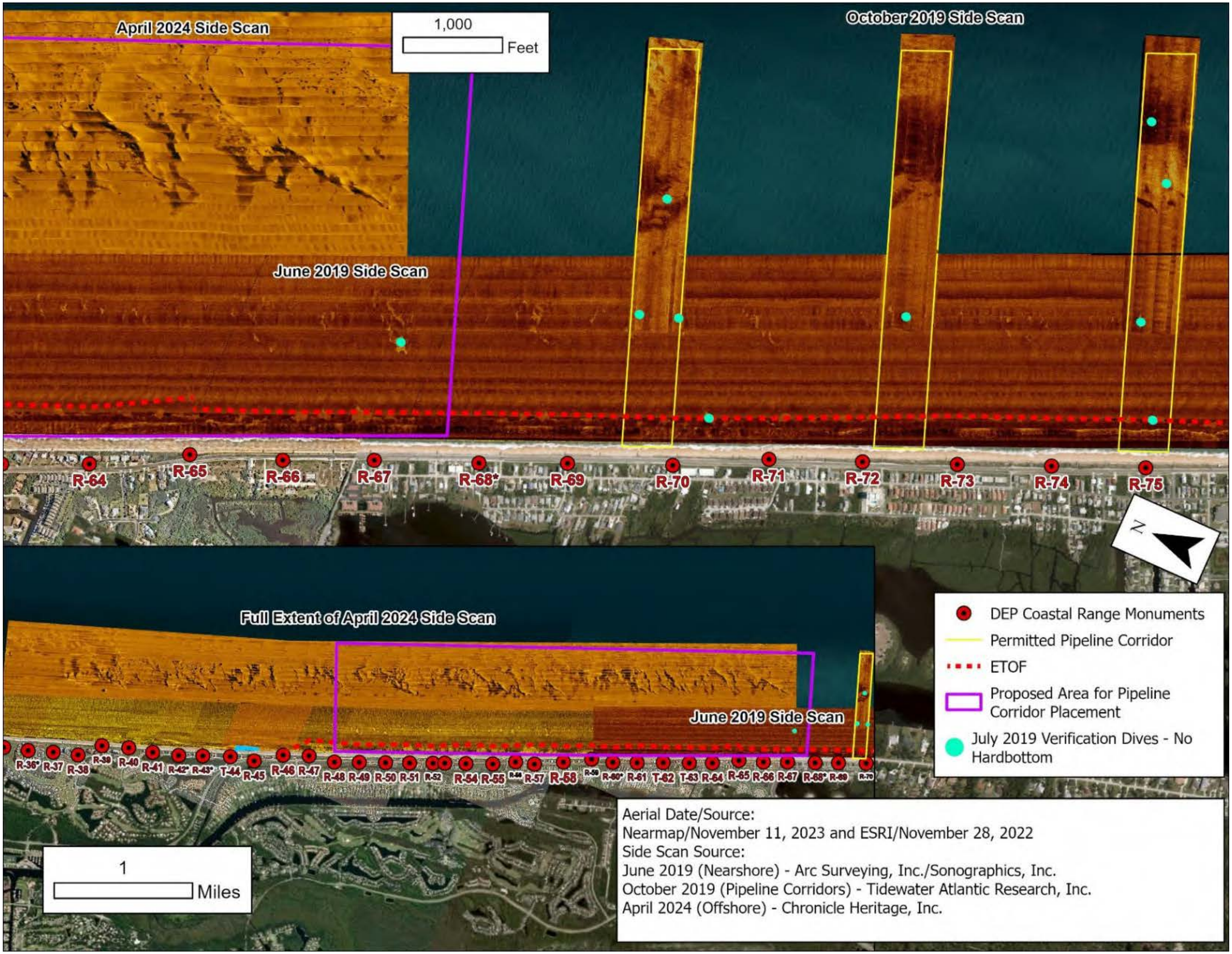


Figure 10. April 2024 side scan imagery signature comparison with July 2019 verification dives and 2019 side scan imagery.

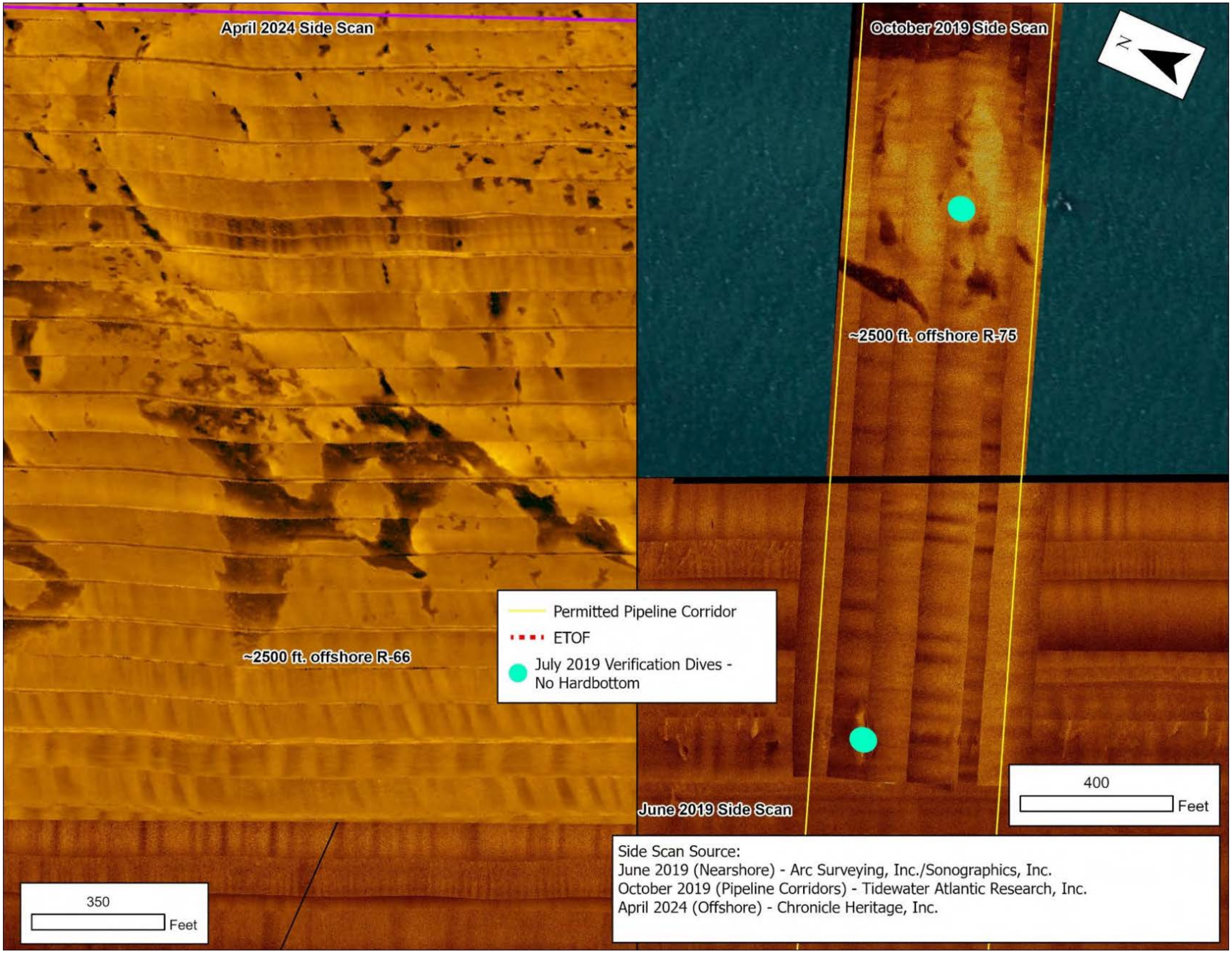


Figure 11. Close up of April 2024 side scan imagery signature comparison with July 2019 verification dives and 2019 side scan imagery.

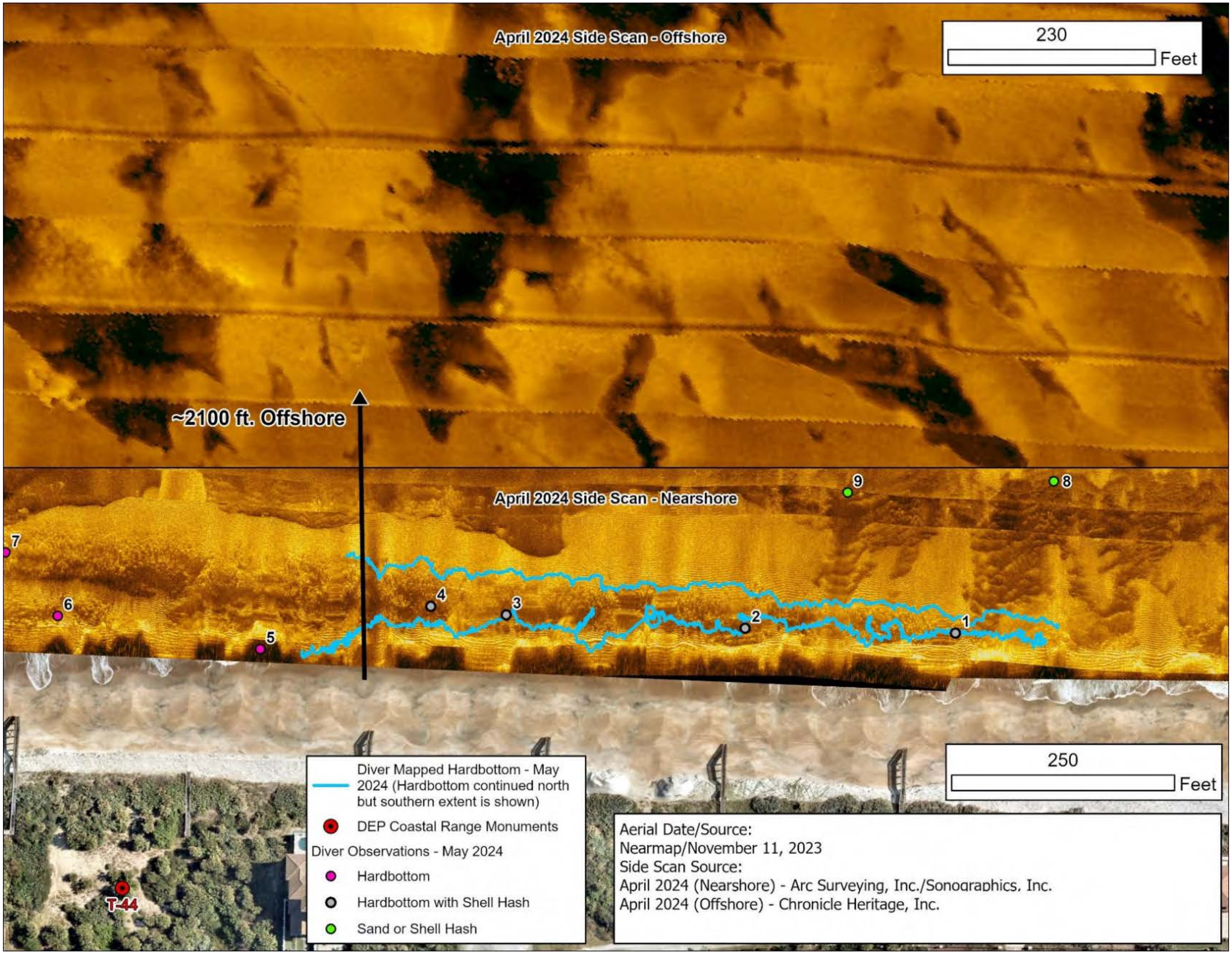


Figure 12. April 2024 side scan imagery with May 2024 diver verified hardbottom signature and comparison to features approximately 2,100 ft. offshore.

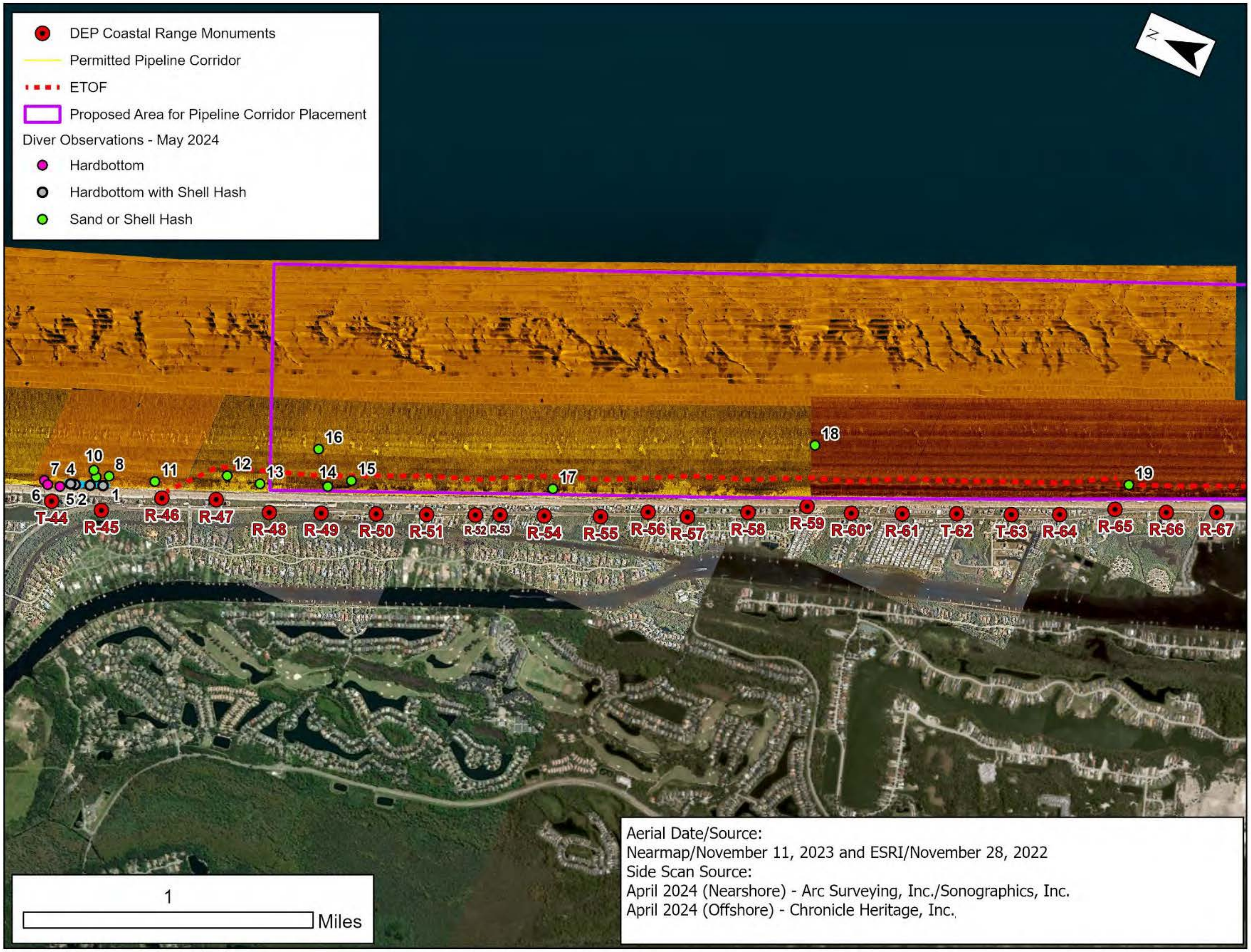


Figure 13. April 2024 side scan imagery with May 2024 diver verification sites and results.

Table 4. May 2024 verification dive results. Refer to **Figure 14** for site locations.

Site	Depth	Sand Color	Field notes
1	4-8 ft.	Orange	Hardbottom, shell hash (in HB mapped area)
2	4-8 ft.	Orange	Hardbottom, shell hash (in HB mapped area)
3	4-8 ft.	Orange	Hardbottom, shell hash (in HB mapped area)
4	4-8 ft.	Orange	Hardbottom, shell hash (in HB mapped area)
5	7 ft.	Orange	Hardbottom (in HB mapped area)
6	8 ft.	Orange	Hardbottom
7	8 ft.	Orange	Hardbottom
8	9 ft.	Tan	Sand with small shell hash
9	8.5 ft.	Tan	Sand with small shell hash
10	8.5 ft.	Brown	Brown fine sand
11	4 ft.	Gray/Brown	Changed to fine brown offshore of target
12	7 ft.	Brown	Shell hash mixed with brown sand. Offshore, orange shell hash
13	3 ft.	Brown	Shell hash, fine brown sand just offshore
14	3 ft.	Gray/Brown	Mixed gray-brown sand with shell hash
15	5.5 ft.	Brown	Brown fine sand (fine, silicious)
16	15 ft.	Orange	Shell hash
17	7 ft.	Gray	Fine gray compacted sand
18	10 ft.	Brown	Brown fine sand with small shell hash
19	14.6 ft.	Brown	Brown fine sand with small shell hash

Table 5. Summary comparison of native beach sediment to the proposed Phase 2 borrow area composite sediment with overfill ratios.

Parameter	Borrow Area Composite	Native Beach Composite
Mean (mm)	0.27	0.24
Median (mm)	0.22	0.17
Sorting (phi)	1.03	1.28
% Retained #4	0.91%	0.71%
% Passing #200	1.91%	1.36%
% Passing #230	1.86%	1.16%
% Shell Content	24.3%	17.3%
Munsell Value	5.9	7.2
Overfill (James, 1974)	-	1.03
Overfill (Dean, 2000)	-	1.00

Notes: Fines are percent material passing No. 230 sieve. Percent shell determined from visual shell content analysis. Source: OAI, 2024.

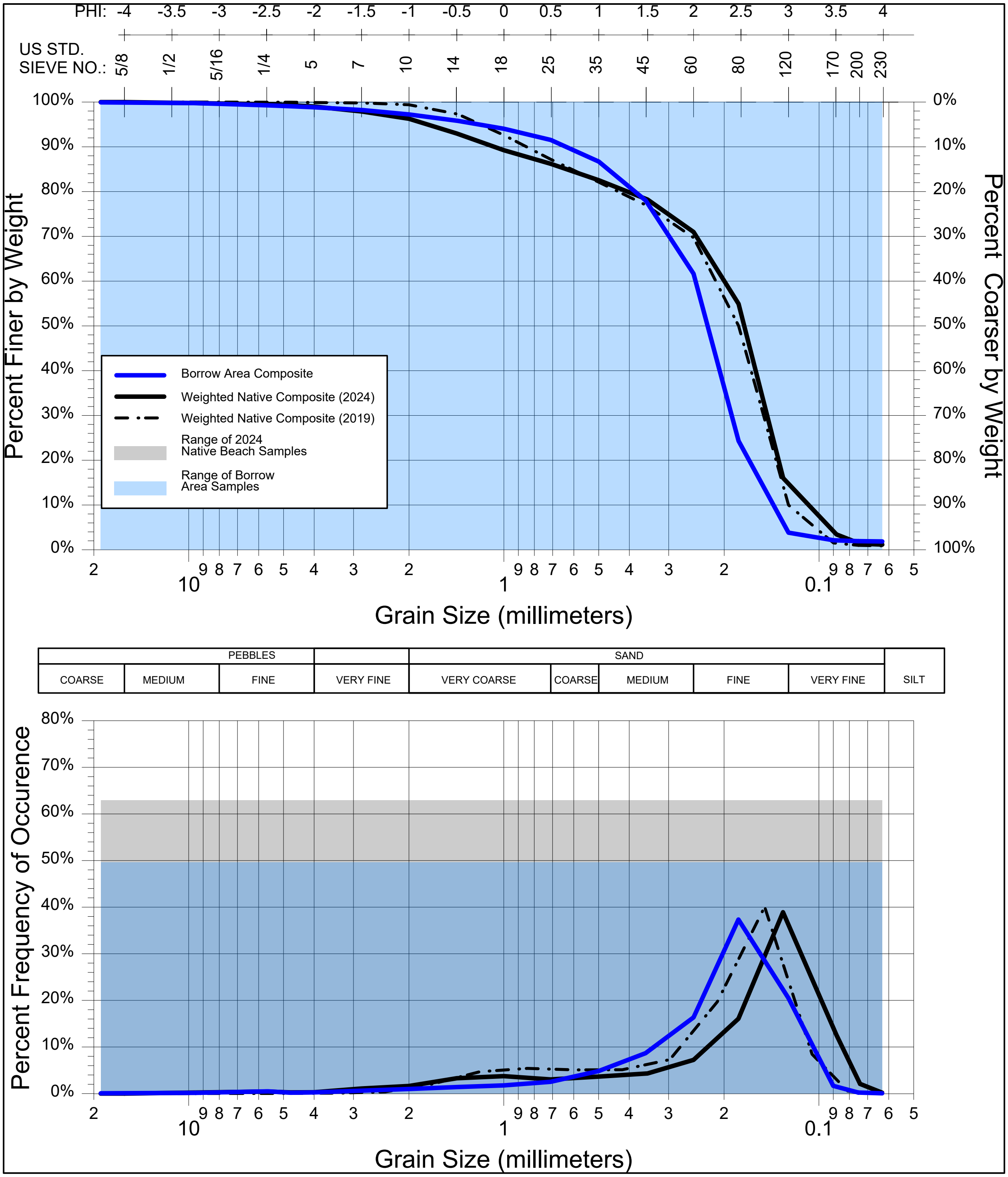


Figure 14. Cumulative grain size curves for the borrow area and existing beach sediments.

Table 6. Estimated levels of pollutants that may be generated during project construction. Source: BOEM.

Type	Location	Mode	HC Emissions (tons)	VOC Emissions (tons)	CO Emissions (tons)	Nox Emissions (tons)	PM_{10} Emissions (tons)	$PM_{2.5}$ Emissions (tons)	CO_2 Emissions (tons)
Crew Boat	Inside State Waters		0.05	0.05	0.28	1.74	0.04	0.04	118.03
Tender 1	Inside State Waters		0	0	0	0	0	0	0
Tow Boat	Inside State Waters		0.09	0.1	0.63	3.2	0.07	0.06	236.06
Bulldozer	Inside State Waters		0.01	0.01	0.01	0.02	0	0	21.19
Bulldozer	Inside State Waters		0.01	0.01	0.01	0.02	0	0	21.19
Excavator	Inside State Waters		0.01	0.01	0.01	0.01	0	0	21.42
Dredge Vessel Generator	Inside State Waters	Transit	0.01	0.01	0.05	0.32	0.01	0.01	21.98
Dredge Vessel Main	Inside State Waters	Transit	0.08	0.08	1.43	6.07	0.12	0.12	391.04
Dredge Vessel Generator	Inside State Waters	Pumping	0.02	0.02	0.11	0.66	0.02	0.02	45.72
Dredge Vessel Main	Inside State Waters	Pumping	0.16	0.17	2.97	12.63	0.25	0.24	813.25
Dredge Vessel Generator	Outside State Waters	Dredging	0.01	0.01	0.05	0.33	0.01	0.01	22.98
Dredge Vessel Main	Outside State Waters	Dredging	0.08	0.08	1.49	6.35	0.13	0.12	408.85
Dredge Vessel Generator	Outside State Waters	Transit	0.01	0.01	0.07	0.42	0.01	0.01	29.31
Dredge Vessel Main	Outside State Waters	Transit	0.1	0.11	1.9	8.1	0.16	0.16	521.39
Total Emissions at all Locations and Sources			0.64	0.67	9.01	39.87	0.82	0.79	2672.41

Image 4. Beach conditions at Varn Park on April 26, 2024. Source: Olsen Associates, Inc.

Image 5a. Existing beach conditions at Beverly Beach on April 26, 2024. Source: Olsen Associates, Inc.

Image 5b. Existing dune vegetation and beach face between R-70 and R-71 Beverly Beach on April 26, 2024. Source: Olsen Associates, Inc.

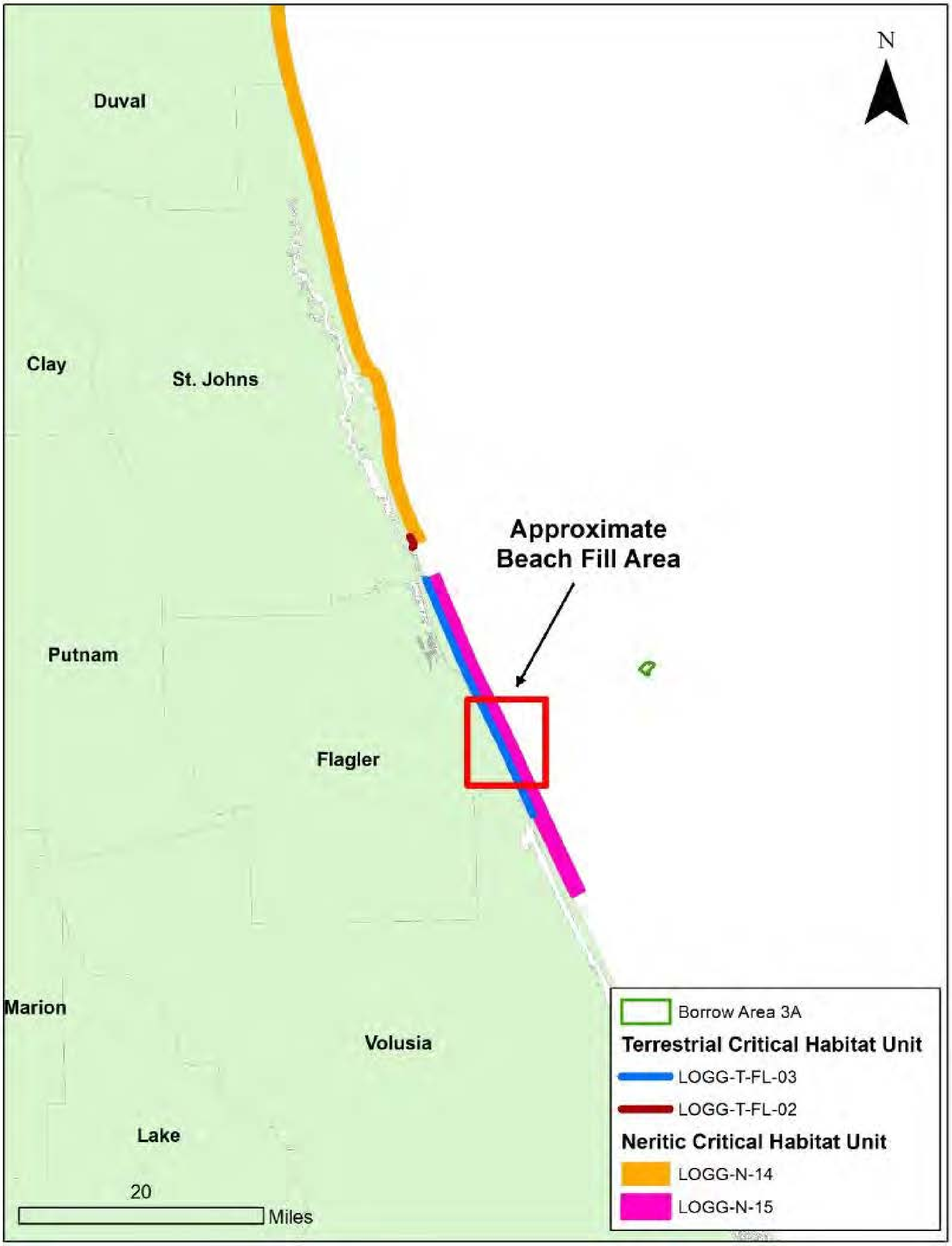


Figure 15. Loggerhead sea turtle critical habitat in the PAA for the Flagler County Beach and Dune Restoration Project.

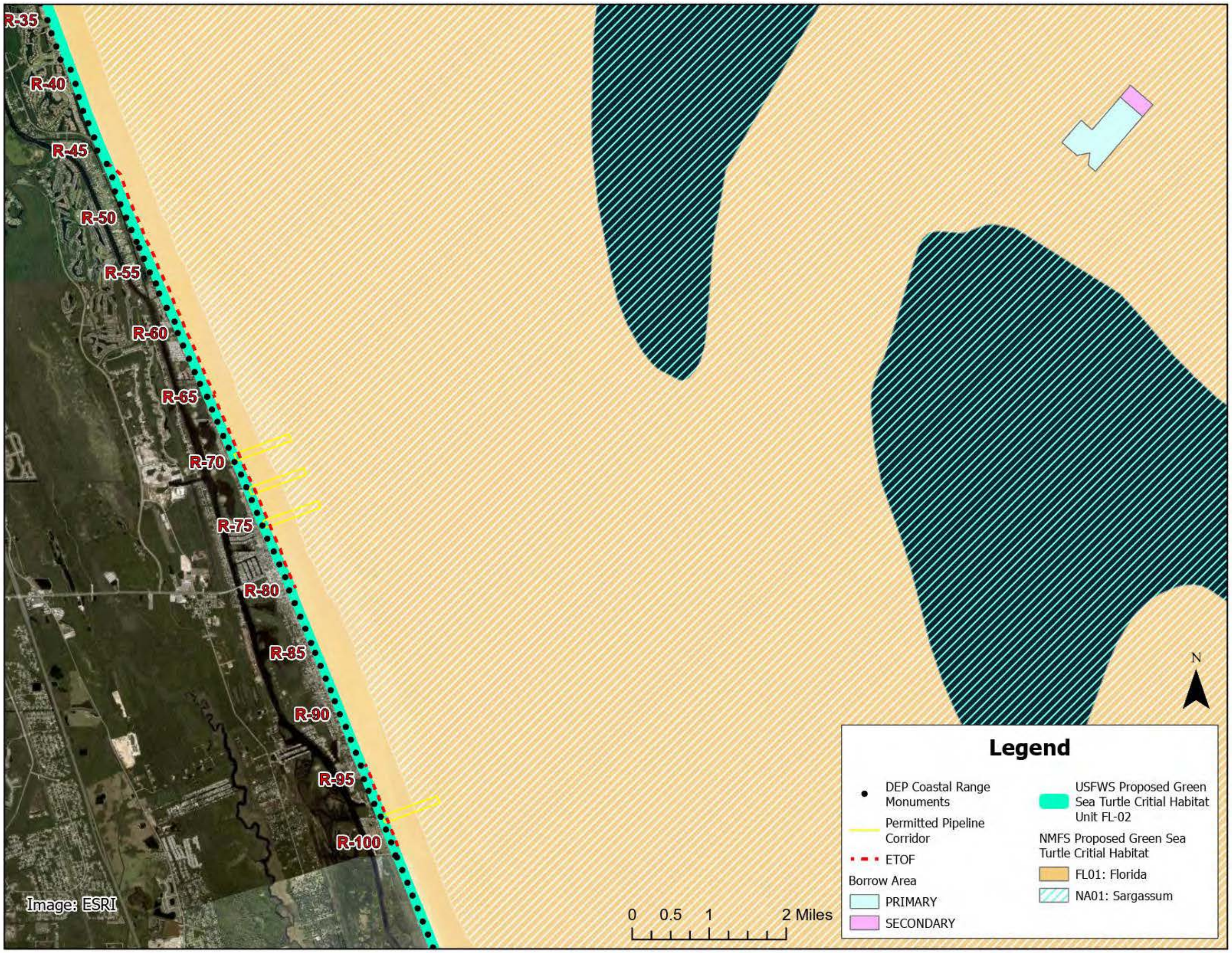


Figure 16. Proposed green sea turtle critical habitat in the PAA for the Flagler County Beach and Dune Restoration Project.

Table 7. Sea turtle nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Nests	False Crawls	Density of Nests per km	Nesting Success	Total # of Nests Relocated	Reasons for Relocation
2014	Flagler Beach	9.6	86	85	9.0	50%	18	High Tide Line, Storm water runoff
2014	Flagler County Beaches (South)	9.7	167	66	17.2	72%	3	High Tide Line
2014	Gamble Rogers Memorial SRA	1.8	30	3	16.7	91%	0	
2015	Flagler Beach	9.6	129	65	13.4	66%	32	High Tide Line
2015	Flagler County Beaches (South)	9.7	252	71	26.0	78%	8	High Tide Line
2015	Gamble Rogers Memorial SRA	1.8	32	19	17.8	63%	1	Washing out, remaining eggs relocated (not initial nest treatment)
2016	Flagler Beach	9.6	192	115	20.0	63%	44	Inundation
2016	Flagler County Beaches (South)	9.7	294	95	30.3	76%	4	High Tide Line
2016	Gamble Rogers Memorial SRA	1.8	46	30	25.6	61%	1	High Tide Line
2017	Flagler Beach	9.6	168	68	17.5	71%	41	High Tide Line
2017	Flagler County Beaches (South)	9.7	335	84	34.5	80%	20	High Tide Line
2017	Gamble Rogers Memorial SRA	1.8	63	13	35.0	83%	0	
2018	Flagler Beach	9.6	92	95	9.6	49%	34	Inundation
2018	Flagler County Beaches (South)	9.7	158	109	16.3	59%	60	3 due to High Tide Line; 57 due to Beach Renourishment Project
2018	Gamble Rogers Memorial SRA	1.8	30	20	16.7	60%	2	Nests washing away, exposed eggs relocated (Not initial nest treatment)

Table 7 continued. Sea turtle nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Nests	False Crawls	Density of Nests per km	Nesting Success	Total # of Nests Relocated	Reasons for Relocation
2019	Flagler Beach	9.6	228	217	23.8	51%	26	imminent tidal inundation
2019	Flagler County Beaches (South)	9.7	482	179	49.7	73%	1	High Tide Line
2019	Gamble Rogers Memorial SRA	1.8	81	26	45.0	76%	2	Both nests were partially exposed as a result of high tides - not initial nest treatment
2020	Flagler County Beaches (South)	9.7	264	195	27.2	58%	0	
2020	Flagler Beach	9.6	161	159	16.8	50%	28	storm water runoff, imminent tidal inundation
2020	Gamble Rogers Memorial SRA	1.8	50	30	27.8	63%	0	
2021	Flagler Beach	9.6	144	122	15.0	54%	14	Imminent tidal inundation
2021	Flagler County Beaches (South)	9.7	290	116	29.9	71%	0	
2021	Gamble Rogers Memorial SRA	1.8	46	26	25.6	64%	2	The nests were being exposed and washing away.
2022	Flagler Beach	9.6	330	205	34.4	62%	24	Laid below tide line and storm water runoff
2022	Flagler County Beaches (South)	9.7	510	188	52.6	73%	7	1 due to High Tide Line, 6 due to beach renourishment project
2022	Gamble Rogers Memorial SRA	1.8	105	44	58.3	70%	2	1-At or near hightide line; 1-Eggs exposed, not the initial nest treatment.
2023	Flagler Beach	9.6	267	212	27.8	56%	9	Imminent tidal inundation
2023	Flagler County Beaches (South)	9.7	440	524	45.4	46%	109	Beach Renourishment Project
2023	Gamble Rogers Memorial SRA	1.8	69	63	38.3	52%	0	

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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 8. Loggerhead nesting, false crawl, and relocation data within the County (Local) and Federal Project Areas, 2014 through 2023.

Year	Beach	Length (km)	Loggerhead Nest	Loggerhead False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	83	77	8.6	52%
2014	Flagler County Beaches (South)	9.7	150	62	15.5	71%
2014	Gamble Rogers Memorial SRA	1.8	30	3	16.7	91%
2015	Flagler Beach	9.6	116	64	12.1	64%
2015	Flagler County Beaches (South)	9.7	189	63	19.5	75%
2015	Gamble Rogers Memorial SRA	1.8	26	19	14.4	58%
2016	Flagler Beach	9.6	188	115	19.6	62%
2016	Flagler County Beaches (South)	9.7	285	89	29.4	76%
2016	Gamble Rogers Memorial SRA	1.8	46	30	25.6	61%
2017	Flagler Beach	9.6	122	53	12.7	70%
2017	Flagler County Beaches (South)	9.7	213	53	22.0	80%
2017	Gamble Rogers Memorial SRA	1.8	54	10	30.0	84%
2018	Flagler Beach	9.6	88	92	9.2	49%
2018	Flagler County Beaches (South)	9.7	152	105	15.7	59%
2018	Gamble Rogers Memorial SRA	1.8	30	19	16.7	61%
2019	Flagler Beach	9.6	191	209	19.9	48%
2019	Flagler County Beaches (South)	9.7	329	139	33.9	70%
2019	Gamble Rogers Memorial SRA	1.8	67	23	37.2	74%
2020	Flagler Beach	9.6	135	153	14.1	47%
2020	Flagler County Beaches (South)	9.7	213	185	22.0	54%
2020	Gamble Rogers Memorial SRA	1.8	43	29	23.9	60%
2021	Flagler Beach	9.6	125	108	13.0	54%
2021	Flagler County Beaches (South)	9.7	214	96	22.1	69%
2021	Gamble Rogers Memorial SRA	1.8	45	24	25.0	65%
2022	Flagler Beach	9.6	277	189	28.9	59%
2022	Flagler County Beaches (South)	9.7	395	168	40.7	70%
2022	Gamble Rogers Memorial SRA	1.8	89	37	49.4	71%
2023	Flagler Beach	9.6	207	176	21.6	54%
2023	Flagler County Beaches (South)	9.7	242	332	24.9	42%
2023	Gamble Rogers Memorial SRA	1.8	55	56	30.6	50%

Table 9. Loggerhead sea turtle hatchling success (2011-2018) in Flagler County (excluding Washington Oaks State Park).

Year	Nests Inventoried	Total Eggs	Emerged Hatchlings	Live Hatchlings	Dead Hatchlings	Success Rate
2011	94	10409	8295	304	240	83%
2012	141	14928	12226	387	279	84%
2013	138	14690	11877	490	175	46%
2014	93	9987	8237	494	132	47%
2015	125	13904	11122	372	219	46%
2016	188	19935	15748	607	334	45%
2017	126	13447	11249	413	158	87%
2018	111	11483	9141	477	122	84%

Source: Volusia/Flagler Turtle Patrol

Table 10. Green sea turtle nesting and false crawl data within Flagler County, 2014 through 2023.

Year	Beach	Length (km)	Green Turtle Nest	Green Turtle False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	3	8	0.3	27%
2014	Flagler County Beaches (South)	9.7	15	4	1.5	79%
2014	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2015	Flagler Beach	9.6	12	1	1.3	92%
2015	Flagler County Beaches (South)	9.7	62	8	6.4	89%
2015	Gamble Rogers Memorial SRA	1.8	5	0	2.8	100%
2016	Flagler Beach	9.6	3	0	0.3	100%
2016	Flagler County Beaches (South)	9.7	7	6	0.7	54%
2016	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2017	Flagler Beach	9.6	45	15	4.7	75%
2017	Flagler County Beaches (South)	9.7	120	31	12.4	79%
2017	Gamble Rogers Memorial SRA	1.8	9	3	5.0	75%
2018	Flagler Beach	9.6	3	3	0.3	50%
2018	Flagler County Beaches (South)	9.7	3	4	0.3	43%
2018	Gamble Rogers Memorial SRA	1.8	0	1	0.0	0%
2019	Flagler Beach	9.6	34	8	3.5	81%
2019	Flagler County Beaches (South)	9.7	152	40	15.7	79%
2019	Gamble Rogers Memorial SRA	1.8	11	3	6.1	79%
2020	Flagler Beach	9.6	25	6	2.6	81%
2020	Flagler County Beaches (South)	9.7	49	10	5.1	83%
2020	Gamble Rogers Memorial SRA	1.8	7	1	3.9	88%
2021	Flagler Beach	9.6	19	14	2.0	58%
2021	Flagler County Beaches (South)	9.7	75	20	7.7	79%
2021	Gamble Rogers Memorial SRA	1.8	1	2	0.6	33%
2022	Flagler Beach	9.6	51	16	5.3	76%
2022	Flagler County Beaches (South)	9.7	113	20	11.6	85%
2022	Gamble Rogers Memorial SRA	1.8	12	7	6.7	63%
2023	Flagler Beach	9.6	58	36	6.0	62%
2023	Flagler County Beaches (South)	9.7	195	191	20.1	51%
2023	Gamble Rogers Memorial SRA	1.8	13	7	7.2	65%

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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 11. 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 12. Leatherback sea turtle nesting and false crawl data within Flagler County, 2014 through 2023.

Year	Beach	Length (km)	Leatherback Nest	Leatherback False Crawl	Density of Nests per km	Nesting Success
2014	Flagler Beach	9.6	0	0	0.0	n/a
2014	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2014	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2015	Flagler Beach	9.6	1	0	0.1	100%
2015	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2015	Gamble Rogers Memorial SRA	1.8	1	0	0.6	100%
2016	Flagler Beach	9.6	1	0	0.1	100%
2016	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2016	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2017	Flagler Beach	9.6	1	0	0.1	100%
2017	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2017	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2018	Flagler Beach	9.6	1	0	0.1	100%
2018	Flagler County Beaches (South)	9.7	3	0	0.3	100%
2018	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2019	Flagler Beach	9.6	3	0	0.3	100%
2019	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2019	Gamble Rogers Memorial SRA	1.8	3	0	1.7	100%
2020	Flagler Beach	9.6	1	0	0.1	100%
2020	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2020	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2021	Flagler Beach	9.6	0	0	0.0	n/a
2021	Flagler County Beaches (South)	9.7	1	0	0.1	100%
2021	Gamble Rogers Memorial SRA	1.8	0	0	0.0	n/a
2022	Flagler Beach	9.6	2	0	0.2	100%
2022	Flagler County Beaches (South)	9.7	2	0	0.2	100%
2022	Gamble Rogers Memorial SRA	1.8	4	0	2.2	100%
2023	Flagler Beach	9.6	2	0	0.2	100%
2023	Flagler County Beaches (South)	9.7	3	1	0.3	75%
2023	Gamble Rogers Memorial SRA	1.8	1	0	0.6	100%

Notes: Nesting data were provided by FWC/FWRI, Statewide Nesting Beach Survey Program Database as of March 21, 2024. Flagler County Beaches (South) is Jungle Hut Road (29.35074, -81.10595) to 23rd St. N at Beverly Bch/Flagler Bch Line (29.50907, -81.14084) and includes ~2k of beach that is not within the fill footprint. 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 13. 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

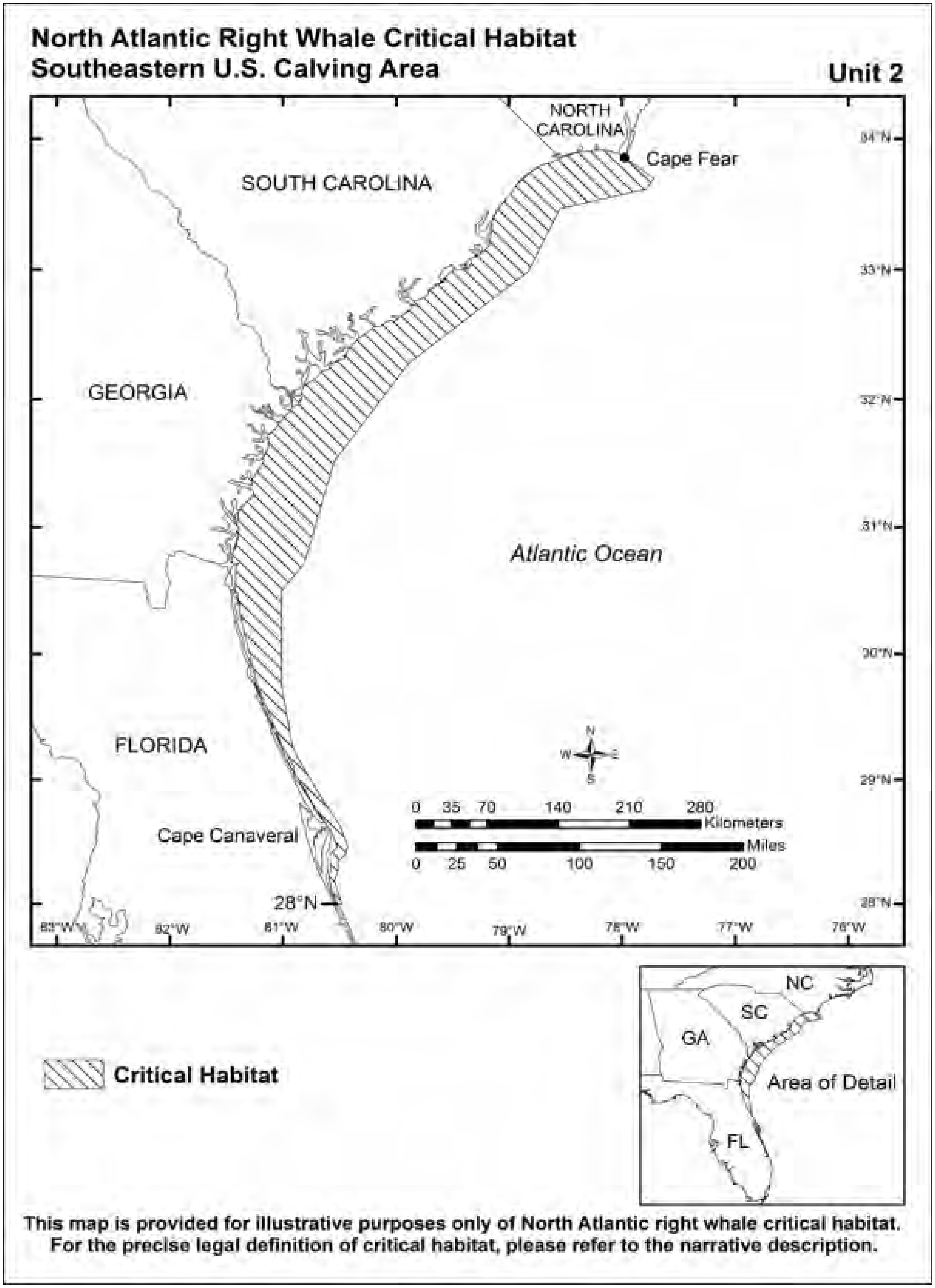


Figure 17. North Atlantic Right Whale Critical Habitat Unit 2. Source: NMFS, 2016.

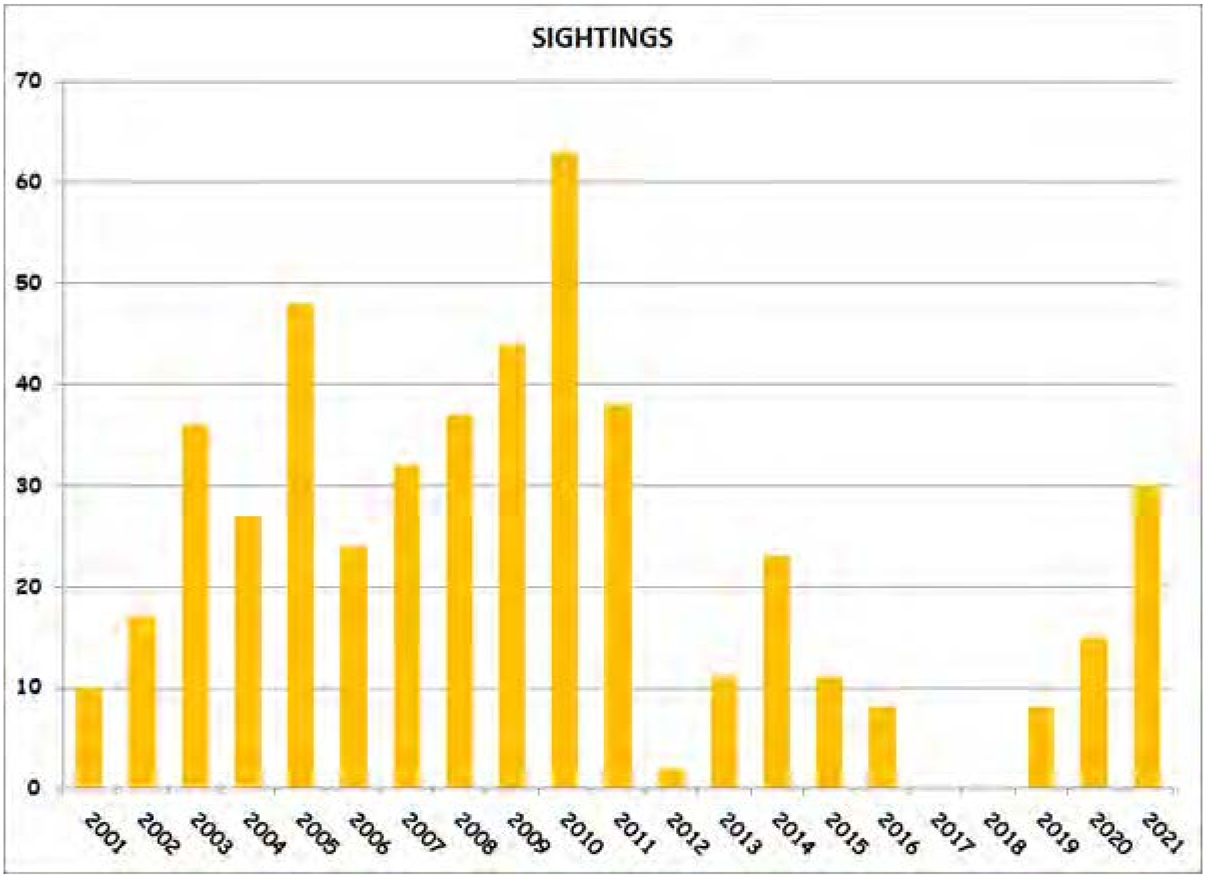


Figure 18. Marineland Right Whale Project Data, 2001 through 2021: total right whale sightings per year. Source: Marineland Right Whale Project, 2021.

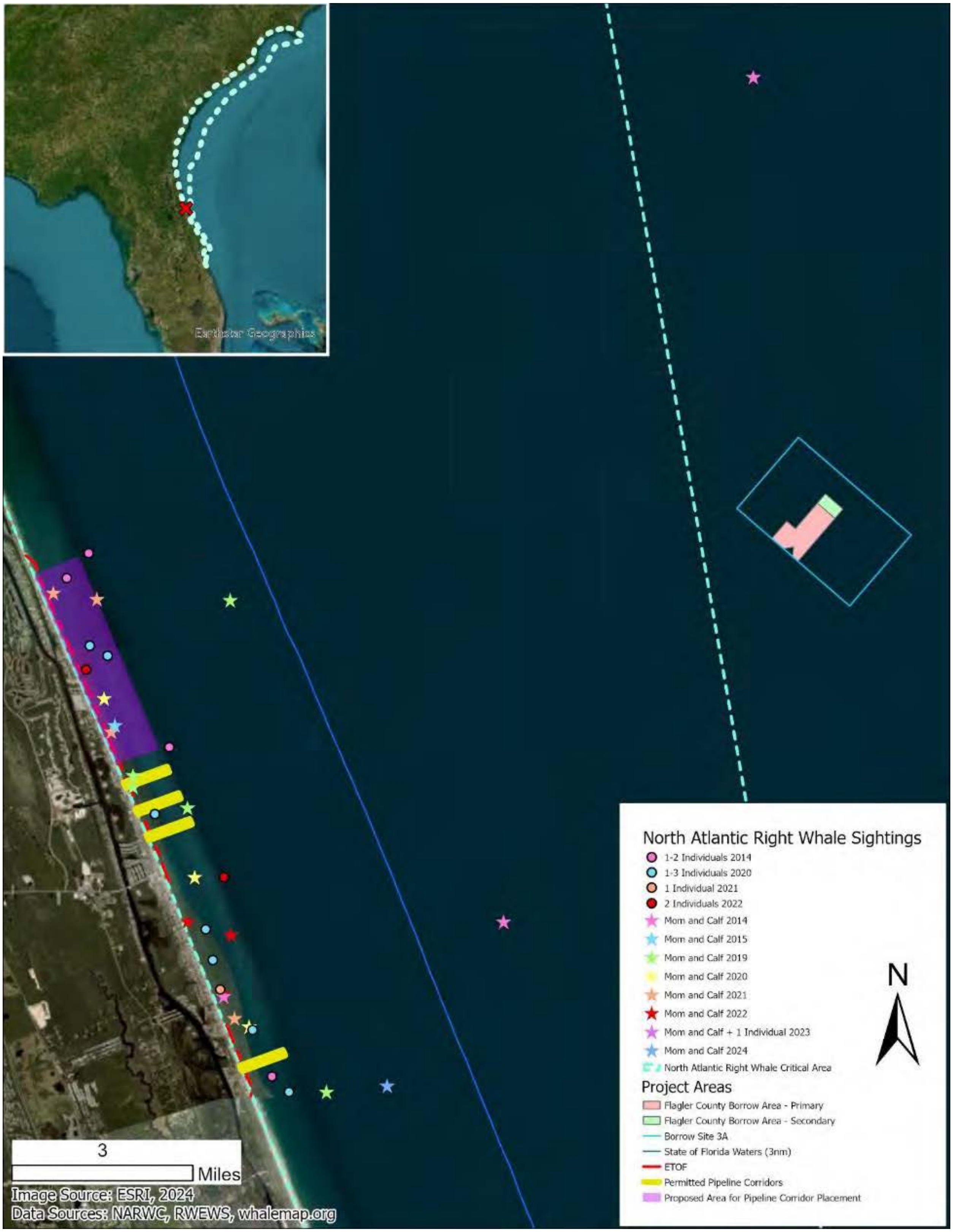
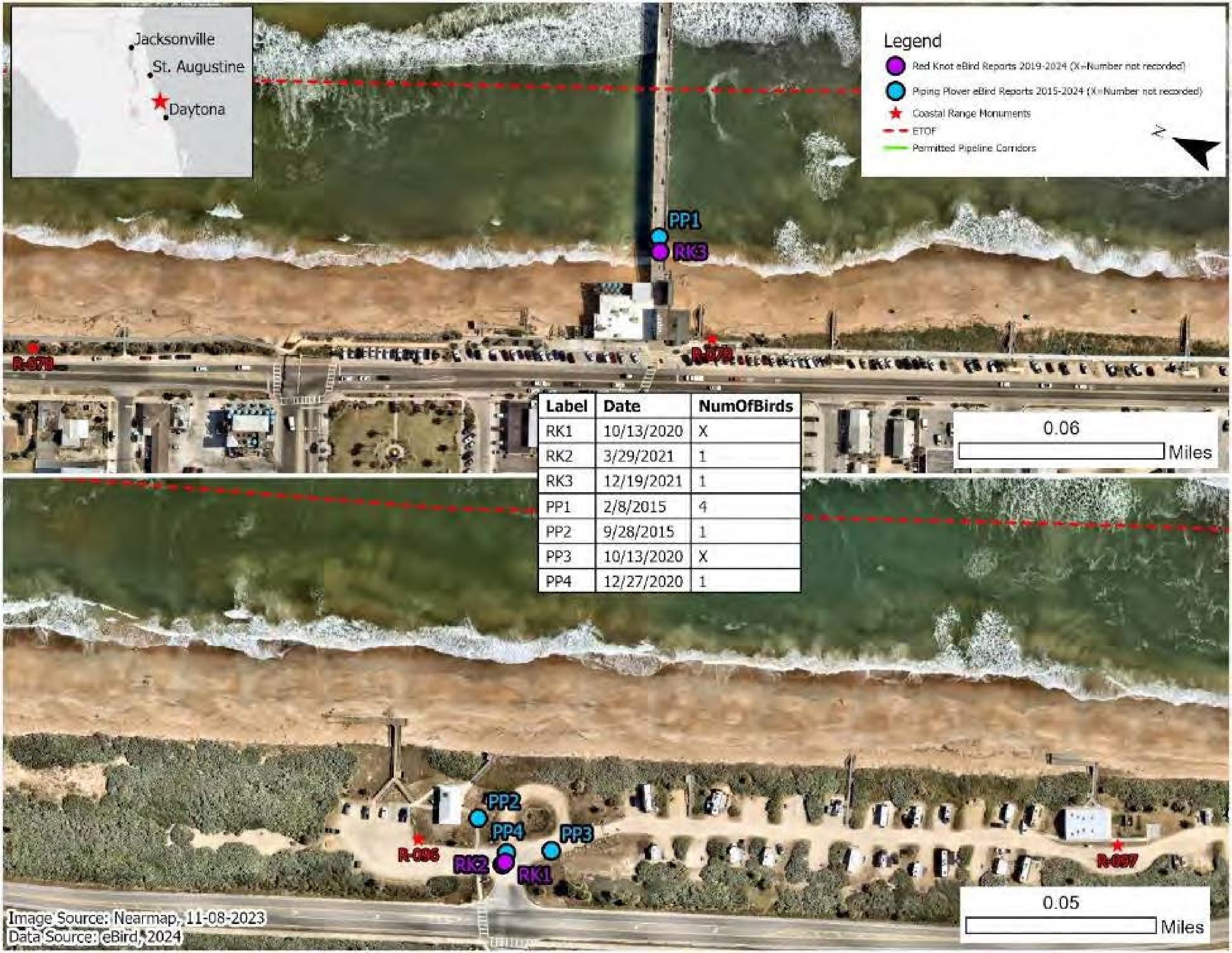


Figure 19. North Atlantic right whale sightings, January 1, 2014 through March 6, 2024. Source: Whalemap.org (2024).



Label	Date	NumOfBirds
RK1	10/13/2020	X
RK2	3/29/2021	1
RK3	12/19/2021	1
PP1	2/8/2015	4
PP2	9/28/2015	1
PP3	10/13/2020	X
PP4	12/27/2020	1

Figure 20. Wintering Piping Plover reported locations in the Flagler County PAA, January 1, 2014 through May 6, 2024 and Red Knot reported locations in the Flagler County PAA, January 1, 2019 through May 2, 2024 (Source: eBird).

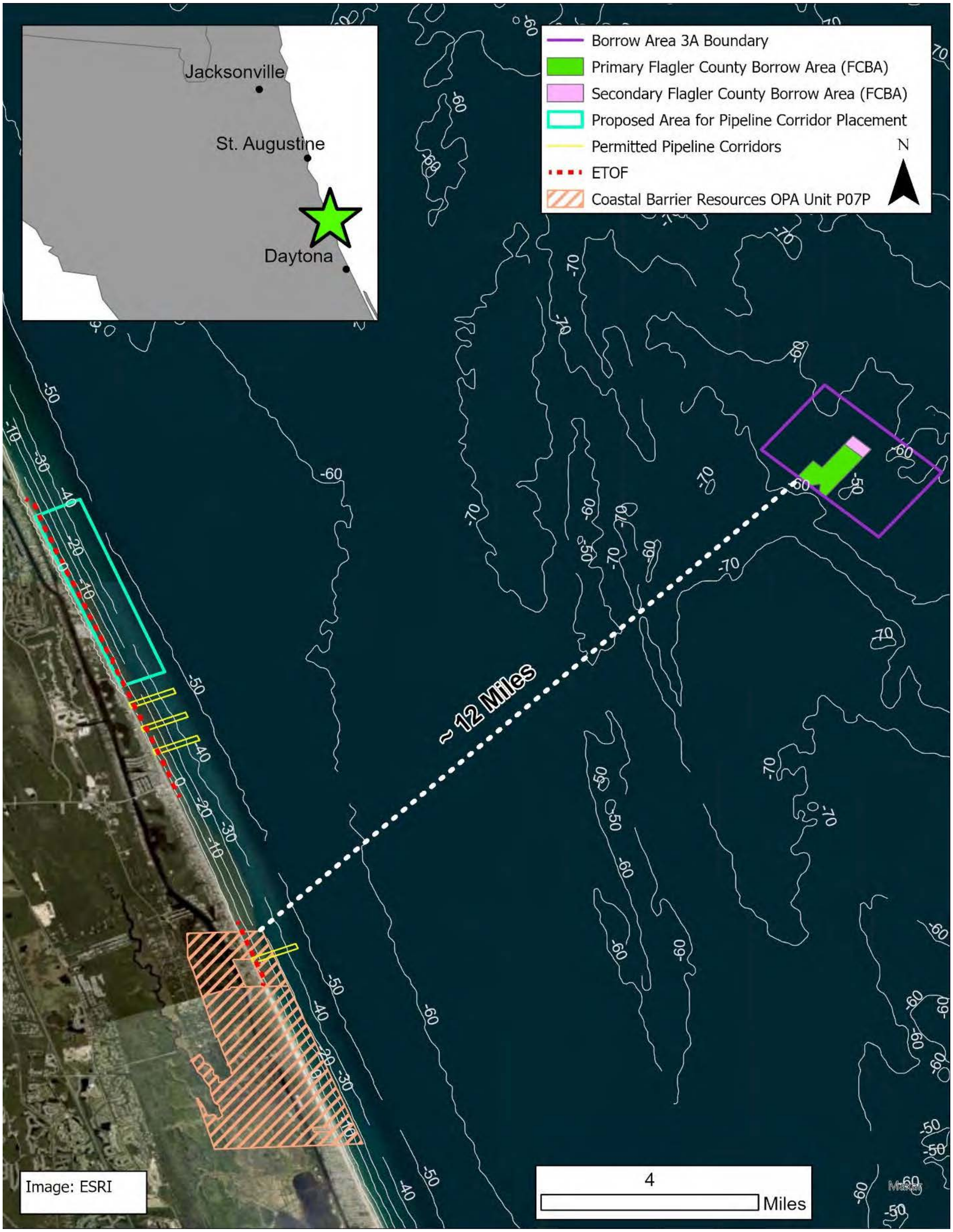


Figure 21. CBRA OPA Unit P07P within the PAA in relation to the FCBA.

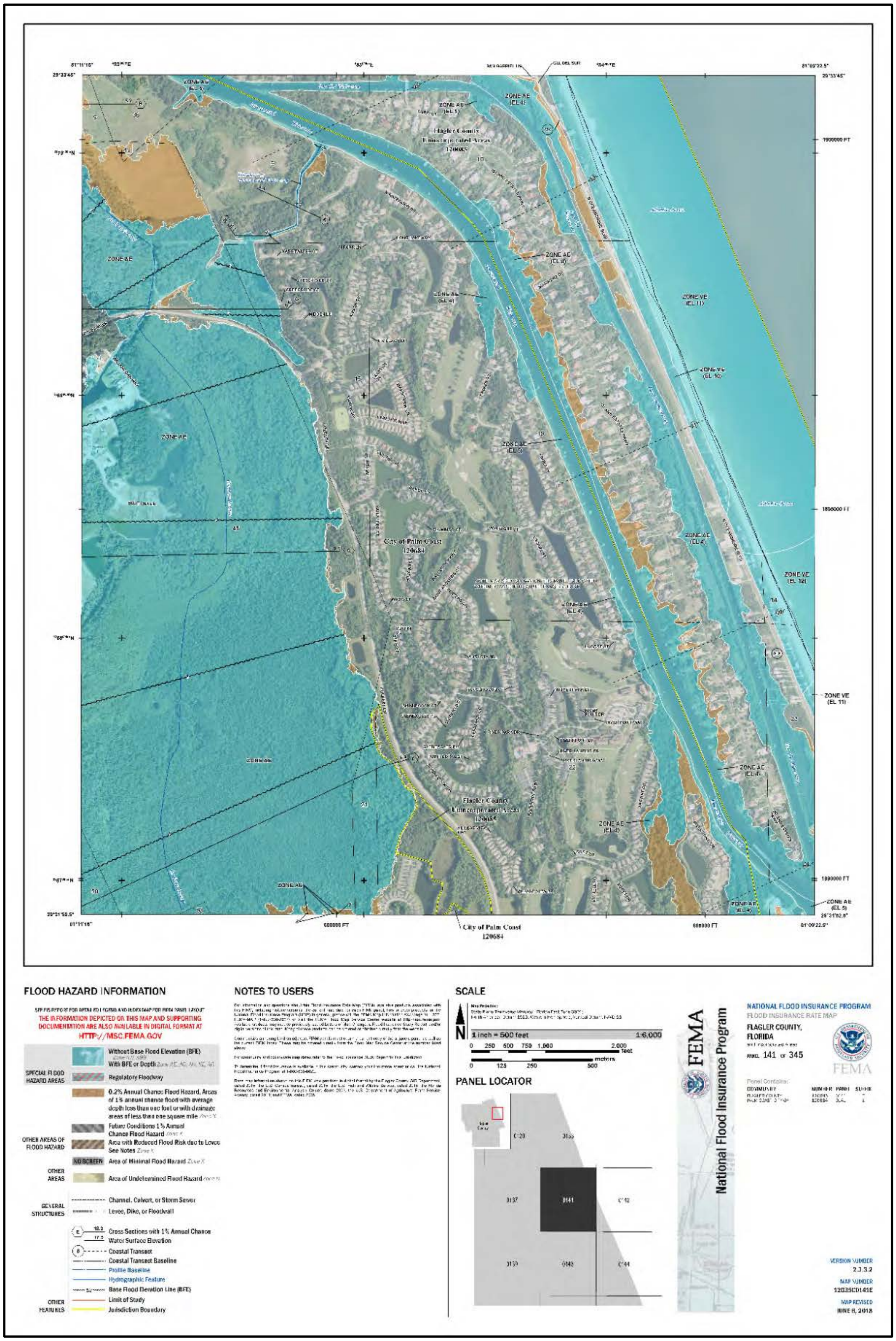


Figure 22a. FEMA digital flood insurance rate (FIRM) map panel 0141.

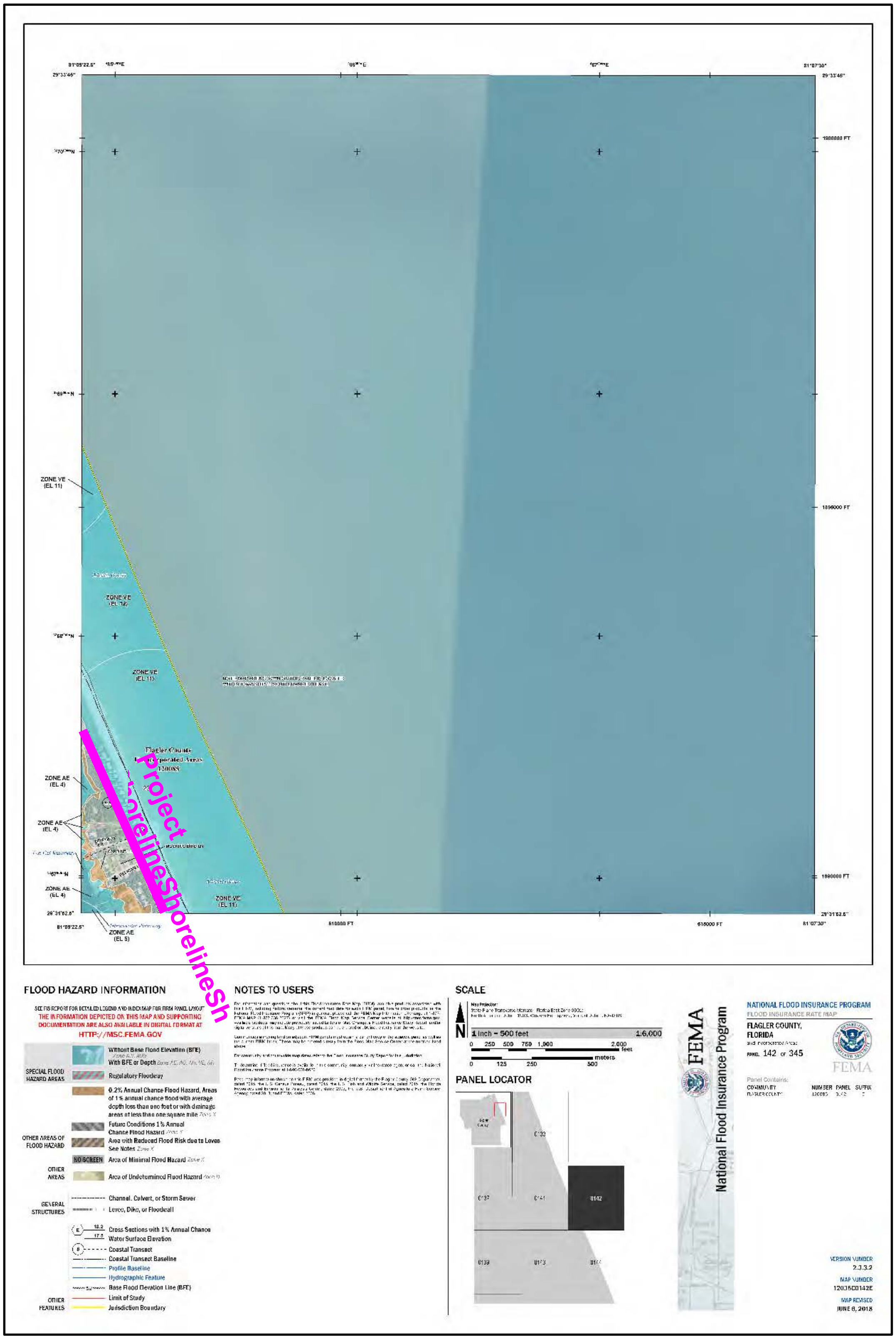


Figure 22b. FEMA digital flood insurance rate (FIRM) map panel 0142.

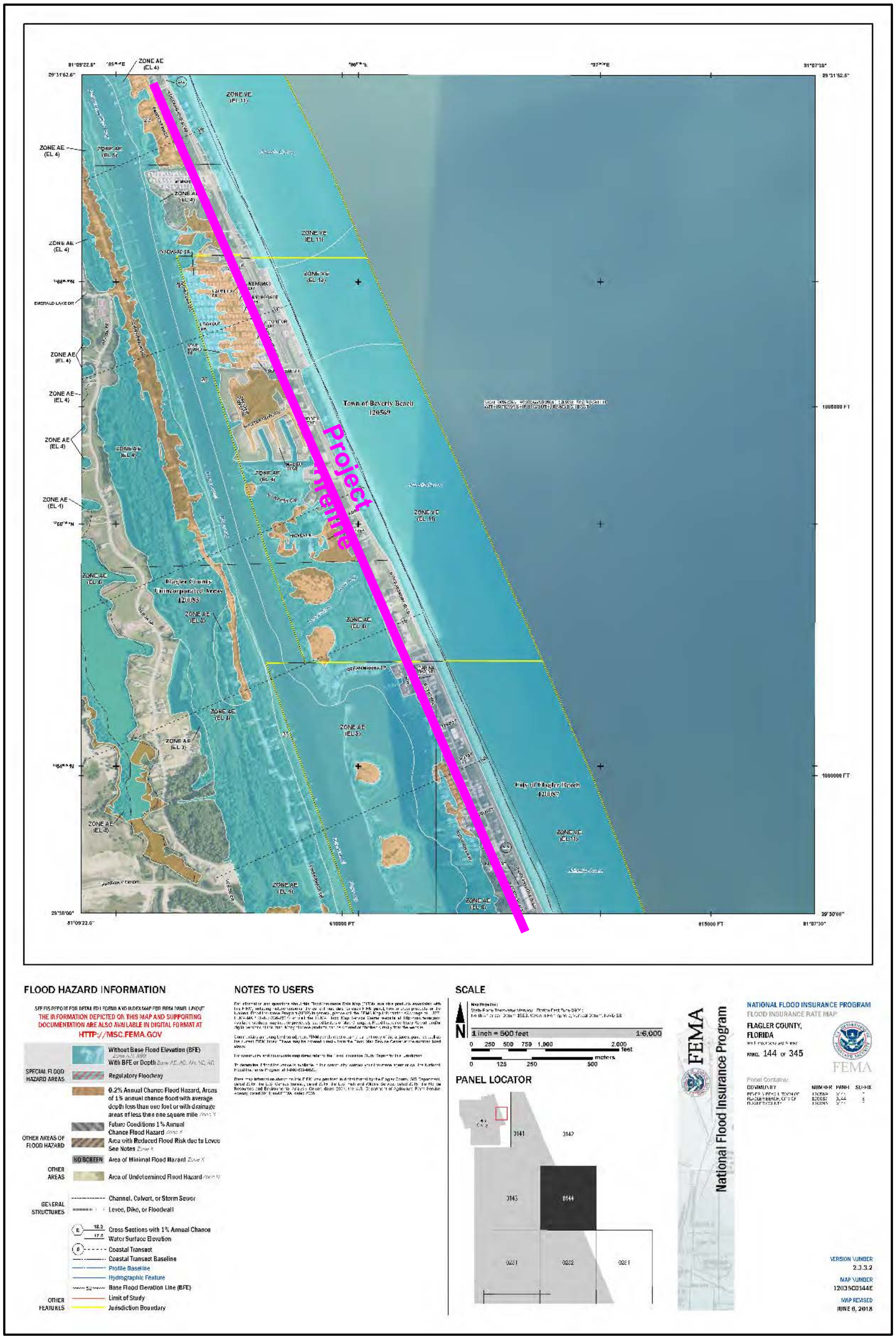


Figure 22c. FEMA digital flood insurance rate (FIRM) map panel 0144.

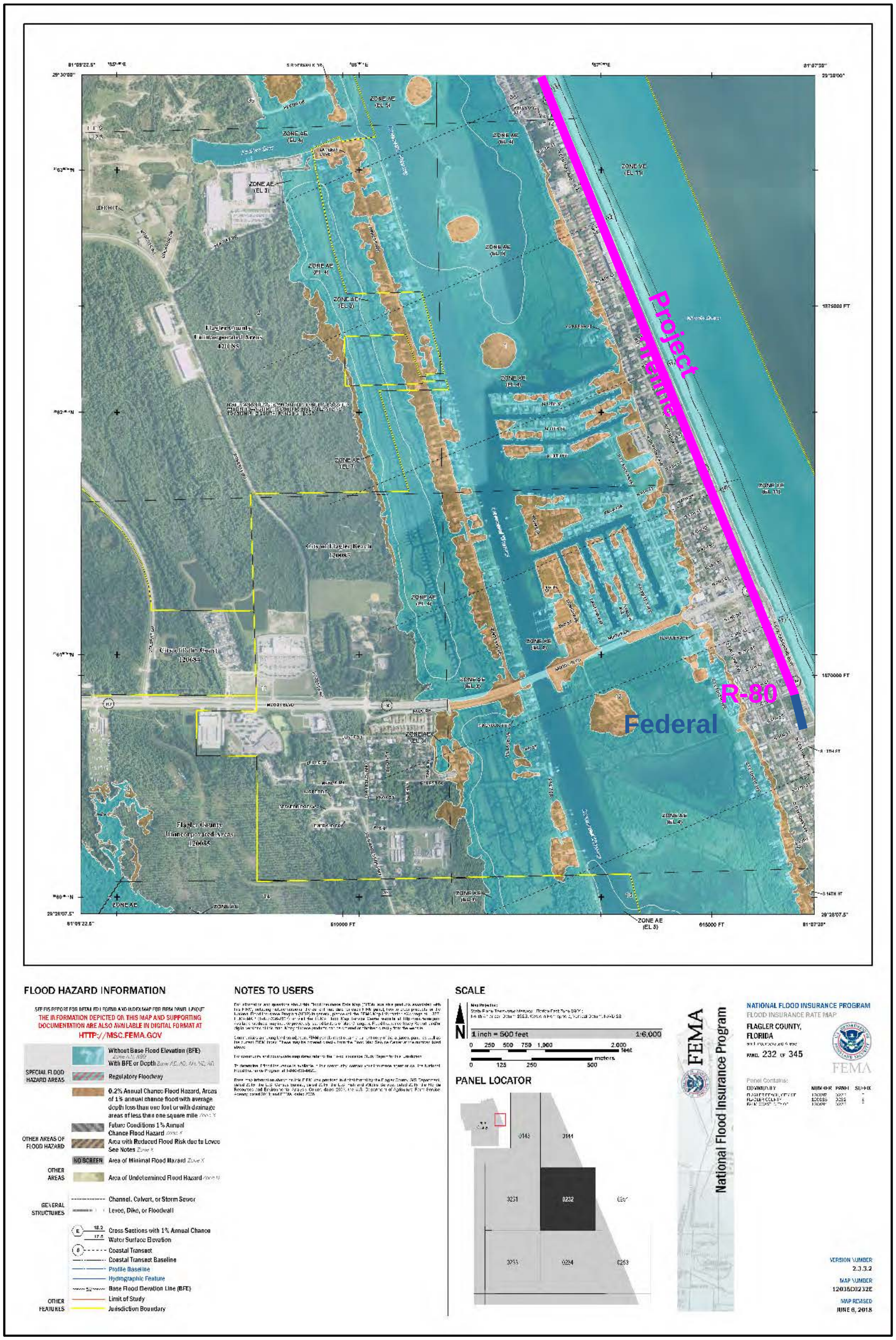


Figure 22d. FEMA digital flood insurance rate (FIRM) map panel 0232.

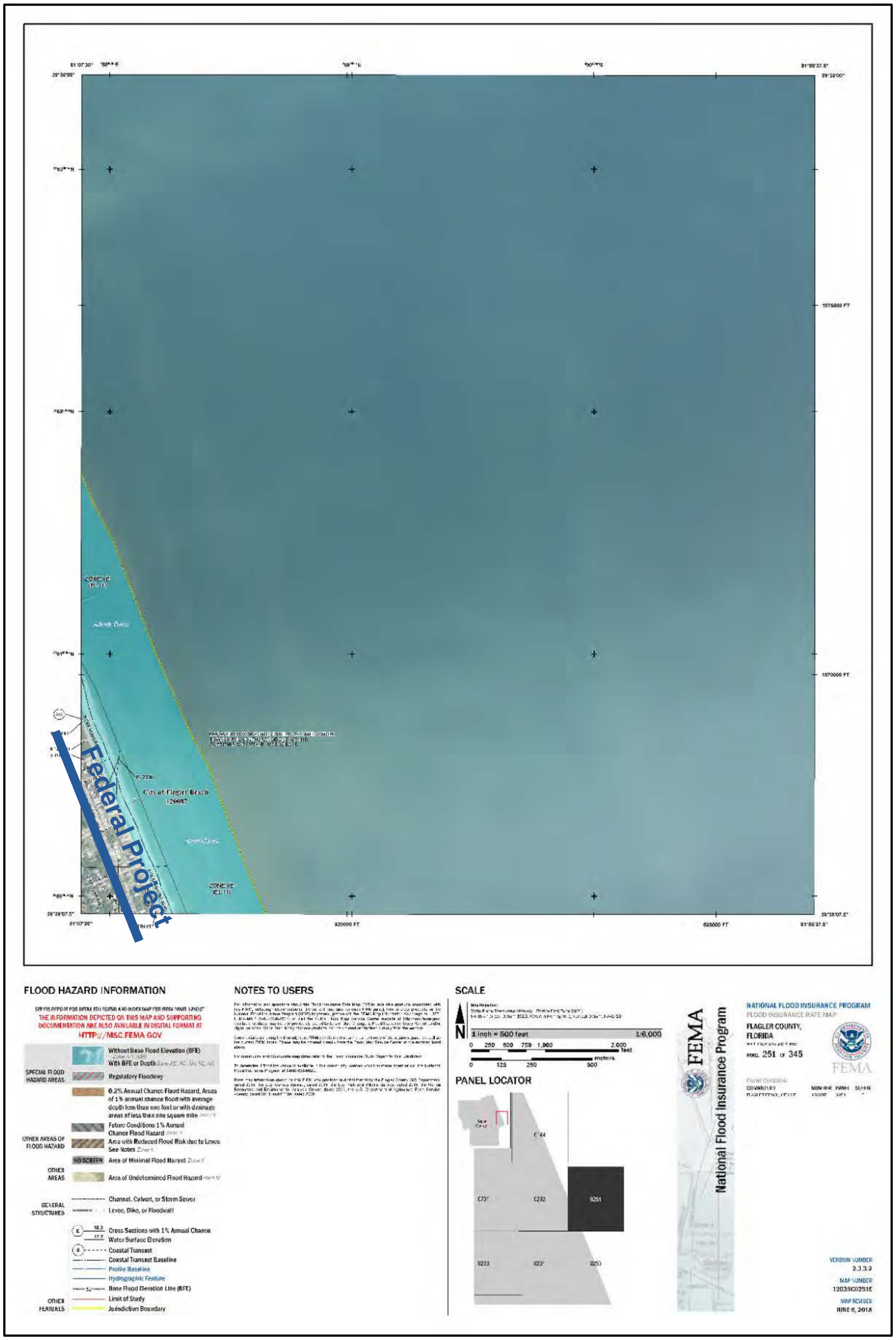


Figure 22e. FEMA digital flood insurance rate (FIRM) map panel 0251.

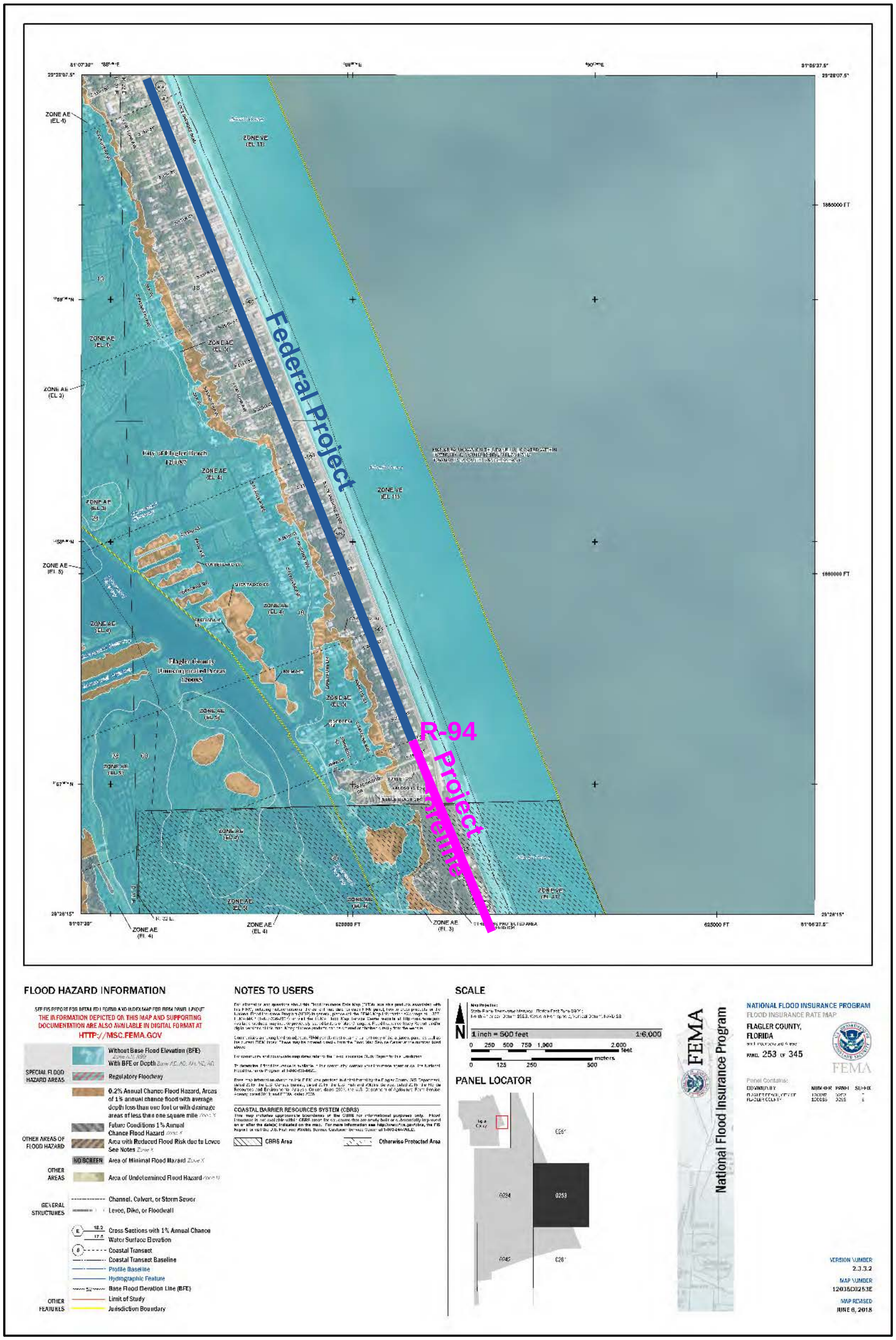


Figure 22f. FEMA digital flood insurance rate (FIRM) map panel 0253.

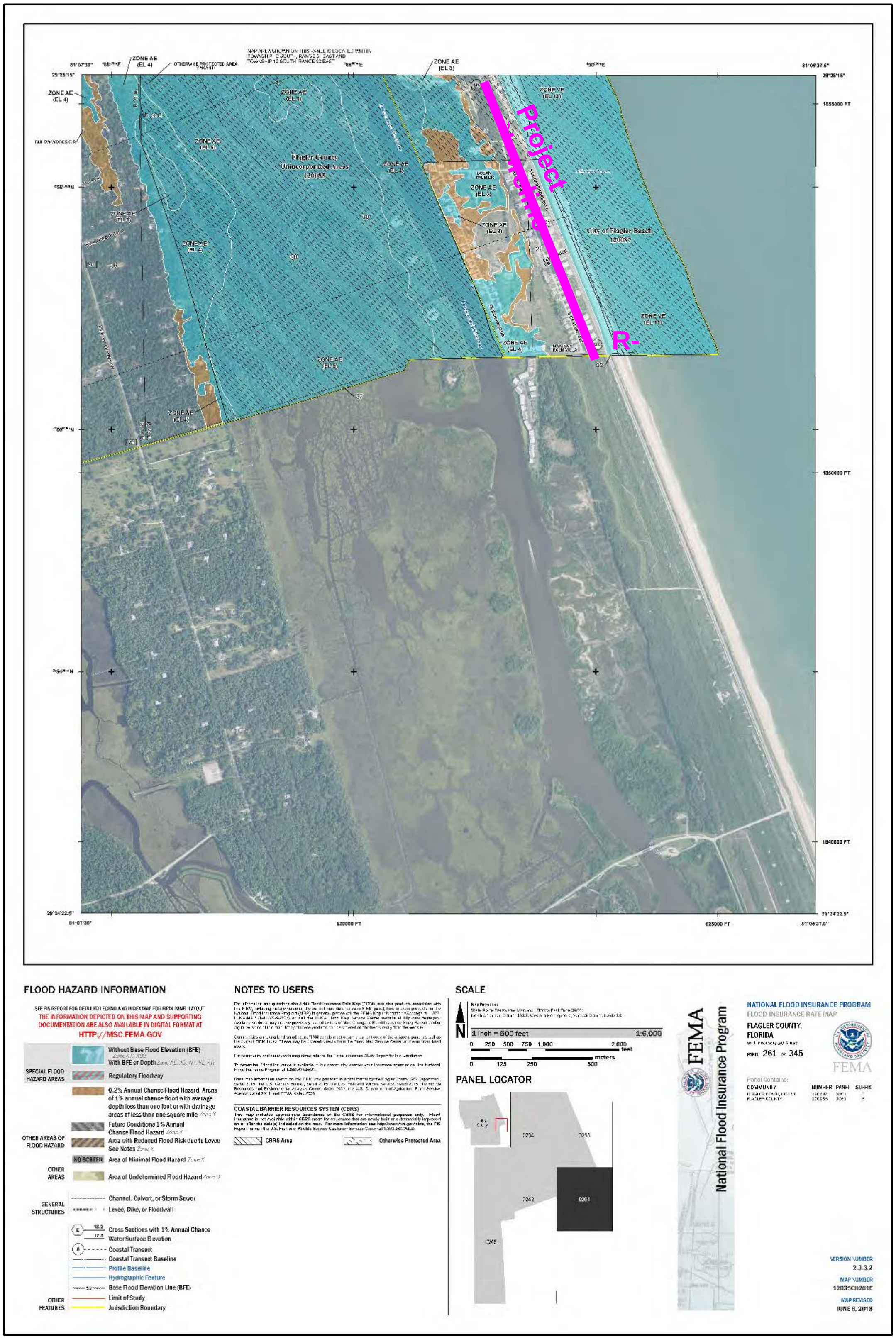


Figure 22g. FEMA digital flood insurance rate (FIRM) map panel 0261.

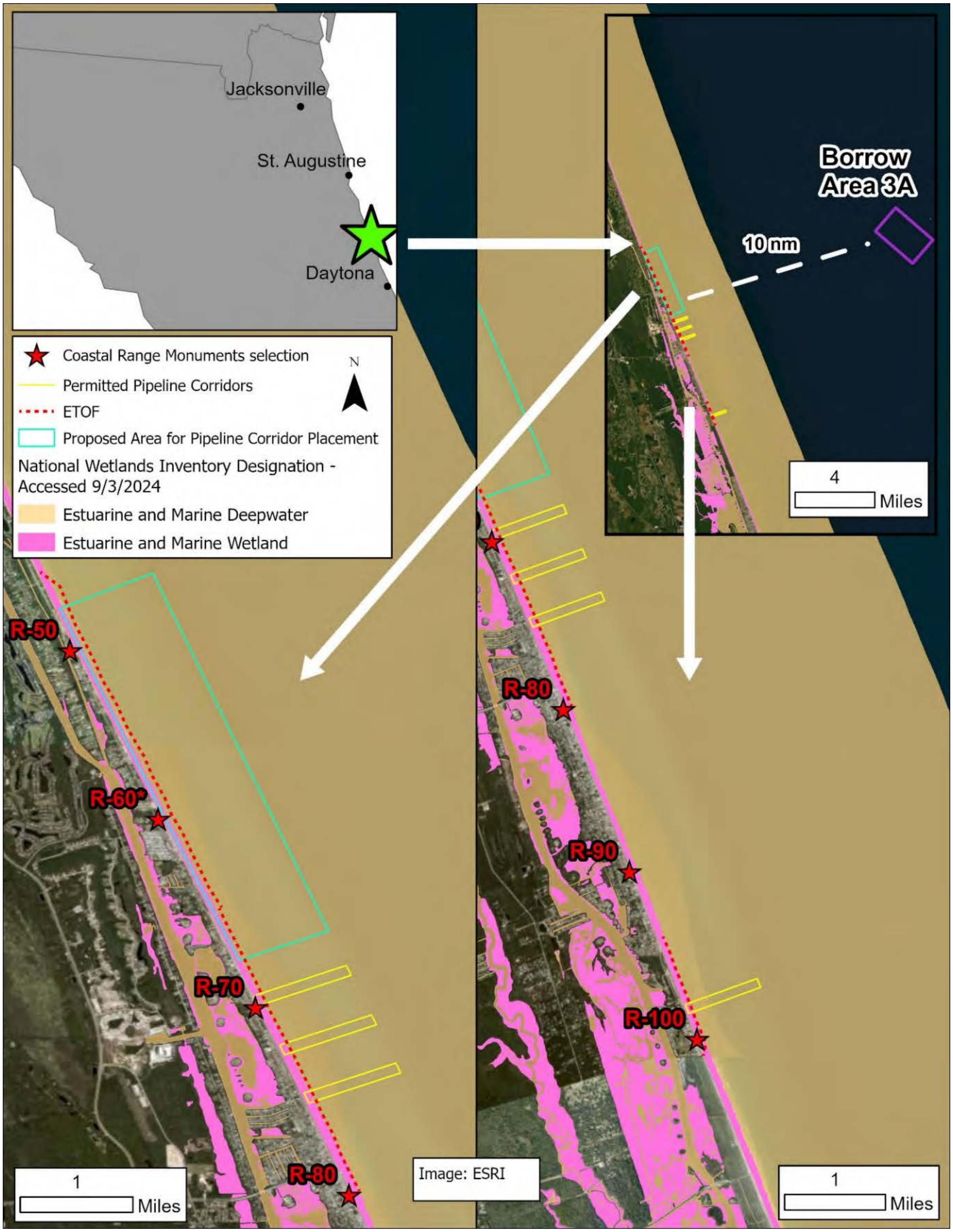


Figure 23. Wetland designations in the PAA (Source: National Wetlands Inventory, 2024).

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

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

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
and Resources	Pre- development to 2062, Flagler County	Larger offshore borrow area 3A was used for federal project but sand resources identified for this project have never been used for beach nourishment or other purposes as of 2015.	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 of 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

EA APPENDIX 4

ITEM #21 IMPACTS TO COASTAL PROCESSES

Flagler County Beach and Dune Restoration Project: Phase 2
Flagler County, FL

MODIFICATION REQUEST

FDEP Joint Coastal Permit (0379716-001-JC) & USACE DA Permit (SAJ-2019-02065 (SP-TMM)

ITEM #21 IMPACTS TO COASTAL PROCESSES

Framework of Discussion

The Joint Coastal Permit application Item #21 requests the following information:

21. Provide an analysis of the expected effect of the proposed activity on the coastal system including but not limited to:

    a. Analysis of the expected physical effect of the proposed activity on the existing coastal conditions and natural shore and inlet processes. The analysis should include a quantitative description of the existing coastal system, the performance objectives of the proposed activity, the design parameters and assumptions, relevant computations, validation of the results and the data used in the analysis.

    b. The information specified in Rule 62B-41.008, F.A.C.

    c. Reasonable assurances that a regulated activity will not cause unacceptable cumulative impacts pursuant to Rule 62-330, F.A.C., and defined in Rule 62B-41.002, F.A.C.

Proposed Activity

The proposed permit modification will provide for restoration of eroded beach and dune along an additional 3.2 miles (5.3 km) of the Atlantic Ocean shoreline in Flagler County, FL that was severely impacted by Hurricanes Matthew (2016), Irma (2017), Dorian (2019), Ian (2022), and Nicole (2022). The project reach is located in Painters Hill and the Town of Beverly Beach between FDEP R-monuments R-46 and R-64.5. The proposed project modification is a major modification to the FDEP permitted project described in 0379716-001-JC for the shoreline reaches from R-64.5 to R-80 and R-94 to R-101. Approval of this modification will provide for beach and dune restoration using the offshore sand borrow area from R-46 to R-80 and R-94 to R-101. Sand placement will occur by trailing suction hopper dredge. The project shoreline includes both private and public parcels.

The proposed modification will include the placement of up to 1.4 million cubic yards (Mcy) of beach-compatible sand for the initial nourishment of the beach. The project will consist of the beach and dune restoration along this reach of shoreline through the hydraulic placement of beach-compatible material from an offshore borrow area. The additional beach width and elevation will significantly improve the level of storm protection offered to the upland and increase the recreational amenity value thereof. The expected renourishment interval for the modified (extended) area is 6 to 8 years. While future renourishment will depend upon project performance, renourishment project volumes are anticipated to require between 600,000 and 700,000 cubic yards of sand considering the background erosion rate and any differences between the native beach and borrow area sediments. Initial construction of the project is anticipated to occur in the late Fall of 2024 or the first half of 2025, immediately following construction of Phase 1 dune/Beach nourishment efforts led by the USACE Jacksonville located between R-77 and R-96 (as authorized by FDEP P/N 0378136-001-JC and 0379716-001-JC).

Consistency with the Flagler County Beach Management Plan

In February 2021, the Flagler County Board of County Commissioners agreed to pursue a comprehensive beach management study in order to identify dune/beach restoration and long-term maintenance needs as well as the regulatory and funding requirements needed to implement a long-term beach management plan for the entire Atlantic Ocean shoreline of Flagler County. The beach management plan shall consist of activities along all 18 miles of shoreline (R-1 to R-101) which shall restore, enhace, maintain, preserve, and protect the beach and dune system. Specifically the beach management plan suggests that beach and dune conditions shall be restored equal to or greater than those prior to the occurrence of Hurrican Matthew. The modified project purpose is consistent with the County's Beach management plan, as project construction shall restore an additional reach of eroded dunes/beach's along approximately 3.2 miles (5.2 km) of the Atlantic Ocean shoreline in Flagler County, FL (R-46 to R-64.5) that were severely impacted by Hurricanes Ian (2022) and Nicole (2022).

Existing Coastal Conditions

The proposed project modification beach is located along the Atlantic Ocean shoreline in central Flagler County, Florida. The project beach is considered an open-coast beach situated well away from tidal inlets, nearshore shoals, and other shore-altering features that could influence or be affected by the proposed project. The northern project limit is located ~11 miles south of Matanzas Inlet and the southern project limit is located ~33 miles north of Ponce Inlet.

The project shoreline contains a number of coastal structures (seawalls, revetment, and a secant wall) which were constructed prior to construction of the proposed project. The seaward extent of the existing structures corresponds to the landward limit of proposed fill placement. Sand shall be placed in the vicinity of the structures up to an elevation equal to or less than the top of each structure. **Figure 21.1** plots the locations of existing coastal structures along the project area.

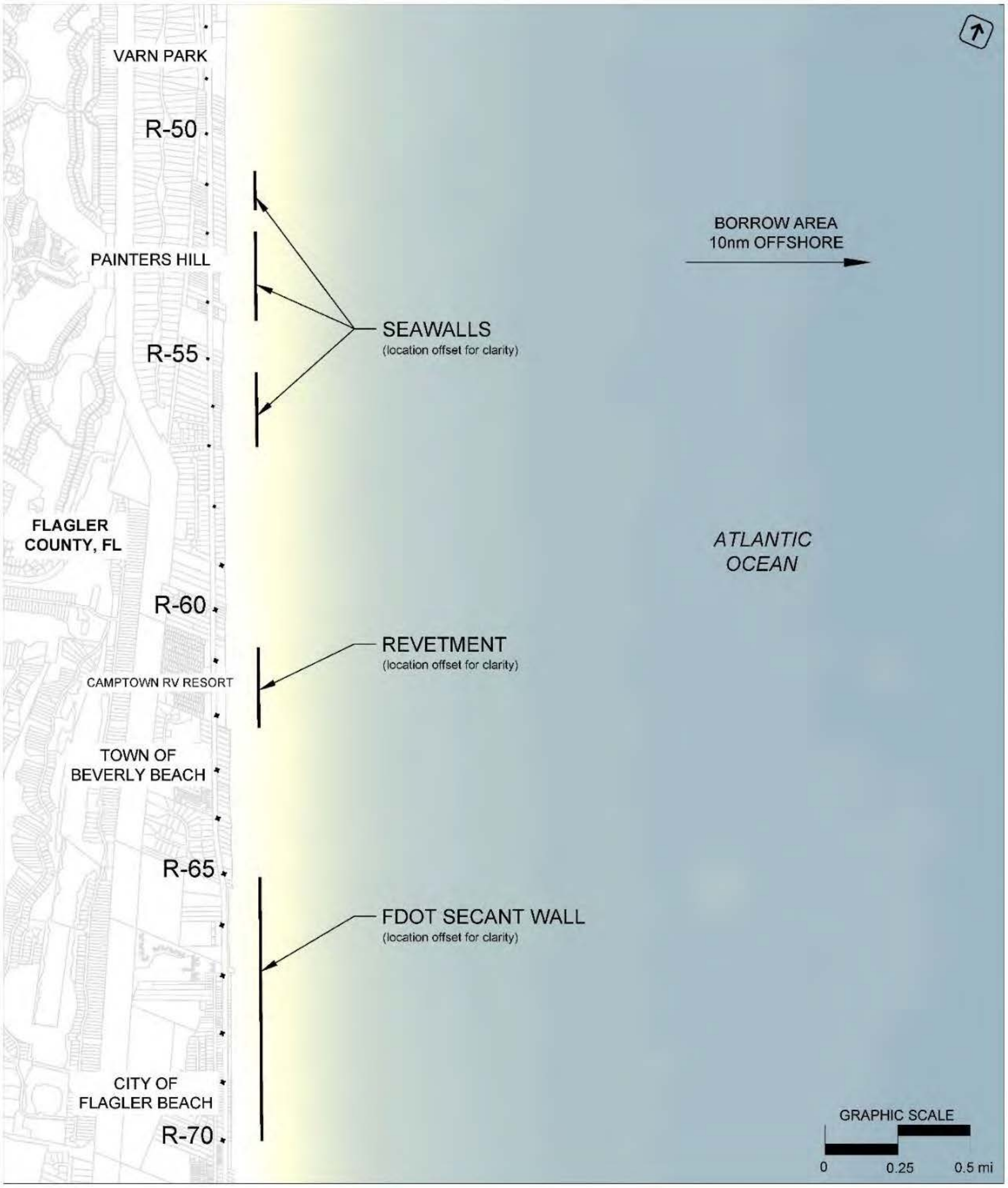


Figure 21.1: North-to-south alongshore locations of existing seawalls along the Phase 2 project area. The project area consists of multiple sheetpile bulkheads with a peak elevation of +16 ft (NAVD) between R-51 to R-56, a revetment with a peak elevation of +17 ft (NAVD) between R-61 to R-62, and a secant wall with a peak elevation of +17 (NAVD) between R-65 to R-70.

The existing beach and dune system along the modified project shoreline is highly eroded due to long-term sand losses and recent impacts associated with the effects of Hurricane Matthew (2016), and multiple recent hurricanes. Although some of the sand displaced by these recent hurricanes has returned to areas of the upper beach through natural cross-shore recovery, a recent beach profile survey reveals that a significant net sand volume deficit remains along the project shoreline compared to pre-Matthew conditions. Historical survey data along the study shoreline are limited. Conditions existing prior to the passage of Hurricane Mathew are documented by a July 2011 beach profile survey; i.e., the most recent survey commissioned prior to Matthew. The following information presents the results of an analysis of recent shoreline and beach volume change that supports the need for the proposed project.

Historical Shoreline Change: The long-term MHW shoreline change and change rates were computed for the project and surrounding shoreline (R-43 to R-65) by direct comparison of beach profile surveys collected in June 1972 and July 2011[1]. **Tables 21.1** list the MHW shoreline change and average annual change rates measured at each R-monument along the study shoreline for the noted 39-year period. Long-term shoreline change trends calculated between direct comparison of 1972 and 2011 surveys reveal that the MHW shoreline retreated by roughly -4.0 ft, which equates to an annual recession rate of -0.1 ft/yr. It is important to note that the measured shoreline change reflects a net observation along the entire surveyed shoreline and does not include quantification of gross sedimentation or erosion events or variations in alongshore MHW trends.

Table 21.1: Historical Mean High Water shoreline changes and change rates along the proposed Phase 2 project area for the period from 1972 to 2011. Survey data at R-52 did not exist for the 1972 survey.

R-Mon	MHW Shoreline Change (ft)	MHW Shoreline Change Rate (ft/yr)
R-43	-25.1	-0.6
R-44	-20.0	-0.5
R-45	-18.9	-0.5
R-46	21.2	0.5
R-47	-5.4	-0.1
R-48	-9.1	-0.2
R-49	-3.1	-0.1
R-50	-3.7	-0.1
R-51	-33.4	-0.9
R-52	N/A	N/A
R-53	-32.6	-0.8

[1] The July 2011 survey was selected as it is the most recent full-coverage beach profile survey available prior to the passage of Hurricane Matthew.

R-Mon	MHW Shoreline Change (ft)	MHW Shoreline Change Rate (ft/yr)
R-54	2.5	0.1
R-55	-23.8	-0.6
R-56	-40.0	-1.0
R-57	10.5	0.3
R-58	-8.0	-0.2
R-59	11.0	0.3
R-60	-16.7	-0.4
R-61	26.0	0.7
R-62	32.9	0.8
R-63	18.1	0.5
R-64	10.1	0.3
R-65	12.4	0.3
Average	-4.3	-0.1

Over the long-term period of measurement and prior to Hurricane Matthew, the MHW shoreline position along the study area varied between advancement and retreat averaging to little observed net change. That is, the MHW shoreline was mildly erosional to stable. After 2011, the study area was impacted by multiple tropical storms including Hurricanes Matthew (October, 2016), Irma (September, 2017), Dorian (September, 2019), Ian (September, 2022) and Nicole (November, 2022). The February 2023 beach profile survey includes the cumulative impacts of each of these storm events, whereby the MHW shoreline was at a historically landward position, on average (see **Figure 21.2**). Comparison of the 1972 and 2023 beach profile surveys indicates the MHW shoreline along the study area was wholly erosional, having receded by an average of about -41 feet, which equates to an average annual erosion rate of -0.8 ft/yr. Shoreline erosion over this period ranged from -10.7 ft (at R-46) to -86.7 (at R-53), see **Table 21.2**. While an interesting and historically significant data point, use of the 2023 survey as an indicator of long-term change may overly weight the effects of the Hurricanes Ian and Nicole.

The most recent beach profile survey along the study area was collected in February 2024. Relative to 2023, the shoreline experienced an average of about 12 ft of natural seaward advance. Except for two profiles, R-46 and R-62, the 2024 MHW location along the surveyed area remained wholly landward of 1972 conditions. On average, the 2024 MHW shoreline was -28.2 ft landward of its 1972 position, equating to an average annual recession rate -0.5 ft/yr. Measured values of MHW change over the 52-year period 1972 to 2024 range from an advance of +17.5 ft (R-62) to recession of -68.4 ft (R-55) see **Table 21.3**.

Table 21.2: Project area historical shoreline change for the period (1972 to 2023)

R-Mon	MHW Shoreline Change (ft)	MHW Shoreline Change Rate (ft/yr)
R-43	-62.1	-1.2
R-44	-75.0	-1.5
R-45	-52.4	-1.0
R-46	-10.7	-0.2
R-47	-36.4	-0.7
R-48	-35.6	-0.7
R-49	-40.4	-0.8
R-50	-39.0	-0.8
R-51	-64.0	-1.2
R-52	#N/A	#N/A
R-53	-86.7	-1.7
R-54	-49.3	-1.0
R-55	-53.2	-1.0
R-56	-76.6	-1.5
R-57	-40.7	-0.8
R-58	-37.0	-0.7
R-59	-19.0	-0.4
R-60	-40.8	-0.8
R-61	-22.5	-0.4
R-62	-15.4	-0.3
R-63	-11.5	-0.2
R-64	-17.8	-0.3
R-65	-13.8	-0.3
Average	-40.9	-0.8

Table 21.3: Project area historical shoreline change for the period (1972 to 2024)

R-Mon	MHW Shoreline Change (ft)	MHW Shoreline Change Rate (ft/yr)
R-43	-31.3	-0.6
R-44	-58.1	-1.1
R-45	-36.5	-0.7
R-46	6.0	0.1
R-47	-14.4	-0.3
R-48	-18.5	-0.4
R-49	-33.1	-0.6
R-50	-23.6	-0.5
R-51	-67.0	-1.3
R-52	#N/A	#N/A
R-53	-50.8	-1.0
R-54	-31.1	-0.6
R-55	-68.4	-1.3
R-56	-60.9	-1.2
R-57	-19.1	-0.4
R-58	-43.9	-0.8
R-59	-12.0	-0.2
R-60	-33.4	-0.6
R-61	-5.2	-0.1
R-62	17.5	0.3
R-63	-8.3	-0.2
R-64	-25.3	-0.5
R-65	-3.3	-0.1
Average	-28.2	-0.5

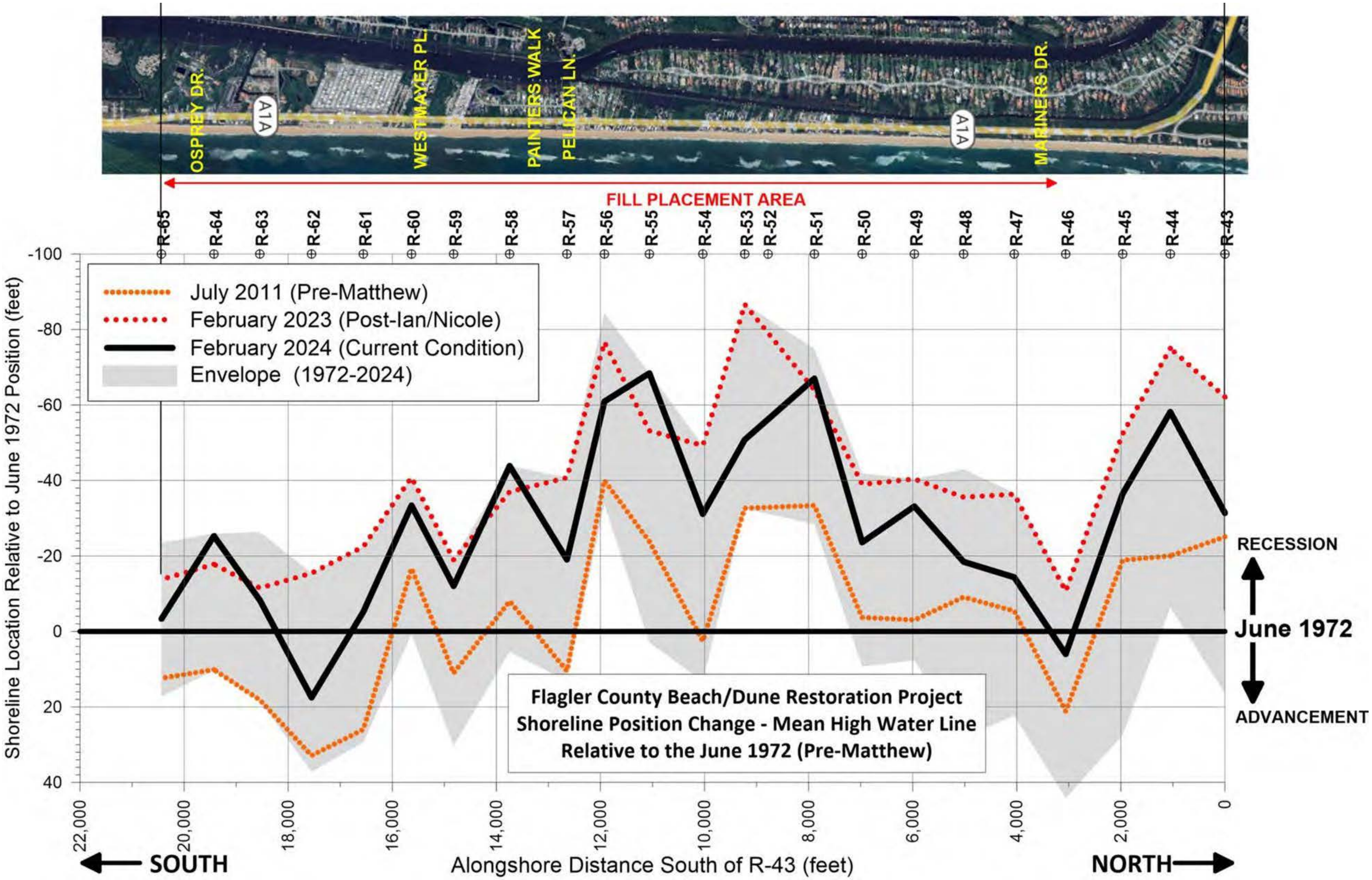


Figure 21.2: Historical shoreline change along the southern Flagler County shoreline (R43 to R65) relative to June 1972 conditions

Historical Volume Changes: **Figure 21.3** and **Figure 21.4** present the respective June 1972 to February 2024, June 1972 to July 2011, and July 2011 to February 2024 beach volume change between R46 and R65. These results represent total beach profile volume change from the landward limit of apparent dune erosion to the assumed depth of survey closure (20 ft, NAVD). In **Figure 21.3** and **Figure 21.4**, both the volume density change (cubic yards per foot, cy/ft) at each R-monument profile and the alongshore cumulative volume change summed from north to south are shown. Consistent with the results shown in **Figure 21.2**, there is an overall trend of consistent beach volume loss along the shoreline between R46 and R65 (see **Figures 21.3** and **21.4** (bottom)).

Along the project shoreline, about -740,000 cy (-42.5 cy/ft) of beach sand were lost during the period between June 1972 and February 2024 equating to an average annual volume change rate of -14,300 cy/yr (see **Figure 21.3**). Beach volume changes computed between June 1972 and July 2011 survey resulted in an increase of roughly +250,000 cy (+14.4 cy/ft), equating to an average annual volume change rate of +6,400 cy/yr. Subsequent to the hurricane impacts beginning with Matthew in 2016, the shoreline lost -990,000 cy (-57.0 cy/ft) of loss between equating to an average annual volume change rate of -79,200 cy/yr between July 2011 and February 2024.

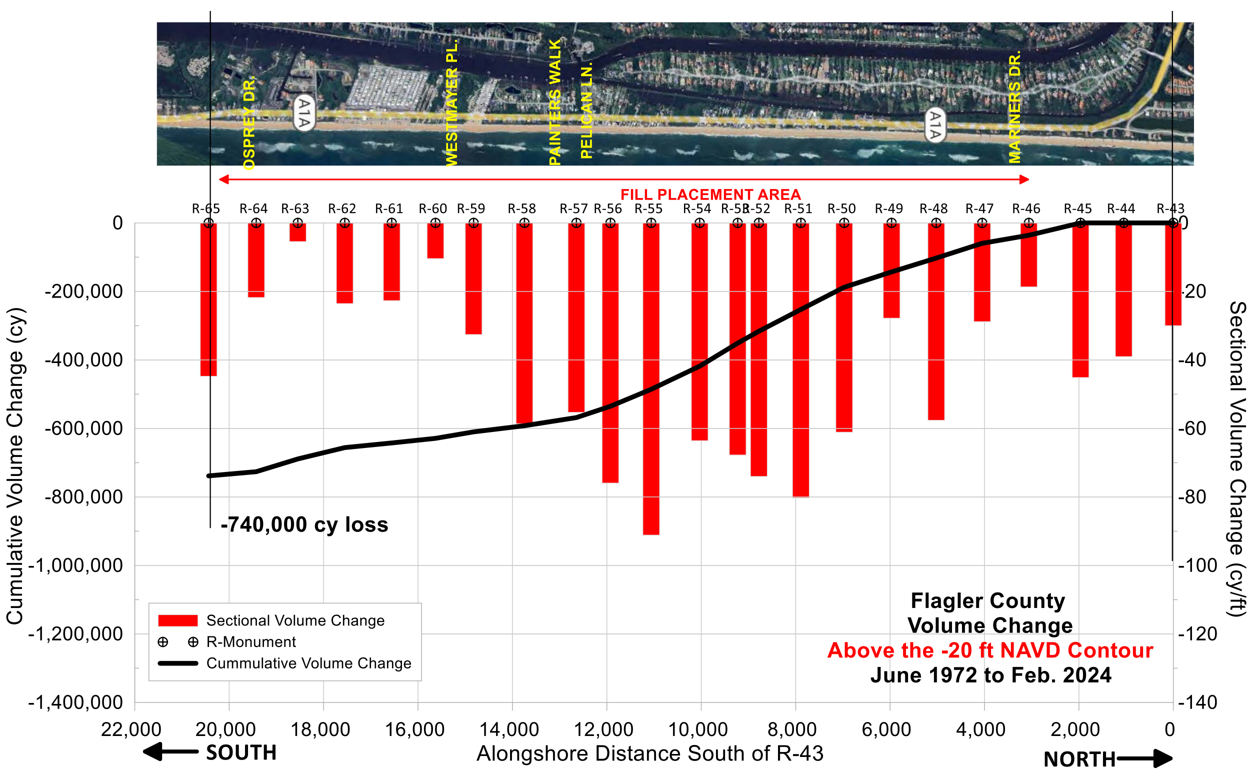


Figure 21.3: Beach volume change along the southern Flagler County shoreline (R43 to R65) between June 1972 to July. 2024 BARS represent sectional volume changes (cy/ft) and LINES represent cumulative alongshore volume change (cy).

The aforementioned historical volume change analysis indicates the severity to which the project shoreline was impacted by storm induced erosion subsequent to July 2011, due to the effects of a number of tropical storm events (i.e. Matthew, Dorian, Ian, and Nicole). Prior to the arrival of these storms, the project shoreline was stable to moderately accretional, see **Figure 21.4** (top), having gained roughly +250,000 cy between June 1972 and July 2011. From July 2011 to February 2024, however, the project shoreline lost -990,000 cy (about -79,200 cy/yr), see **Figure 21.4** (bottom). The data suggest that the combined impacts of Hurricane's Matthew (2017), Dorian (2019), Ian and Nicole (2022) have caused this reach of shoreline to become critically eroded within the last decade.

It is anticipated that along the proposed project area, R46 to R64.5, initial construction will require placement of about 1.4M cy of sand. The intent of the proposed project is to, at a minimum, mitigate for the -990,000 cy volume deficit observed from 2011 to 2024. The total volume required for initial construction exceeds the measured deficit as it requires consideration of not only measured volume losses but includes allowance for advanced nourishment and the overfill ratios associated with the proposed borrow area material (quantified under separate cover).

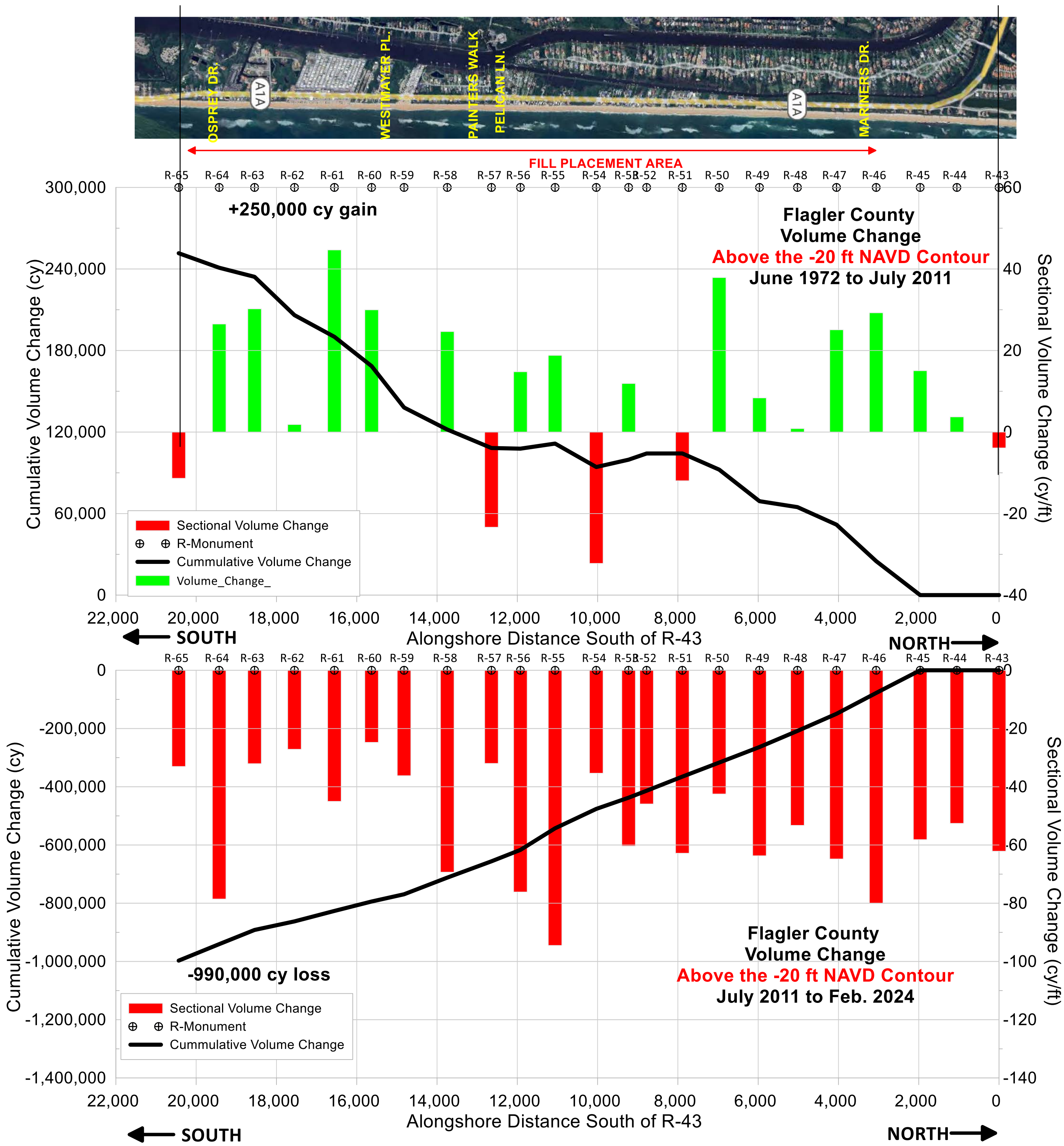


Figure 21.4: Beach volume change along the southern Flagler County shoreline (R43 to R65) between June 1972 to July 2011 (top) and July 2011 to February 2024 (bottom). BARS represent sectional volume changes (cy/ft) and LINES represent cumulative alongshore volume change (cy).

Beach Profile Seasonal Variability: Like most Florida east coast beaches, the Flagler County beach experiences seasonal changes associated with the cross-shore movement of sand. 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.

To evaluate the scope of seasonal changes to the Flagler County beach, available beach profile data were used to formulate typical summer and winter beach profile shapes for the project area. The objective was to evaluate how the typical beach shape may vary seasonally and how the proposed project and anticipated beach fill equilibration may respond to the seasonal changes.

A representative summer profile was developed by generating a composite from the beach survey profiles (R-43 to R-65) taken in July 2011. The 2011 survey was selected as it is a complete survey (includes both upland and offshore data) representative of summer beach profile conditions prior to any major storm. Each profile was shifted to a common horizontal point at the MHWL and an average of all the profiles was computed at each horizontal position. **Figure 21.5** shows the individual R-monument profiles and the averaged composite profile that that will be used to describe the typical summer shape within the project area.

The winter profile was developed using the same approach described above but using the February 2024 survey data. This is the most recent beach profile survey that represents the characteristics of a typical winter profile and captures the entire beach profile. **Figure 21.6** shows the individual R-monument profiles and the composite profile that will be used to describe the typical winter shape.

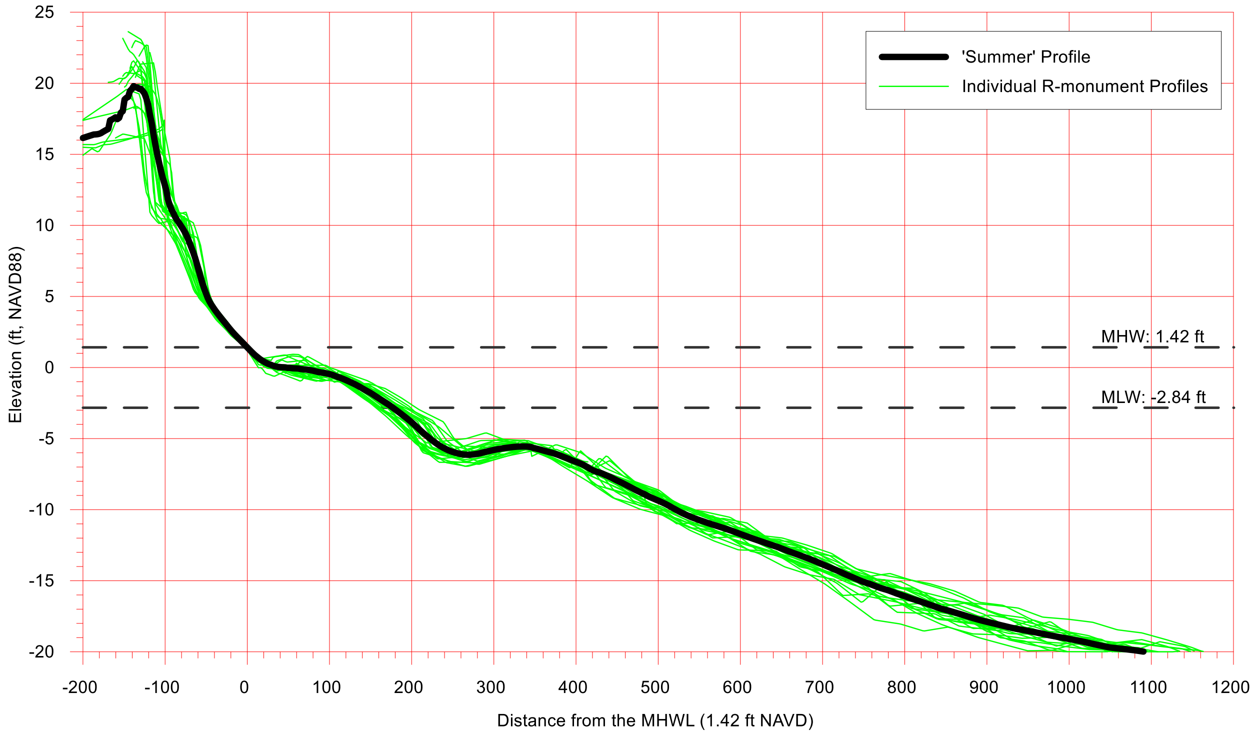


Figure 21.5: Plot of all R-monument profiles from the July 2011 survey for R-43 to R-65. The composite profile (in black) represents the typical "summer" profile of the project area.

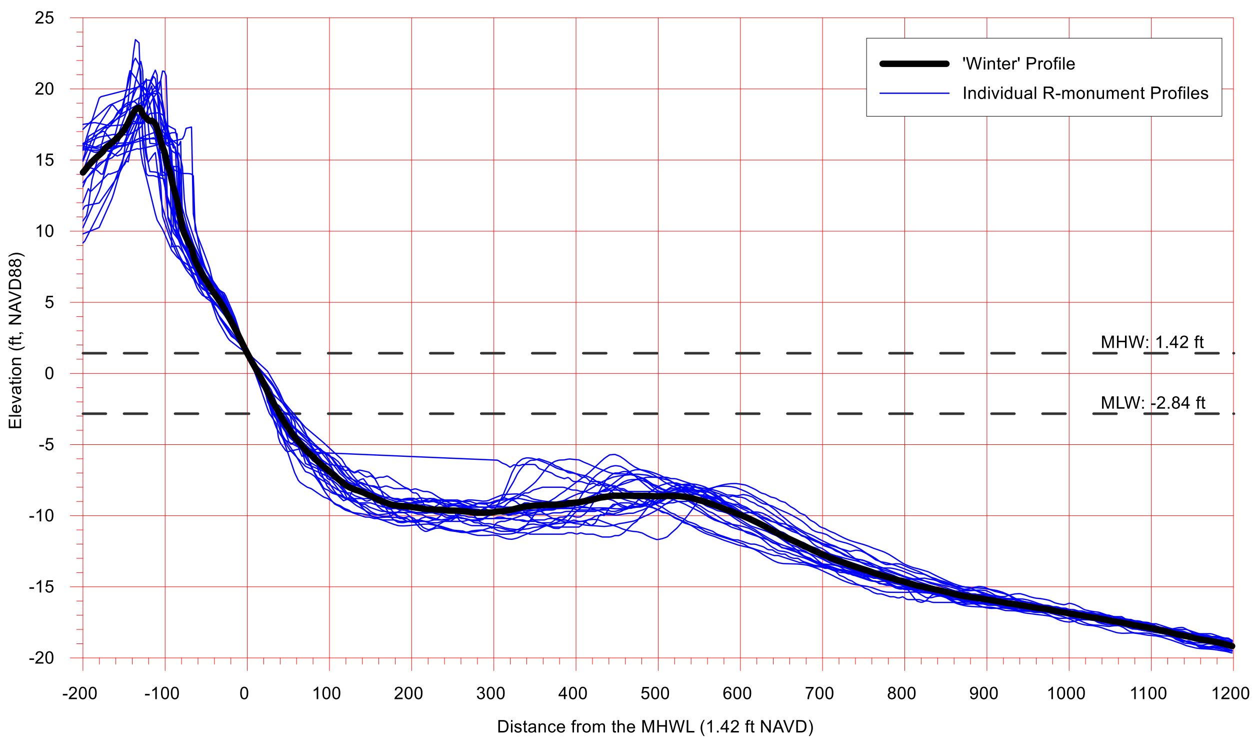


Figure 21.6: Plot of all R-monument profiles from the February 2024 survey for R-43 to R-65. The composite profile (in black) represents the typical "winter" profile of the project area.

Figure 21.7 compares the representative typical summer and winter profiles computed for the project area. Relative to winter conditions, the summer profile exhibits a milder upper beach slope and nearshore profile associated with the nearshore bar which tends to migrate onshore during the transition from winter to summer and conversely erode from summer to winter. In contrast, the winter profile exhibits a steeper upper beach slope, a nearly flat low-water terrace, and a very pronounced primary bar lying nearly 500 ft offshore of the Mean Low Water Line (MLWL). In the smoothed winter composite profile, the primary bar exhibits roughly 2.5 ft of relief, rising from the trough in the profile at roughly -10ft NAVD88 to above -7.5 ft. Individual, measured profiles in the winter series exhibit over five feet of vertical relief in localized areas.

While not plotted, any background losses, or net storm impacts, that occur during the typical year, serve to translate this entire process landward over time. Conversely, the addition of beach fill material to the project beach will translate the entire profile seaward, and subsequent seasonal shifts (and potentially damaging storm impacts) will occur farther from the existing seawalls. Such is the intended purpose of the beach fill placement. With the placement of similarly sized sediments, the seasonal effects described herein are expected to continue in similar magnitude following construction (see Items #16 and #17 for geotechnical data and compatibility). The additional beach width and elevation will significantly improve the level of storm protection offered to the upland and shall likewise widen the beach, increasing the recreational amenity value thereof.

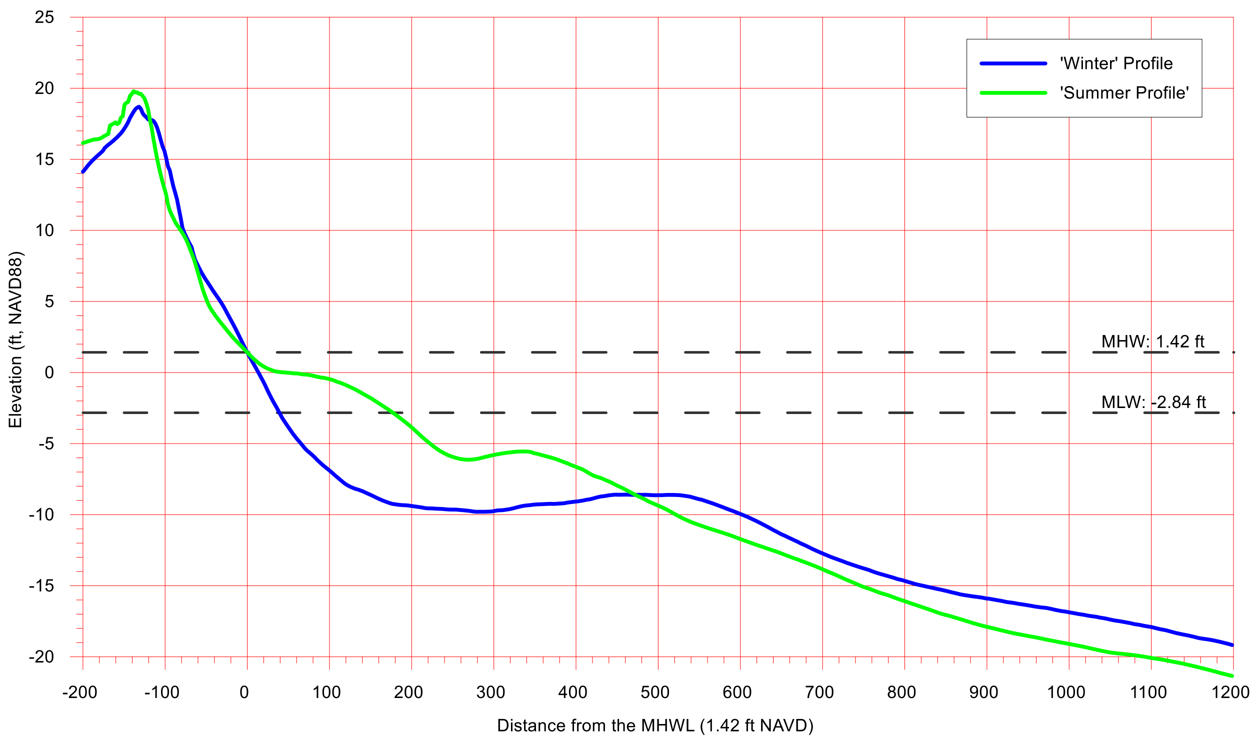


Figure 21.7: Comparison of the typical summer (green) and winter (blue) profile shape present in the Flagler County, FL Beach/Dune Restoration Project area.

Nourishment Template

Figure 21.8 depicts the typical construction template proposed for the nourishment along the project area. The proposed average fill density along the project shoreline is about 80 cy/ft. The beach fill template includes an engineered dune feature with a crest that varies in elevation between +15 and +22 ft NAVD88. The dune feature is tied into the existing beach profile based on the typical elevation of the edge of dune vegetation delineated from aerial photography and beach profile surveys. Side slopes on the seaward face of the dune are 1V:4H, down to the upper berm elevation at +9 ft NAVD88. The dune feature shall be stabilized by the installation of salt-tolerant vegetation and sand fencing. This feature is critical in extending and promoting growth of the existing dune to increase protection of upland infrastructure. In select locations, the proposed dune feature is not included in the proposed project plans. For example, from approximately R-60 to R-62 a seawall encroaches upon the adjacent continuous dune feature. In this area the landward limit of fill corresponds to the location of the top of the wall, and the construction template reflects a 1V:4H slope down to the upper berm elevation at +9 ft NAVD88

Seaward of the proposed dune feature, the upper berm maintains an elevation of +9 ft over a constant width of roughly 50 ft. The upper berm then extends seaward at a 1V:20H slope over a constant 80 ft width to its seaward edge at +5 ft NAVD88. From this point, the fill template dips seaward at a 1V:12H slope, generally conforming to the anticipated angle of repose of the water/sediment slurry from the dredge, to its intersection with the existing seabed. The fill template typically intersects with the February 2024 profile at roughly -10 ft NAVD88. The shape of the beach fill template is intended to reduce post-construction scarping of the beach fill, reduce ponding of water on the new berm, and direct turtle hatchlings toward the ocean following emergence. As drawn in **Figure 21.8** the construction template results in a post-construction shift of the MHWL, prior to equilibration, of approximately 120 ft seaward from the February 2024 MHWL.

Figure 21.8 also provides a prediction of the equilibrated beach profile shape and width. The equilibrated shape was developed from the results of the numerical hydrodynamic and morphodynamical model XBeach, as described in the predicted project performance section of this report. The predicted response of the beach fill template following exposure to a simulated storm having a 5-year return period was used as a representation of the equilibrated profile. Equilibration of the construction profile is predicted to shift the MHWL approximately 60 ft landward relative to the MHWL position of the construction template. As a rough verification of the XBeach results, equilibrium profile theory was applied to predict the relationship between the average sectional fill volume (80 cy/ft) and the corresponding MHW response. Assuming an approximate berm height of +9 ft and a typical depth of survey closure of -20 ft, the resulting seaward translation of an idealized equilibrium profile is expected to be 74 ft, which is generally consistent with the much more computationally rigorous XBeach derived estimation.

In an attempt to replicate typical, existing beach behavior following placement of sand from the offshore borrow area, efforts will be made during construction to retain, to the extent possible, the coarser grained sand materials common along the upper berm of the project shoreline to the higher areas of the upper construction template.

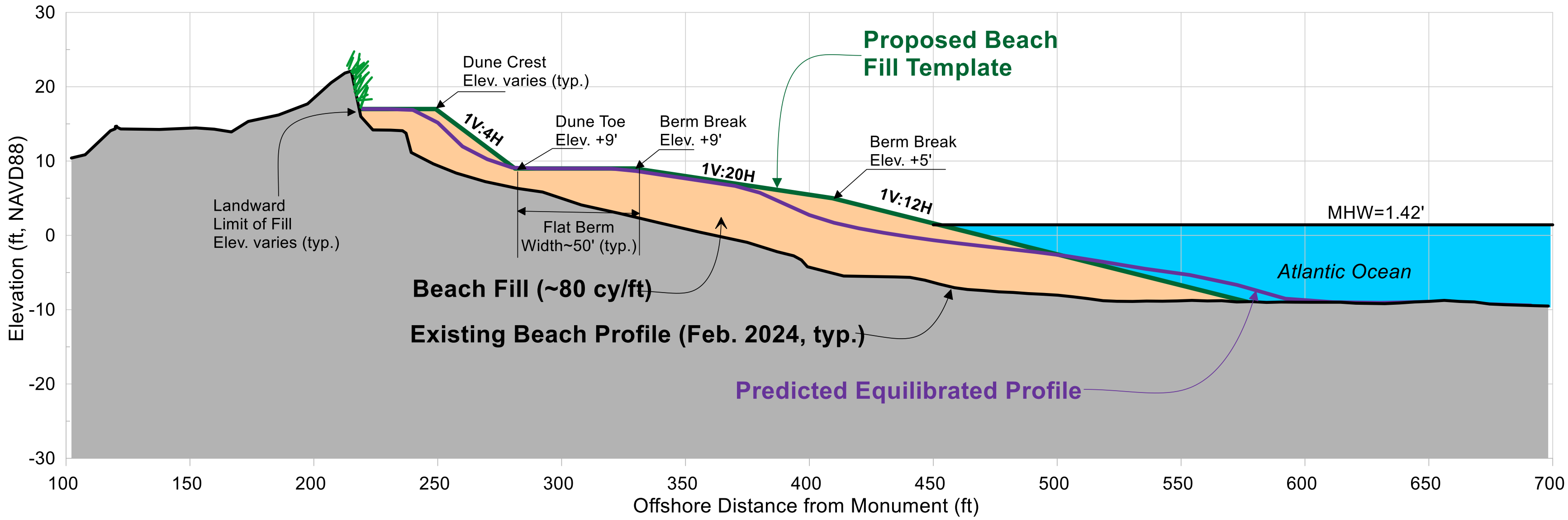


Figure 21.8: Typical nourishment construction template for the engineered beach, Flagler County, FL Beach/Dune Restoration Project. The template consists of an engineered dune feature and a sloping construction fill berm that achieves a post-construction, pre-equilibration extension of the Mean High Water Line (MHWL) approximately 120 ft seaward. The typical project construction volume density is approximately 80 cy/ft on average. A prediction of the resultant beach width following equilibration of the fill is plotted. The dune feature will be stabilized by salt-tolerant vegetation and, as necessary, the installation of sand fencing.

Cumulative Effects.

The proposed project lies along a Critically Eroded Beach and will enhance the shoreline from both a physical and environmental standpoint. Any potential adverse impacts from the project are anticipated to be only temporary and associated with the construction period. As detailed below, no cumulative impacts from the project upon the local coastal ecosystem are expected. A discussion of potential impacts to hardbottom resources located in the vicinity of the project area is provided in a later section.

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).

A summary of the cumulative impacts as defined by the USACE in **Table 21.4** 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 ecosystems 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 21.4. Summary of Cumulative Effects (USACE, 2015)[2].

	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.
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 of 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.	Easements will compensate property owners for replacement cost for private access to the beach

[2] Table reflects removal of effects not anticipated to be generated by proposed modification, specifically the deletion of private dune walkovers.

NEARSHORE HARDBOTTOM.

Nearshore hardbottom outcrops have historically been observed along the northern half of the Flagler County Atlantic Ocean shoreline. Studies of the locations of these outcrops have been conducted by the FDEP (FDEP, 2009), Dial Cordy Associates, Inc. (DCA, 2011), and Arc Surveying & Mapping, Inc./Sonographics (2019 and 2024). These outcrops have appeared to occur predominantly, and persistently (viz., temporally and by physical exposure), north of the proposed project area between approximately R-43.5 to R-43.7. **Figures 21.9a** and **21.9b** show examples of historical aerial imagery of exposed nearshore hardbottom in this vicinity in December 2008 and November 2023, notice the tracts that run northwest to southeast parallel to the shoreline.

Exposure of the southerly extent of observed hardbottom at approximately R-43.5 to R-43.7 has varied through time, though the southern mapped limit of persistent hardbottom appears to be in this vicinity. Hardbottom outcrops north of R-43.5 to R-43.7 have appeared more persistently exposed, historically, than those southward thereof. In the area to the south (south of R-43.5 to R-43.7), hardbottom outcrops have not typically been observed, but an exposed "ephemeral" edge was diver-mapped on 23 May 2024 by Coastal Eco Group, Inc., the southerly limit of which is shown in **Figure 21.10**. This figure also presents the location of the north end taper of the proposed beach fill project for reference, which is about 1,000 ft south of the diver-mapped hardbottom. This hardbottom mapped south of R-43.7 had not been previously observed, hence being termed "ephemeral", and is opined to have been recently exposed because of a substantial decrease in profile elevation, which is further discussed in the following paragraph.

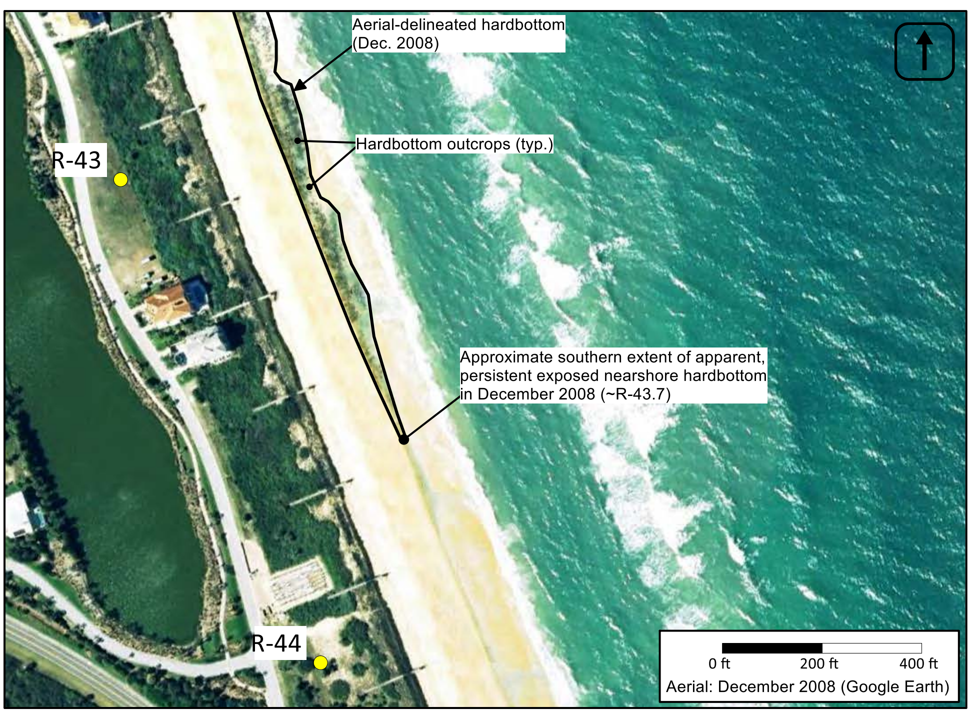


Figure 21.9a: Approximate southerly extent of apparent, persistent exposed nearshore hardbottom in December 2008.

Figure 21.9b: Approximate southerly extent of apparent, persistent exposed nearshore hardbottom in November 2023.

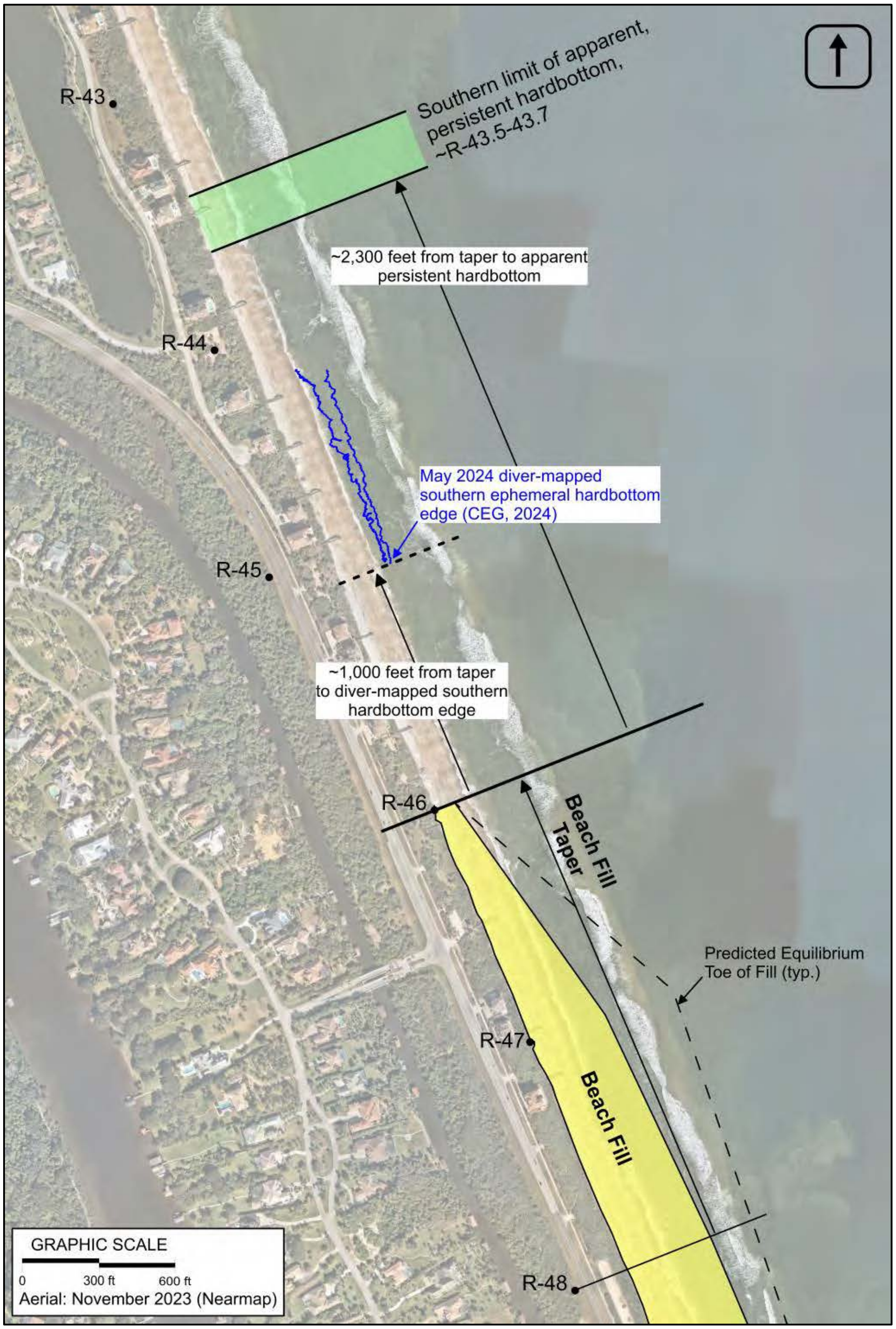


Figure 21.10: Location of May 2024 diver-mapped southern ephemeral hardbottom edge (mapped by Coastal Eco Group, Inc.) and southerly limit of apparent persistent hardbottom at approximately R-43.5 relative to the proposed beach fill northern taper.

The recently observed and diver-mapped (May 2024) hardbottom is believed to have become exposed because of seasonal bar-trough behavior, cross-shore beach profile elevation changes and a chronic sediment deficit due to continued erosion and no comprehensive beach nourishment to-date. The burial and unburial of hardbottom in this area is likely related to the natural onshore and offshore movement of sediments in the form of nearshore sand bars, as well as acute changes resulting from storm impacts. In general, beach profiles vary seasonally, with mild, gently sloping profiles occurring during the summer and steeper, barred profiles occurring during the winter (**Figure 21.11**). Longer period wave conditions, conducive for onshore sediment transport, typically occur over summer, while shorter period energetic wave conditions that erode the beach face typically occur during winter (Dean, 2004). Storm events, on the other hand, can deposit substantial volumes of sand from onshore to offshore relatively quickly (hours to days), while post-storm recovery of the beach can be prolonged (months to years).

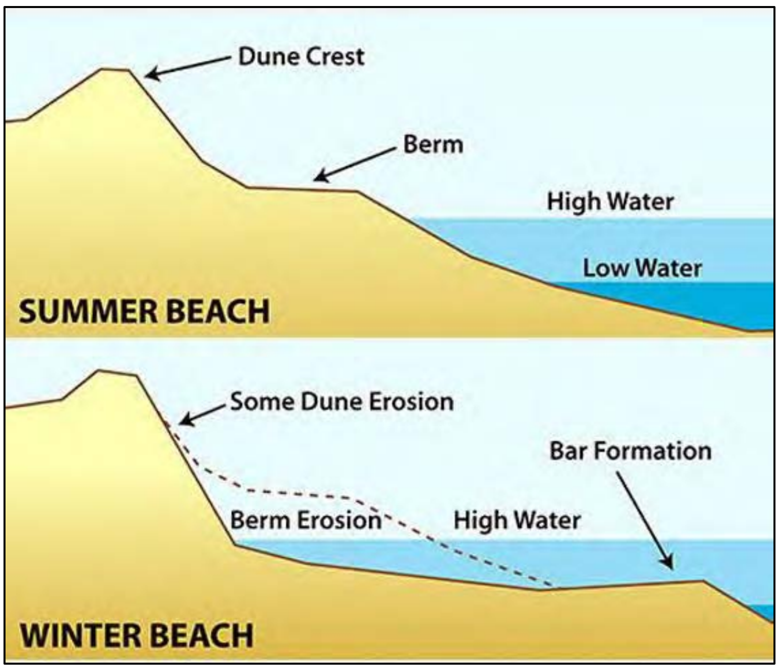
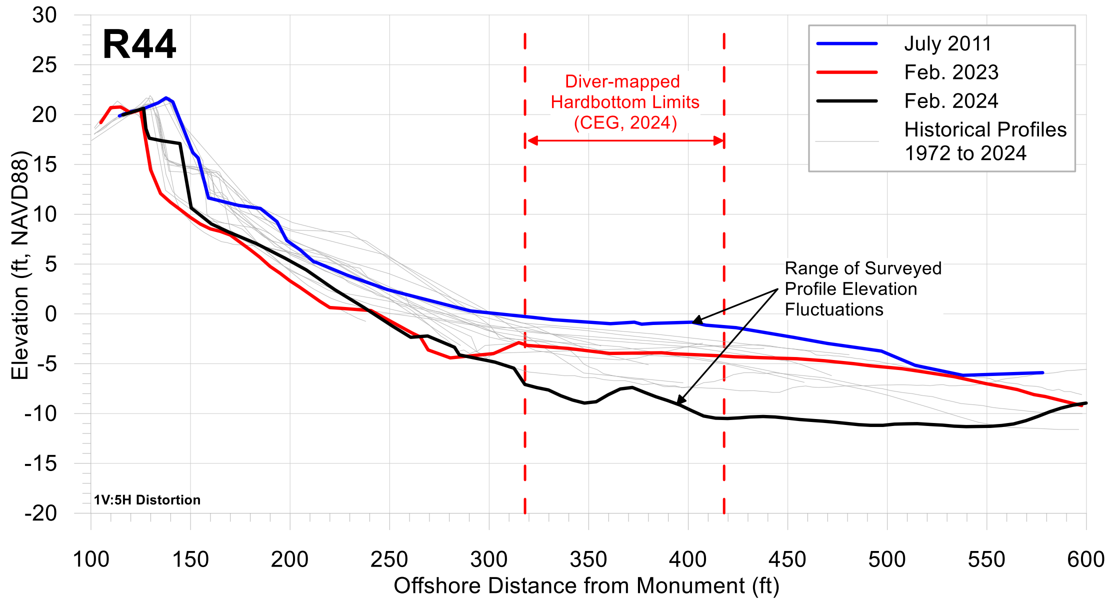


Figure 21.11: Illustration of "Summer" and "Winter" beach profile shapes. Image courtesy of Friends of Island Beach State Park.

Historical beach profiles at R-44 and R-45 were analyzed for the available record from 1972 to 2024 and are plotted in **Figure 21.12** to demonstrate the range of natural vertical profile elevation fluctuations. In the figure, the historical profiles are shown in grey, with July 2011 (blue), February 2023 (red), and February 2024 (black) colorized for comparison. The red dashed vertical lines illustrate the landward and seaward limits of mapped hardbottom in May 2024. Within the limits of exposed rock (and remainder of profiles) the range of natural profile elevations fluctuates considerably – approximately 9 feet (-1 ft to -10 ft, NAVD88) at R-44; and approximately 5 ft (0 to -5 ft, NAVD88) at R-45. To note, within the areas of 2024 rock exposure, the February 2024 profiles appear to be the *deepest* profile measured in the 52-year historical record, with all other surveyed elevations above February 2024 conditions, suggesting that these outcrops have been persistently buried and were only recently exposed.

Given this record of historical beach profile surveys at R-44 and R-45, which are south of the limits of apparent, persistent exposed hardbottom between R-43.5 and R-43.7, it is compelling that the observed rock in the May 2024 diver-mapped edge survey has become exposed within the past 6 months and is expected to be a short-term, temporary condition as summer bar recovery occurs. Because of the ephemeral nature of the hardbottom in this area, known and well documented seasonal behavior of the bar-trough system along the Flagler County shoreline, and the buffer distance between location of persistent hardbottom and the northern beach fill taper -- more than 2,300 feet. In addition to providing a buffer between ephemeral and persistent hardbottom at the northern end of the proposed project, observations of shoreline behavior suggest bi-modal transport with a moderate bias towards net southerly transport, placing the project downdrift of the hardbottom resources. The proposed beach nourishment project is not anticipated to have negative impacts upon the hardbottom



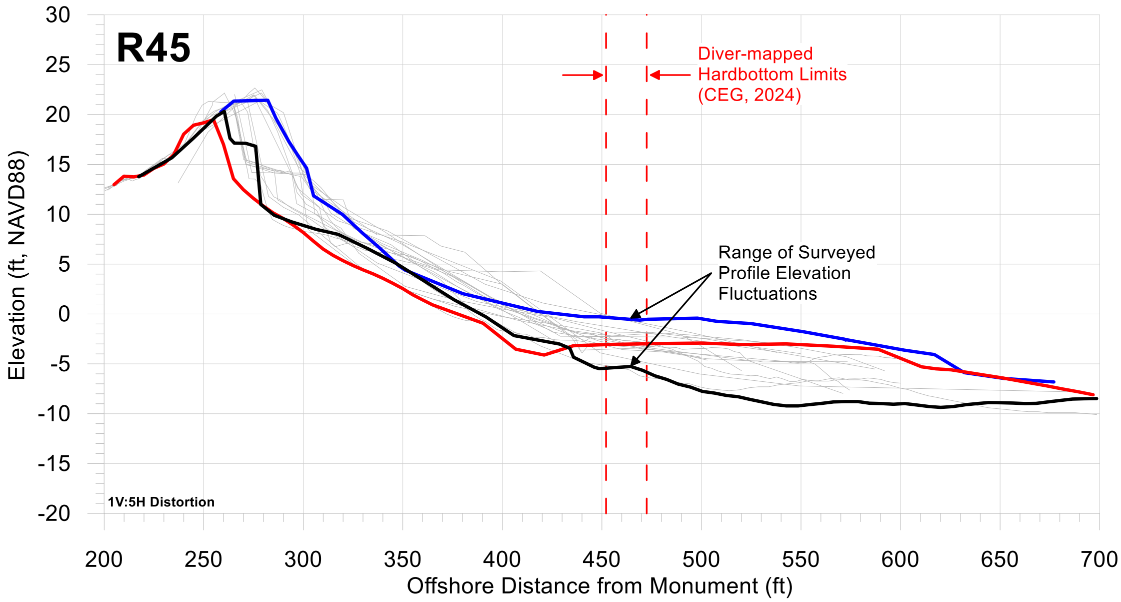


Figure 21.12: Historical surveyed beach profiles at R-44 and R-45 for the period from 1972 to 2024 and cross-shore limits of May 2024 diver-mapped hardbottom for comparison.

<u>Predicted Project Performance.</u>

Historical volume change and shoreline change analysis has shown that the project shoreline is vulnerable to storm induced erosion. Within recent years the Flagler Beach shoreline has been impacted by a number of storms i.e. Hurricane Matthew, Dorian, Ian, and Nicole. In order to assess storm related impacts to the dune and beach system along the project shoreline the present study applied a combination of beach profile surveys and the computer-based model XBeach. The model was implemented to obtain predictions of project performance and quantify the relative benefits of the proposed construction beach fill template in terms of storm protection.

XBeach is an open source hydrodynamic and morphodynamic model which was originally developed to simulate processes and impacts on sandy coasts with a domain size of kilometers and on the time scale of storms (Roelvink et al., 2009). The model was employed to obtain predictions of beach profile response along the project shoreline under various storm conditions. Model grid and bathymetry were constructed for both the existing (without project) and designed beach fill (with project) conditions. The cross-shore extent of the model grid in both configurations was related to the beach profile surveys, which typically extend from the landward edge of dune to approximately 3,000 feet offshore into depths of -30 ft. The along-shore extent of the model grid is approximately 23,500 ft corresponding to the alongshore distance between R-43 and R-68.

The model bathymetry representative of "without project" conditions was generated from the most recent beach profile surveys (February 2024). Similarly, the model bathymetry representative of "with project" conditions was constructed from the designed beach fill template, corresponding to nourished reaches of shoreline with an average fill density of 80 cy/ft between R-46 and R-65. Grid spacing in the cross-shore direction is refined as the bathymetry becomes shallower. Grid resolution becomes as fine as 10 ft in the vicinity of the dune and berm. The along-shore grid resolution is kept constant at 100 ft in the alongshore direction.

Hydrodynamic inputs were prescribed at the offshore boundary of the model at a depth of -30 ft. These inputs correspond to water level and wave conditions derived from published FDEP storm hydrographs for Flagler County (FDEP 2011b). The published hydrographs are representative of synthetic 15- and 25-year storm water levels, which include wave setup and runup. The FDEP published hydrographs were adjusted to create input hydrographs for XBeach which represent various return period storms events by matching the peak tide levels for the respective curves to match the published peak storm tide levels (see **Figure 21.13**). There is no available wave information for the various return period storms. Previous modelling studies have shown that constant wave conditions can provide a reasonable representation for measured time series data (McCall et al., 2010). Wave heights and periods were varied iteratively in order to obtain the peak measured water levels consistent with the published FDEP hydrographs. The input wave and hydrodynamic conditions are described in **Table 21.5.** The wave conditions were prescribed parametrically using a JONSWAP spectrum propagating from the offshore at an angle of 90 deg from the north.

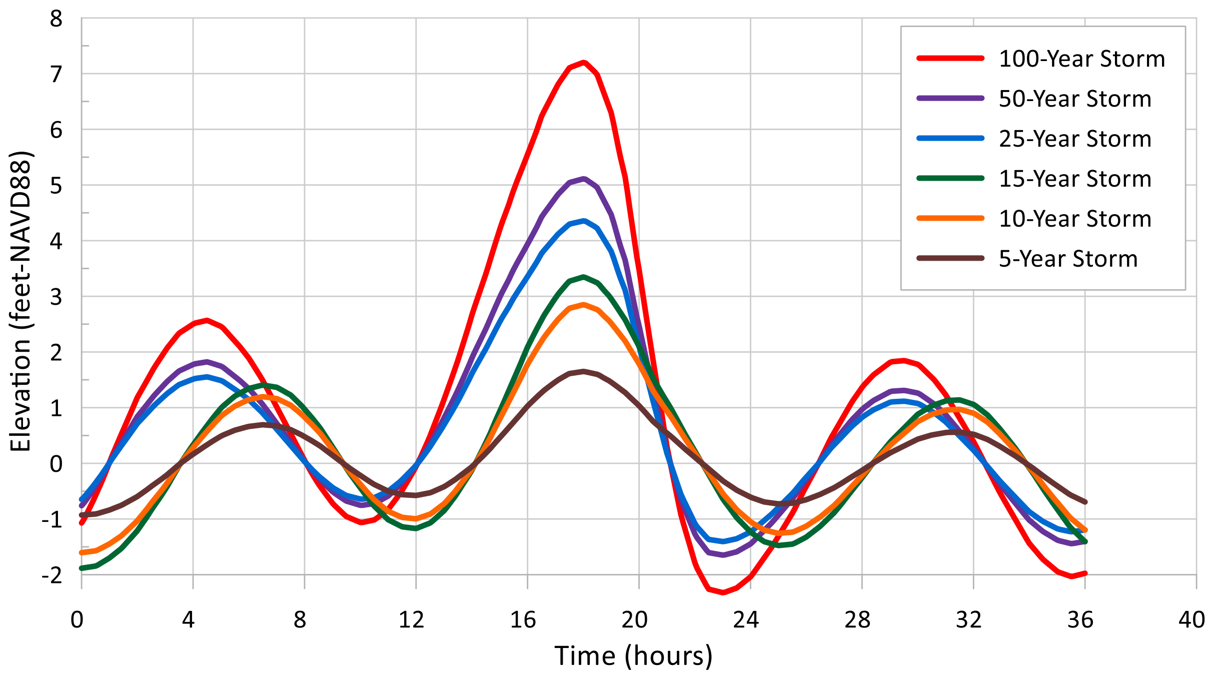


Figure 21.13: Adjusted Flagler County, FL storm hydrographs **(**FDEP 2011b) for XBeach water level elevation input.

Table 21.5. Input wave and water level conditions for XBeach model runs.

Storm Event	Wave Height (ft)	Wave Period (s)	Peak Storm Water Level (ft-NAVD)
5-Year	9	9	1.7
10-Year	9.5	10	2.9
15-Year	10	10	3.4
25-Year	10	10	4.4
50-Year	12.5	11	5.1
100-Year	16	12	7.2

Hydrodynamic forcing was applied on the “without project” and “with-project” model domains for approximately 36 hours with outputs of water level, RMS wave height, fluid velocity, and bed level generated at 1-hour intervals. **Figure 21.14** shows the beach profile response at R-48 for both bathymetric settings under these various storm conditions. Examining the predicted profile response under current conditions, the majority of erosion occurs between the dry beach and MHW. The existing dune is un-affected by the smaller storms but appears to erode under the 25-,50-,and 100-year storm conditions, as given by the position of the +15 ft contour relative to the current, February 2024 position (**Table 21.6**). The existing dune is completely undermined and removed under the 100 year-storm conditions.

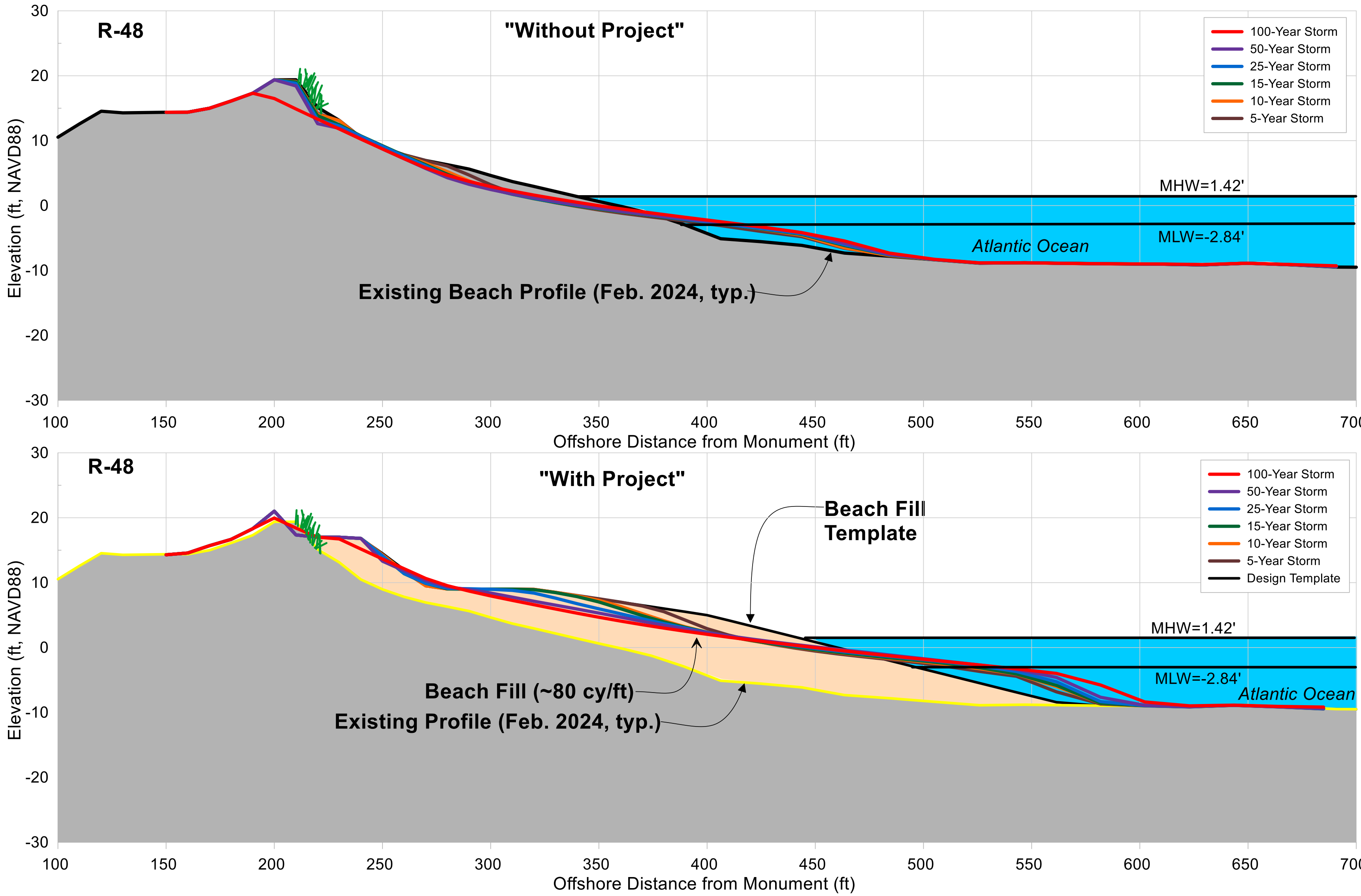


Figure 21.14: XBeach simulation output at R-48 for "without project" (top) and "with project" conditions.

Table 21.6: Average (between R-47 and R-65) XBEACH predicted post storm shoreline position for “without project” (existing) and “with project” (beach fill) conditions for selected storm events. Δ values indicate the difference between the “without project” and “with project” contour position.

Elevation (ft-NAVD)	5 Year Storm Event "Without Project"	5 Year Storm Event "With Project"	5 Year "With" and "Without" Difference	10 Year Storm Event "Without Project"	10 Year Storm Event "With Project"	10 Year "With" and "Without" Difference	15 Year Storm Event "Without Project"	15 Year Storm Event "With Project"	15 Year "With" and "Without" Difference
15	-0.4	14.9	15.2	-1.3	14.8	16.1	-2.9	14.7	17.6
14	-0.4	14.6	15.0	-2.1	14.6	16.6	-4.2	14.1	18.3
13	-0.2	14.9	15.1	-2.9	14.7	17.6	-5.1	13.9	19.0
12	-0.3	16.0	16.3	-2.9	15.7	18.6	-4.5	15.0	19.5
11	-0.3	17.1	17.4	-2.7	16.9	19.6	-3.2	17.0	20.2
10	-0.4	18.1	18.5	-2.0	18.3	20.3	-1.9	19.4	21.3
9	-0.7	31.9	32.6	-1.4	53.2	54.7	-1.6	49.3	50.9
8	-1.6	74.8	76.5	-2.7	73.1	75.9	-2.7	70.8	73.5
7	-3.2	85.0	88.2	-5.2	78.0	83.2	-5.2	74.0	79.2
6	-6.7	88.9	95.7	-9.0	77.7	86.7	-8.9	73.6	82.6
5	-12.1	86.3	98.4	-14.4	74.9	89.3	-14.7	71.5	86.2
4	-15.2	84.1	99.2	-17.9	74.6	92.5	-17.8	72.1	90.0
3	-17.3	83.8	101.1	-19.4	77.2	96.6	-19.2	75.7	94.9
2	-19.3	84.7	104.0	-20.6	81.0	101.6	-20.2	80.7	100.8
Average	-5.6	51.1	56.7	-7.5	48.9	56.4	-8.0	47.3	55.3

Elevation (ft-NAVD)	25 Year Storm Event "Without Project"	25 Year Storm Event "With Project"	25 Year "With" and "Without" Difference	50 Year Storm Event "Without Project"	50 Year Storm Event "With Project"	50 Year "With" and "Without" Difference	100 Year Storm Event "Without Project"	100 Year Storm Event "With Project"	100 Year "With" and "Without" Difference
15	-5.8	14.5	20.3	-12.5	11.1	23.6	-19.5	8.6	28.1
14	-7.8	13.5	21.3	-13.1	11.2	24.3	-17.7	10.8	28.5
13	-8.5	13.1	21.6	-11.6	13.5	25.1	-15.1	13.6	28.6
12	-7.3	14.6	21.9	-8.4	17.0	25.5	-11.8	17.2	29.0
11	-5.0	17.6	22.6	-5.6	20.6	26.1	-8.7	21.0	29.7
10	-2.9	20.3	23.2	-3.4	23.9	27.2	-6.3	25.3	31.6
9	-2.1	43.3	45.3	-2.6	33.4	36.0	-4.9	30.3	35.2
8	-3.2	61.7	64.8	-3.4	43.4	46.8	-5.7	35.5	41.2
7	-5.6	64.4	70.0	-5.6	49.2	54.9	-7.9	40.8	48.8
6	-9.6	65.8	75.5	-9.7	54.1	63.9	-11.6	45.2	56.8
5	-14.9	66.3	81.2	-15.1	57.8	72.9	-16.4	49.1	65.6
4	-18.4	69.3	87.7	-18.1	63.4	81.5	-17.7	56.6	74.3
3	-19.5	74.6	94.0	-18.8	71.7	90.5	-15.4	67.3	82.7
2	-19.8	81.0	100.8	-17.8	81.3	99.1	-11.8	79.2	91.1
Average	-9.3	44.3	53.6	-10.4	39.4	49.8	-12.2	35.8	47.9

Under “with project” conditions, the model predicts that the beach fill template provides a significant level of storm protection regardless of storm intensity. Following all the modeled storm events, the average position of the shoreline under the designed beach fill conditions is located further seaward relative to the current position of the shoreline. Comparison of the “with” and “without” project profile response under the most extreme event (i.e., 100- year storm) there is about 48 ft of additional shoreline width (averaged between the +15 and +2 NAVD contours) across the entire project area. **Table 21.6** lists the predicted, post-storm position of various profile contours relative to their respective position in February 2024. In the table, a value of 0 suggests there is no change relative to February 2024. A negative value reflects a contour which has been eroded relative to current conditions, and a positive value indicates sedimentation of the contour relative to 2024 conditions (generally the result of the cross-shore transfer of sand eroded from a point higher on the profile).

Table 21.7 describes the alongshore distribution of the dune for both the "with" and "without" project conditions. The +15 NAVD was selected as it is the average elevation of the dune under the current beach fill template design. Under the existing (without project) conditions, the position of the +15 ft contour would retreat under the storm conditions. The increasing intensity of each storm would result in greater retreat of the +15 ft NAVD under the current conditions (see top panel **Figure 21.15**). The predicted post storm position of the +15 ft NAVD contour for the constructed beach appears to remain at a constant distance of roughly 15 ft seaward of existing conditions for the 5-,10-,15, and 25- year synthetic storm events (top panel **Figure 21.15**). The constructed dune begins to migrate further landward under the 50- and 100-yr storm events, however simulation results suggests that under the most extreme conditions (100-year storm), the difference in the position of the +15 ft NAVD contour between without and with project condition averaged across the entire project area about 28 ft. This would suggest the under the most extreme storm event the proposed project adds about 28 ft of relief at an elevation of +15 NAVD across the entire project.

Table 21.8 describes the alongshore distribution of the shoreline for both the "with" and "without" project conditions. The +7 NAVD was selected as it is the average elevation of the dry berm under the current beach fill template design. Under the existing (without project) conditions, the position of the +7 ft contour would retreat under the storm conditions. The increasing intensity of each storm would result in greater retreat of the +7 ft NAVD under the current conditions (see bottom panel **Figure 21.15**). The majority of the retreat can be observed on the southern end of the project area between R-61 and R-65. The predicted, post-storm position of the +7 ft NAVD contour under the designed (with project) conditions, for all profiles along the project shoreline is located further seaward than its current position. Comparison of the "with" and "without" project post-storm position of the +7 ft contour demonstrates the protective value of the beach fill. That is, the beach fill provides an additional buffer between the sea and upland infrastructure which persists for each of the synthetic storm events. The magnitude of this protective buffer is predicted to decrease with increasing storm intensity. Considering the most energetic event (100-year storm), the difference in the position of the +7 ft NAVD contour between without and with project condition averaged across the entire project area about 49 ft. This would suggest the under the most extreme storm event the proposed project adds about 49 ft of relief at an elevation of +7 NAVD across the entire project – this protective effect benefits from the full placement volume at the time of construction and would be expected to decrease as the project is eroded over time.

Table 21.7: Predicted location of the +15 ft contour at each R-monument relative to baseline conditions (pre-project February 2024) for "with project" and "without project" conditions

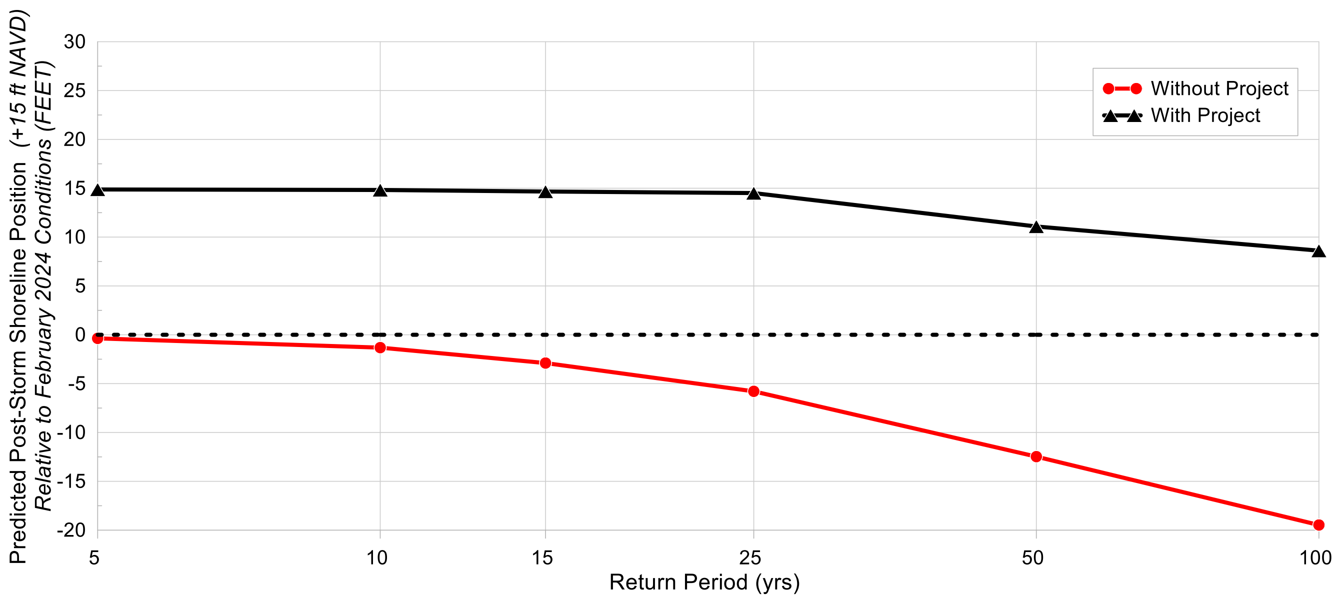
R-Mon ID	5 Year Storm Event "Without Project"	5 Year Storm Event "With Project"	5 Year "With" and "Without" Difference	10 Year Storm Event "Without Project"	10 Year Storm Event "With Project"	10 Year "With" and "Without" Difference	15 Year Storm Event "Without Project"	15 Year Storm Event "With Project"	15 Year "With" and "Without" Difference
R-47	0	8	8.1	0	8	8.1	0	8	8.1
R-48	-2	27	29.1	-2	27	29.1	-2	26	28.1
R-49	0	21	21.1	0	21	21.1	0	21	21.1
R-50	0	-3	-2.9	0	-3	-2.9	-6	-3	3.1
R-51	0	12	12.1	0	12	12.1	-3	12	15.1
R-52	0	25	25.1	0	25	25.1	0	25	25.1
R-53	0	12	12.1	-3	12	15.1	-3	12	15.1
R-54	0	35	35.1	0	35	35.1	0	35	35.1
R-55	0	41	41.1	0	41	41.1	0	41	41.1
R-56	0	14	14.1	-4	14	18.1	-4	14	18.1
R-57	-2	31	33.1	-2	31	33.1	-2	31	33.1
R-58	-1	25	26.1	-2	25	27.1	-3	25	28.1
R-59	0	10	10.1	-2	10	12.1	-3	9	12.1
R-60	-1	12	13.1	-1	11	12.1	-2	11	13.1
R-61	0	-5	-4.9	-7	-5	2.1	-14	-6	8.1
R-62	0	-5	-4.9	0	-5	-4.9	-6	-5	1.1
R-63	0	4	4.1	0	4	4.1	-2	4	6.1
R-64	-1	4	5.1	-2	4	6.1	-5	4	9.1
R-65	0	12	12.1	0	12	12.1	0	12	12.1
Average	-0.4	14.9	15.2	-1.3	14.8	16.1	-2.9	14.7	17.6

R-Mon ID	25 Year Storm Event "Without Project"	25 Year Storm Event "With Project"	25 Year "With" and "Without" Difference	50 Year Storm Event "Without Project"	50 Year Storm Event "With Project"	50 Year "With" and "Without" Difference	100 Year Storm Event "Without Project"	100 Year Storm Event "With Project"	100 Year "With" and "Without" Difference
R-47	-2	8	10.1	-7	8	15.1	-11	5	16.1
R-48	-3	26	29.1	-4	25	29.1	-11	21	32.1
R-49	-3	21	24.1	-7	17	24.1	-15	14	29.1
R-50	-7	-3	4.1	-18	-5	13.1	-25	-9	16.1
R-51	-10	12	22.1	-13	8	21.1	-20	6	26.1
R-52	-3	25	28.1	-4	20	24.1	-13	19	32.1
R-53	-10	12	22.1	-17	9	26.1	-21	6	27.1
R-54	-2	35	37.1	-7	32	39.1	-12	29	41.1
R-55	-2	41	43.1	-9	38	47.1	-17	35	52.1
R-56	-11	14	25.1	-18	11	29.1	-25	8	33.1
R-57	-5	31	36.1	-12	28	40.1	-19	25	44.1
R-58	-4	24	28.1	-12	21	33.1	-18	19	37.1
R-59	-7	9	16.1	-16	5	21.1	-23	3	26.1
R-60	-6	10	16.1	-9	6	15.1	-18	5	23.1
R-61	-17	-6	11.1	-30	-13	17.1	-39	-14	25.1
R-62	-7	-6	1.1	-16	-11	5.1	-27	-13	14.1
R-63	-3	4	7.1	-12	1	13.1	-20	-2	18.1
R-64	-6	4	10.1	-18	0	18.1	-22	-2	20.1
R-65	-2	12	14.1	-8	8	16.1	-14	6	20.1
Average	-5.8	14.5	20.3	-12.5	11.1	23.6	-19.5	8.6	28.1

Table 21.8: Predicted location of the +7 ft contour at each R-monument relative to baseline conditions (pre-project February 2024) for "with project" and "without project" conditions

R-Mon ID	5 Year Storm Event "Without Project"	5 Year Storm Event "With Project"	5 Year "With" and "Without" Difference	10 Year Storm Event "Without Project"	10 Year Storm Event "With Project"	10 Year "With" and "Without" Difference	15 Year Storm Event "Without Project"	15 Year Storm Event "With Project"	15 Year "With" and "Without" Difference
R-47	-4	29	33.1	-10	22	32.1	-11	19	30.1
R-48	0	91	91.1	-3	84	87.1	-4	81	85.1
R-49	0	94	94.1	-1	88	89.1	-2	86	88.1
R-50	0	80	80.1	-2	76	78.1	0	70	70.1
R-51	-1	93	94.1	-3	87	90.1	-1	83	84.1
R-52	0	95	95.1	-3	89	92.1	-3	85	88.1
R-53	-1	95	96.1	-1	86	87.1	-1	83	84.1
R-54	0	105	105.1	-2	100	102.1	-2	94	96.1
R-55	-6	107	113.1	-7	100	107.1	-6	97	103.1
R-56	0	101	101.1	1	93	92.1	0	89	89.1
R-57	-1	100	101.1	-5	95	100.1	-7	90	97.1
R-58	-4	95	99.1	-6	86	92.1	-6	84	90.1
R-59	-7	81	88.1	-7	71	78.1	-8	65	73.1
R-60	0	78	78.1	-5	72	77.1	-5	67	72.1
R-61	-8	79	87.1	-6	71	77.1	-5	67	72.1
R-62	-4	68	72.1	-7	61	68.1	-6	58	64.1
R-63	-7	76	83.1	-9	68	77.1	-9	63	72.1
R-64	-11	77	88.1	-12	70	82.1	-11	66	77.1
R-65	-6	69	75.1	-10	61	71.1	-11	57	68.1
Average	-3.2	85.0	88.2	-5.2	78.0	83.2	-5.2	74.0	79.2

R-Mon ID	25 Year Storm Event "Without Project"	25 Year Storm Event "With Project"	25 Year "With" and "Without" Difference	50 Year Storm Event "Without Project"	50 Year Storm Event "With Project"	50 Year "With" and "Without" Difference	100 Year Storm Event "Without Project"	100 Year Storm Event "With Project"	100 Year "With" and "Without" Difference
R-47	-11	14	25.1	-13	10	23.1	-11	8	19.1
R-48	-5	68	73.1	-8	53	61.1	-8	45	53.1
R-49	-2	71	73.1	-1	57	58.1	-1	52	53.1
R-50	-1	61	62.1	0	45	45.1	-3	37	40.1
R-51	1	77	76.1	2	58	56.1	1	48	47.1
R-52	-4	76	80.1	-6	61	67.1	-4	51	55.1
R-53	1	74	73.1	3	62	59.1	1	49	48.1
R-54	-3	89	92.1	-3	69	72.1	-4	61	65.1
R-55	-7	85	92.1	-7	70	77.1	-13	59	72.1
R-56	2	78	76.1	3	61	58.1	1	56	55.1
R-57	-8	82	90.1	-8	66	74.1	-11	55	66.1
R-58	-7	75	82.1	-7	59	66.1	-9	48	57.1
R-59	-9	53	62.1	-8	40	48.1	-12	34	46.1
R-60	-6	58	64.1	-7	42	49.1	-12	33	45.1
R-61	-5	52	57.1	-5	41	46.1	-13	31	44.1
R-62	-7	48	55.1	-8	32	40.1	-13	24	37.1
R-63	-10	57	67.1	-10	39	49.1	-11	28	39.1
R-64	-13	60	73.1	-11	41	52.1	-12	31	43.1
R-65	-12	43	55.1	-13	27	40.1	-17	23	40.1
Average	-5.6	64.4	70.0	-5.6	49.2	54.9	-7.9	40.8	48.8



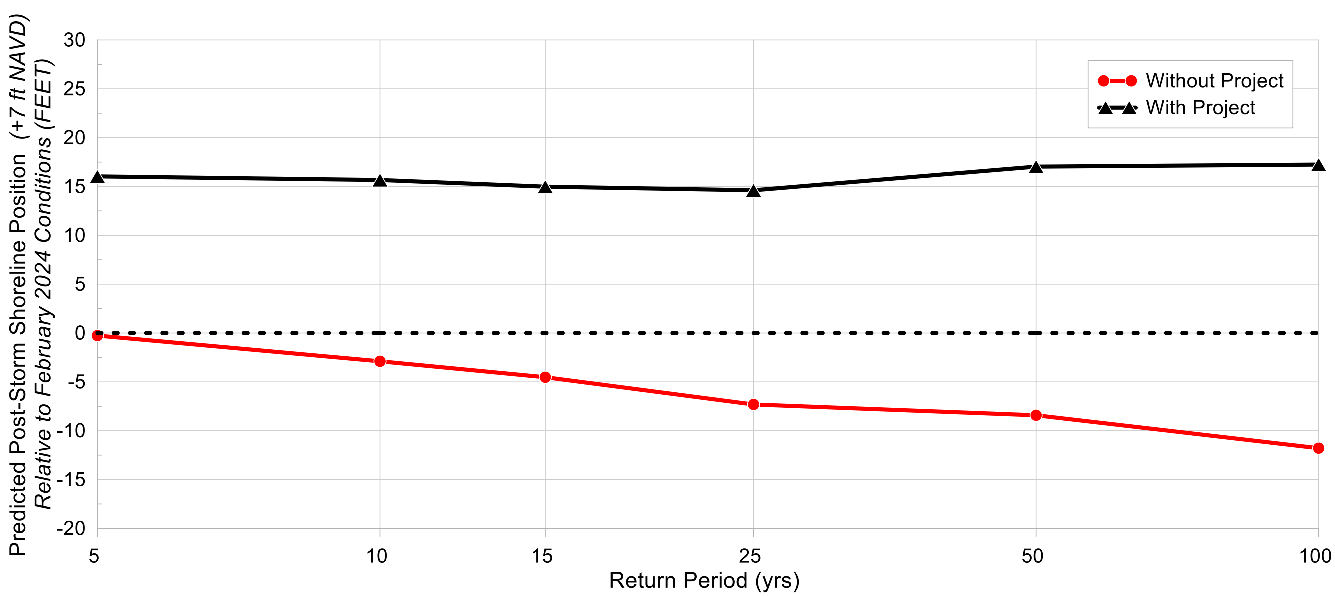


Figure 21.15: Alongshore averaged predicted post-storm profile response for various return period storm events. (Top) Predicted post-storm position of the +15 ft NAVD contour for with and without project conditions. (Bottom) Predicted post-storm position of the +7ft NAVD contour for with and without project conditions. Y-axis values represent the horizontal distance of the elevation contour relative to pre-storm February 2024 survey elevation (i.e. a value of 0 suggest no change relative to existing conditions)

Summary of dune/beach fill design volume as well as historical volume changes are described in **Table 21.9.** The project was designed to contain fill densities at each R-monument which are equal to or greater than the volume loss at that monument between July 2011 and February 2024. A summary of the beach fill design and predicted performance of the proposed project is described by **Figure 21.16.** The top panel shows the alongshore distribution of placement volume as well as the observed volume loss between the July 2011 and February 2024 surveys. The bottom panel was included to show the difference in the predicted post storm shoreline position (+7 ft NAVD) between the "with" and "without" project configurations as determined from the XBeach model. The modeled results appear to be correlated with the projected fill densities placed at each R-Monument. The greatest fill density is at R-55 which corresponds to the greatest change in predicted post storm shoreline position. This would suggest that the larger the fill density the greater the benefit in terms of storm protection. Overall, the proposed Dune/Beach Restoration project along the Phase 2 Flagler County shoreline would create a more resilient beach in response to storms. The project will also provide and added level of protection to infrastructure located landward of the existing dune system, which could be potentially impacted under existing conditions.

Table 21.9: Dune/Beach Fill Design Summary. Beach fill design volume and measured volume change (2011 to 2024) observed at each R-monument and the cumulative total along the entire project area.

R-Mon ID	Distance from R-43 (ft)	Volume Change* (cy/ft)	Total Volume Change* (cy)	Cumulative Volume Change* (cy)	Fill Density (cy/ft)	Total Fill Volume (cy)	Cumulative Fill (cy)	Net Volume Change (cy)
R-46	3,060	-80.0	-77,835	-77,835	0.0	0	0	-77,835
R-47	4,049	-64.8	-71,625	-149,460	40.4	19,962	19,962	-51,663
R-48	5,022	-53.3	-58,806	-208,266	76.7	58,305	78,267	-501
R-49	5,968	-63.7	-55,339	-263,605	90.8	79,240	157,507	23,901
R-50	6,972	-42.5	-53,311	-316,916	76.4	83,946	241,453	30,635
R-51	7,890	-62.8	-48,329	-365,245	79.0	71,341	312,794	23,012
R-52	8,779	-45.9	-48,390	-413,635	89.0	74,766	387,560	26,377
R-53	9,228	-60.4	-23,858	-437,492	83.0	38,612	426,172	14,754
R-54	10,033	-35.3	-38,530	-476,022	98.8	73,178	499,350	34,648
R-55	11,060	-94.5	-66,668	-542,690	112.2	108,343	607,693	41,674
R-56	11,924	-76.1	-74,202	-616,892	94.2	89,766	697,459	15,565
R-57	12,645	-32.0	-39,168	-656,060	91.5	67,246	764,705	28,077
R-58	13,745	-69.3	-55,991	-712,051	95.9	103,559	868,264	47,568
R-59	14,822	-36.2	-57,193	-769,244	81.9	96,364	964,628	39,172
R-60	15,630	-24.8	-24,886	-794,130	63.7	59,414	1,024,042	34,528
R-61	16,557	-45.0	-32,324	-826,454	80.6	66,816	1,090,858	34,492
R-62	17,552	-27.1	-35,890	-862,344	66.5	73,150	1,164,008	37,261
R-63	18,546	-32.1	-29,441	-891,785	79.1	72,417	1,236,426	42,977
R-64	19,427	-78.6	-48,743	-940,527	91.6	75,222	1,311,647	26,479
R-65	20,436	-33.0	-56,569	-997,096	77.4	85,641	1,397,288	29,072
Total	**17,375**	**-57.4**	**-997,096**		**80.4**	**1,397,288**		

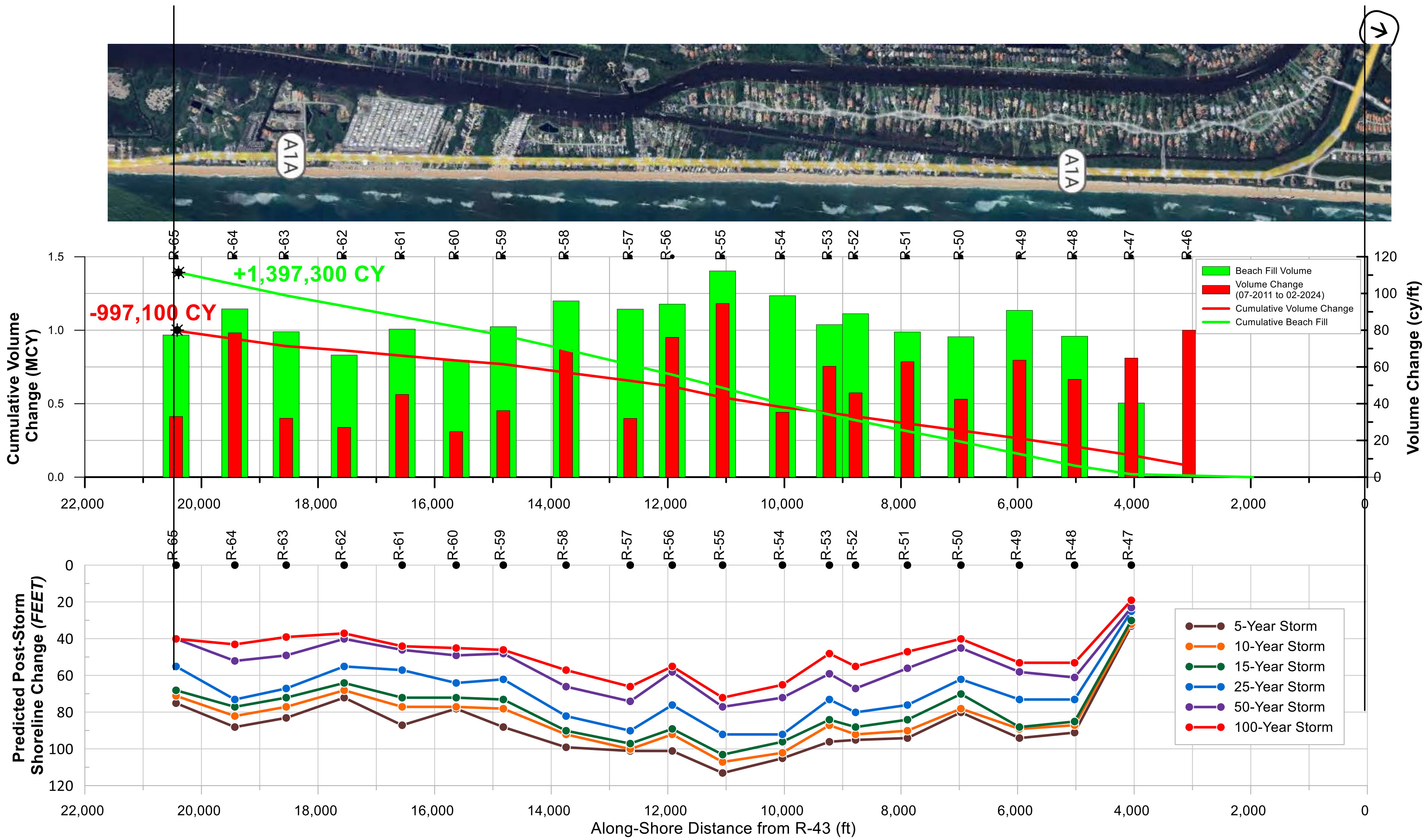


Figure 21.16: Overview of the beach fill design and predicted post storm shoreline response. (Top) Color bars represent design fill density (green) and volume change density (red) along the project area. (Bottom) Predicted location of the +7 ft contour at each R-monument relative to project baseline conditions (i.e., Δ in **Table 21.9**).

References

Dean, Robert G. and Dalrymple, Robert A., 2004. "Coastal Processes with Engineering Applications." Cambridge University Press. 2004.

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Roelvink, J. A., Reniers, A. J. H. M., van Dongeren, A. R., van Thiel de Vries, J. S. M., McCall, R. T. and Lescinski, J. (2009). "Modelling storm impacts on beaches, dunes and barrier islands", Coastal Engineering 56, 1133 – 1152. December 2009

USACE. (2015). "Flagler County, Florida Hurricane and Storm Damage Reduction Project Final Integrated Feasibility Study and Environmental Assessment", Prepared by: US Army Corps of Engineers Jacksonville District, April 2015.

EA APPENDIX 5

SHPO LETTERS

FLORIDA DEPARTMENT of STATE

RON DESANTIS
Governor

CORD BYRD
Secretary of State

Florida Department of Environmental Protection
8800 Baymeadows Way West Suite 100
Jacksonville, FL 32256-7590

November 25, 2024

RE: DHR Project File No.: 2018-4830-G; Received by DHR: November 5th, 2024
Application No.: 0379716-003-JM
Project: Flagler County Beach and Dune Restoration Project: Phase 2
County: Flagler

To Whom It May Concern:

Our Office reviews 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.

A review of the Florida Master Site File indicates that the Resource Group, Steamship Northwestern Maritime Landscape (FL00988) is within the project boundaries. However, based on the work being done it is the opinion of this office that the resource group will not be affected. Since unexpected finds may occur during ground disturbing activities, we request that the permit, if issued, include the following special condition regarding inadvertent discoveries:

- If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the vicinity of the discovery. The applicant shall contact the Florida Department of State, Division of Historical Resources, Compliance and Review Section at (850)-245-6333. Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, *Florida Statutes*.

If you have any questions, please contact Danica Vasic, Historic Sites Specialist, by email at Danica.Vasic@dos.fl.gov

Sincerely,

Kelly L Chase
For

Alissa S. Lotane
Director, Division of Historical Resources
& State Historic Preservation Officer

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,

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.

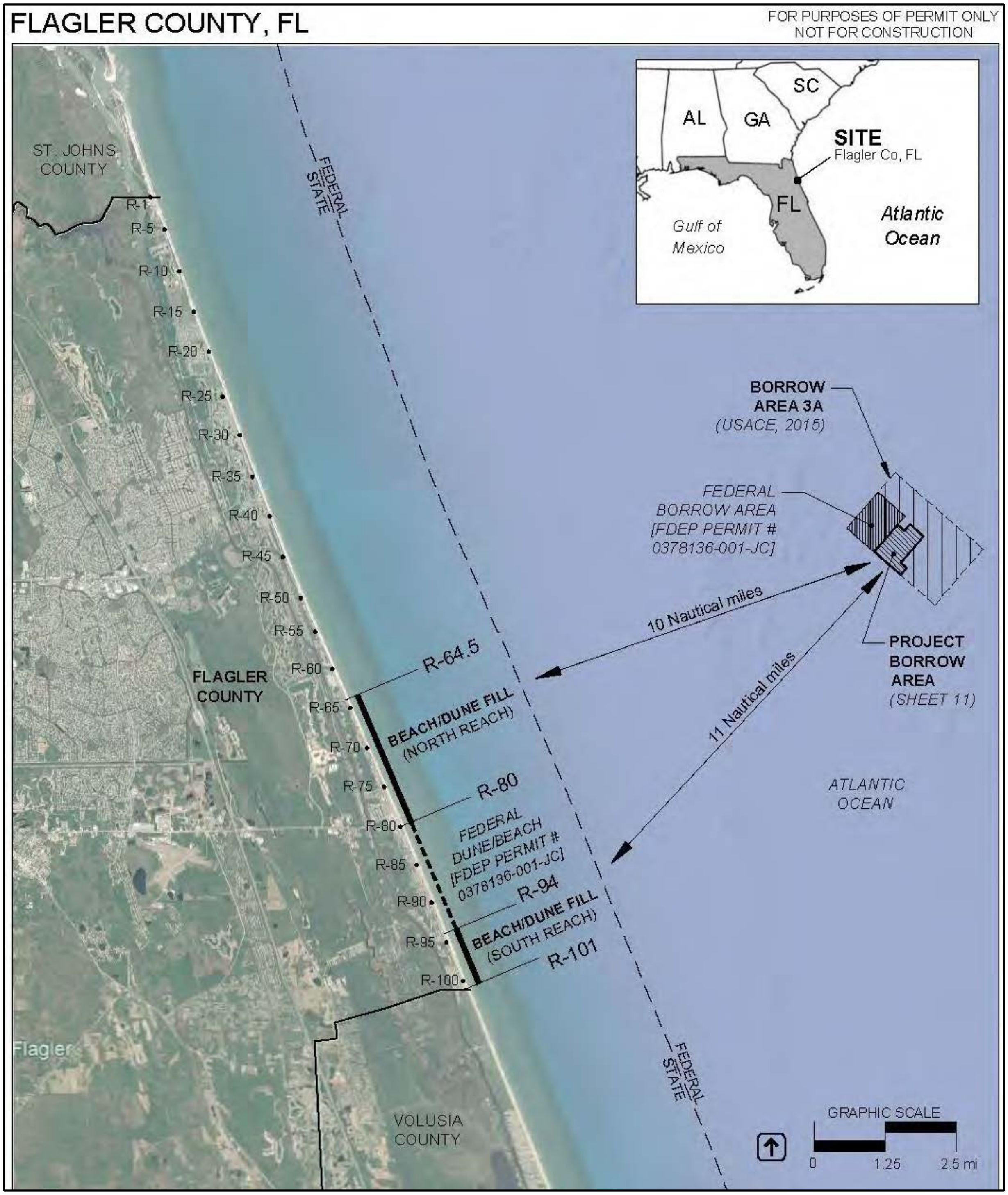

Figure 1. Project location map – Flagler County Dune/Beach Restoration Project.

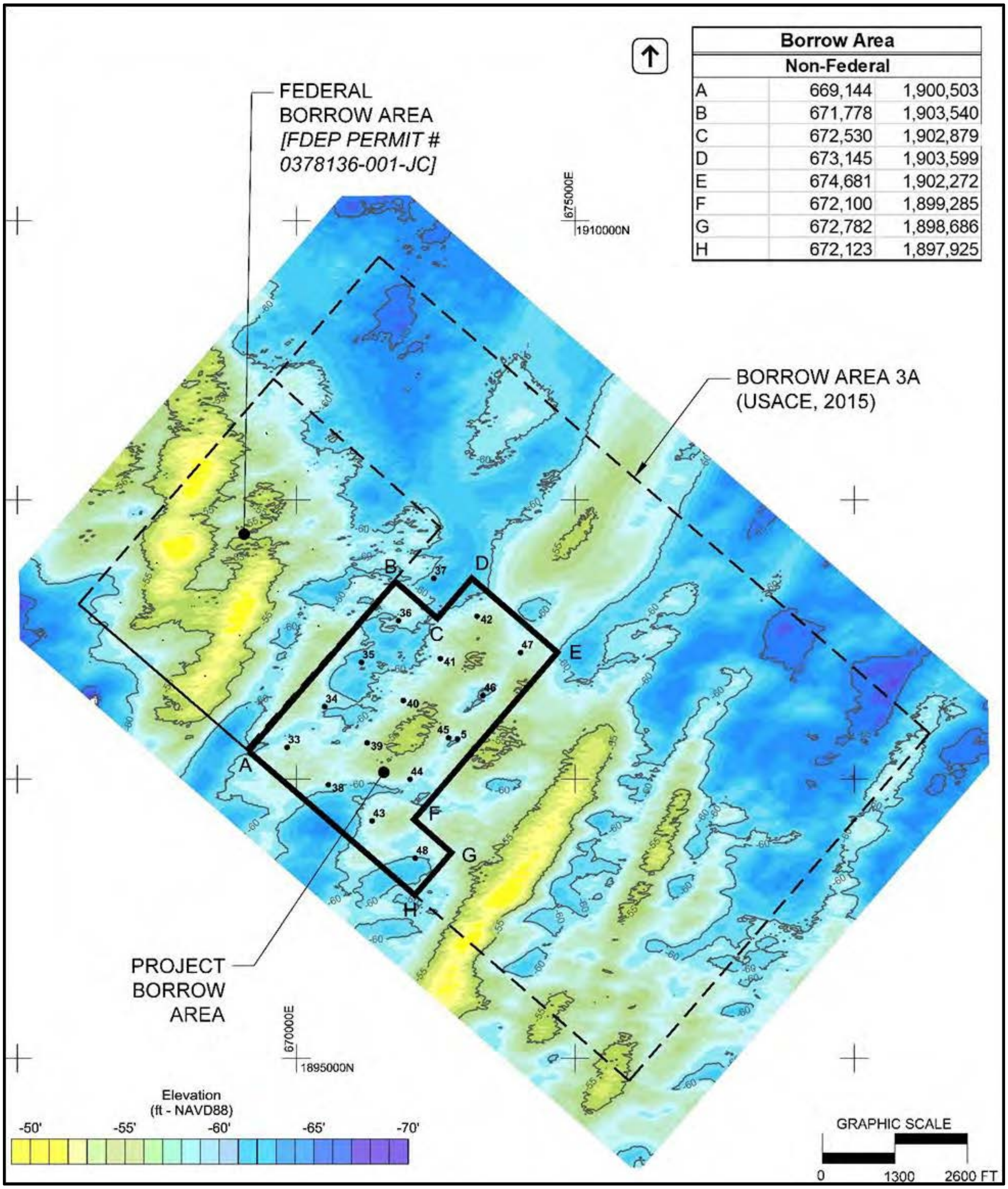

Figure 2. Borrow Area 3A plan view showing the Local and Federal borrow area sections.

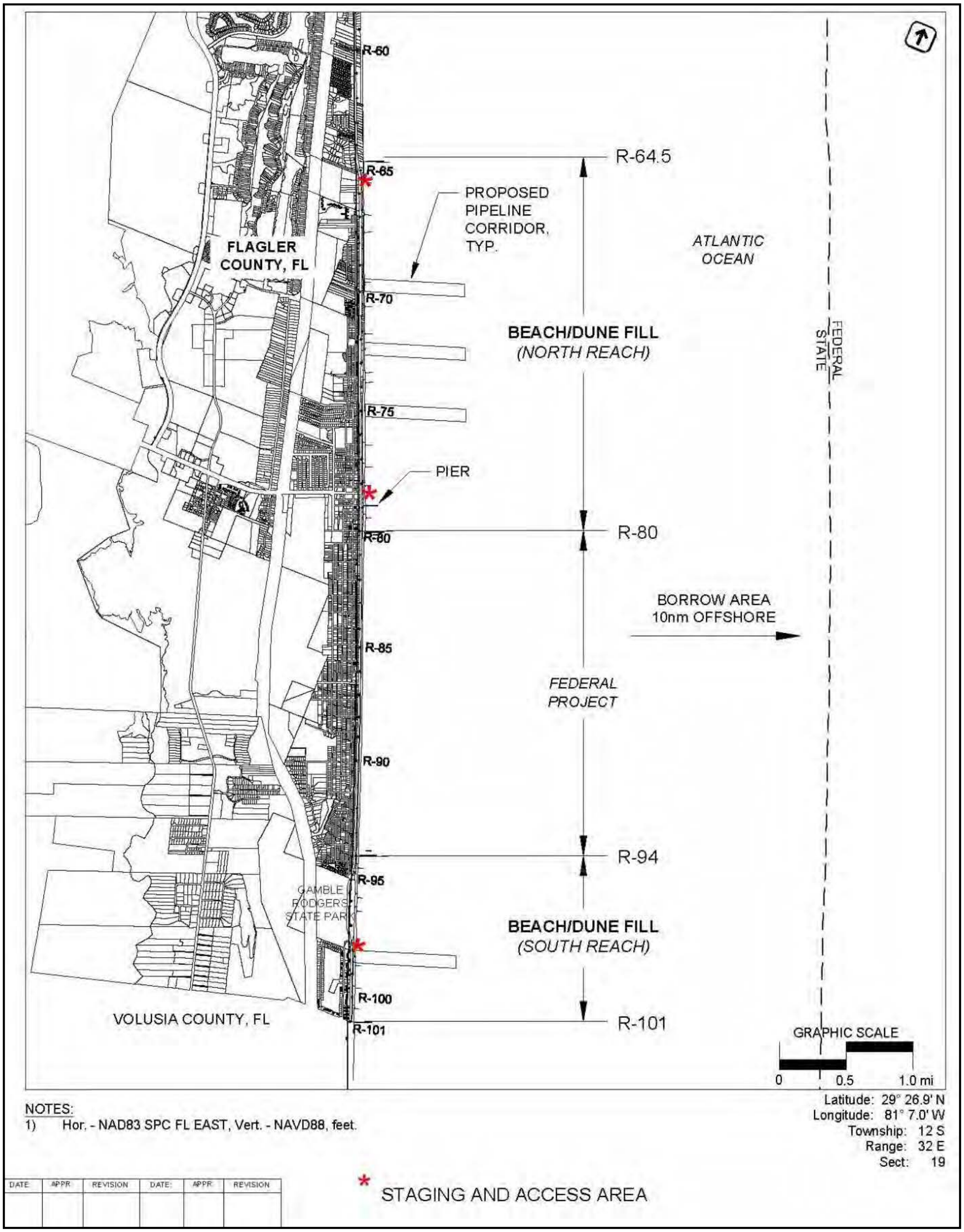

Figure 3. Beach fill placement areas for the Local and Federal projects in Flagler County.

FLORIDA DEPARTMENT *of* STATE

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

RON DESANTIS
Governor

CORD BYRD
Secretary of State

US Army Corps of Engineers
701 San Marco Blvd.
Jacksonville, FL 32207-8175

June 23, 2025

RE: DHR Project File No.: 2024-5026-B Received by DHR: April 14, 2025
INTENSIVE CULTURAL RESOURCE REMOTE SENSING SURVEY FOR THE FLAGLER COUNTY, FL BEACH AND DUNE RESTORATION PROJECT, FLAGLER COUNTY, FLORIDA

To Whom It May Concern:

Our office reviewed the referenced project 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*, as well as 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*. The project is subject to compliance with requirements for Florida Bureau of Archaeological Research (FBAR) 1A-32 Permit No. 2324.042 and a United States Army Corps of Engineers (USACE) Permit App. No. SAJ-2019-02065.

In April 2024, Chronicle Heritage conducted the above referenced submerged cultural resource assessment survey (SCRAS) as part of Flagler County's efforts to restore and stabilize portions of the east coast beach and dunes. The SCRAS consisted of a maritime remote-sensing survey of the submerged APE as well as terrestrial survey of the adjacent beachfront (a total of 458.5 acres). This included magnetometer, side-scan sonar, and sub-bottom profiler data collection and analysis as is required by DHR, along with pedestrian magnetometer survey of the shoreline APE. The terrestrial survey identified 153 terrestrial magnetic anomalies. Resultant of the maritime survey, Chronicle identified 84 magnetic anomalies, 17 acoustic contacts, and four feature reflectors. Surveyors note: "This investigation identified eight (n=8) potentially significant targets. Three (n=3) of these targets were in the On-Shore Placement Area, and the remaining five (n=5) targets were in the Near-Shore Placement Area. Avoidance of the potentially significant targets is recommended. If avoidance is not feasible, further investigation is required."

Based on the information provided, our office finds the submitted report complete and sufficient in accordance with Chapter 1A-46, *Florida Administrative Code*. USACE has provided the following review:

> "The Corps has reviewed the submitted report and finds it complete and sufficient in accordance with Chapters 1a-46, Florida Administrative Code... The nearshore pipeline zone for the current project area as well as the beach itself (up to the dune line) was recently surveyed for submerged and terrestrial cultural resources by Chronicle Heritage in 2024. Of the 237 magnetometer anomalies recorded in both areas (84 submerged anomalies, and 153 anomalies within the terrestrial area), Chronicle archaeologists identified 8 significant targets in the submerged

> component of the survey area which they recommended for avoidance. Four of these (labelled in the CRAS document as Targets 5, 6, 7, and 8) fall within the current project footprint and includes the previously identified Beverly Beach Wreck (8FL0927). None of the anomalies in the terrestrial portion were indicative of a significant resource nor did visual reconnaissance result in identification of resources. Chronicle recommends a 200 foot buffer around targets 6, 7, and 8, and a buffer of 300 feet around target 5/8FL0927 (Attachment 2). The Corps concurs with the findings and recommendations presented in Chronicle's survey report and intends to require the suggested buffers around Targets 5, 6, 7, and 8 within which no project activities shall occur. Based upon the findings of the 2024 nearshore/shoreline survey, the 2019 offshore borrow area survey of Borrow Area 3A, and upon the no work buffers that shall be required, the Corps finds that the proposed undertaking will have no adverse effect to historic properties and no further work is required."

This office concurs with the determination provided by USACE.

If you have any questions, please contact Ethan Putman, Historic Preservationist, by email at *Ethan.Putman@dos.fl.gov*.

Sincerely,

Kelly L Chase
For

Alissa Slade Lotane
Director, Division of Historical Resources
& State Historic Preservation Officer

EA APPENDIX 6

SEDIMENT QUALITY CONTROL/QUALITY ASSURANCE 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. 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

EA APPENDIX 7

EXECUTIVE ORDER 11988 FLOODPLAIN MANAGEMENT CHECKLIST

(44 CFR Part 9)

Executive Order 11988 Floodplain Management Checklist (44 CFR Part 9)

Project Information

Date: 08/28/2024

Reviewer: Kari Elkins

Disaster/Program: PA DR 4673 and DR 4680

Project Number: 4673-PW 714658 & 4680 PW 703819

Project Title: Flagler County Beach and Dune Restoration Project: Phase 2

Latitude: 29.557491°

Longitude: -81.164972°

Description of Proposed Action:

The current Phase 2 project will consist of placement of approximately 1.8 million cubic yards (Mcy) of sand between R-46 and R-77 during the initial restoration with an expected nourishment interval of 6 to 8 years. It is noted that the Phase 2 areas R-77 to R-80 and R-94 to R-96 will be restored during the USACE project to be constructed in 2024. Likewise, the Phase 2 area from R-96 to R-101 will not be restored at this time. This latter reach will be part of an

Applicability

Actions which have the potential to affect floodplains or their occupants, or which are subject to potential harm by location in floodplains.

Will the proposed action potentially adversely affect the floodplain or support floodplain development?

Yes ☐ No ☑

Will the proposed action potentially be adversely affected by the floodplain?

Yes ☑ No ☐

Critical Action

Determine whether the proposed action is an action for which even a slight chance of flooding is too great. Critical actions must be reviewed against the 500-year floodplain.

Is the action a critical action?

☐ Yes, review against the 500-year floodplain

☑ No, review against the 100-year floodplain.

☐ Not Applicable, the action is located in wetlands only

Step 1: Determine Proposed Action Location

Determine whether the proposed action is located in the 100-year floodplain (500-year floodplain for critical actions); and whether is has the potential to affect or be affected by a floodplain or wetland (44 CFR Section 9.7).

Floodplain Determination

Flood Hazard Data (Check the box that applies)

Is the project located in a 100 year floodplain as mapped by a FEMA FIRM?

Yes ☑ No ☐

FIRM Panel Number: 12035C0141E, 12035C0142E, 12035C0144E, 12035C0232E, 12035C0251E, 12035C0253E, and 12035C0261E

Date: 09/03/2024

Is the project located in a 500 year floodplain as mapped by a FEMA FIRM?

Yes ☐ No ☑

FIRM Panel Number:

Date:

Is the project located in a floodplain as mapped by a FIMA draft/preliminary study?

Yes ☐ No ☑

Study Name:

Date:

Is the project located in a floodplain as mapped by another agency (State, USACE, USGS, NRCS, local community, etc)?

Yes ☐ No ☑

Study Name:

Date:

Is the project outside the floodplain but has potential to affect the floodplain, including support of floodplain development?

Yes ☐ No ☑

Flood Hazard Data Not Available

Is the proposed action subject to flooding based on an evaluation from soil surveys, aerial photos, site visits, and other available data?

Yes ☐ No ☐

Evaluation material:

Does FEMA assume the Proposed Action is subject to flooding based on previous flooding of the facility/structure?

Yes ☐ No ☑

Floodway/Coastal High Hazard Area

Is the project located in a floodway or coastal high hazard area (full 8 step process is required?

Yes ☑ No ☐

Source, other than FIRM:

Wetland Determination

Is the project in a wetland as mapped by the National Wetlands Inventory?

Yes ☑ No ☐

Wetland Classification: Estuarine and Marine Deepwater/Marine Wetland

Date: 9/3/24

Is the project in a wetland as mapped by another agency (USACE, state, local community)?

Yes ☐ No ☑

Name of study

Date:

Scope

Select the appropriate block for the steps required.

- ☐ Steps 1, 4, 5, and 8 (44 CFR Part 9.5(g))
- ☐ Steps 1, 2, 4, 5, and 8. (44 CFR Part 9.5(d))
- ☑ All 8 steps

Step 2: Early Public Notice

Notify the public at the earliest possible time of the intent to carry out an action in a floodplain and involve the affected and interested public in the decision-making process (44 CFR Section 9.8).

Was notice provided as part of a disaster cumulative notice?

Yes ☑ No ☐ Not Applicable ☐

Was a project specific notice provided?

Yes ☑ No ☐ Not Applicable ☐

If yes, select the type of notice:

☐ Newspaper, name:

☐ Post Site, location:

☐ Broadcast, station:

☐ Direct Mailing, area:

☐ Public Meeting, dates:

☑ Other: https://www.saj.usace.army.mil/Missions/Regulatory/Public-Notices/Article/3891502/saj-2019-02065-sp-tmm/

Date of Public Notice: 08/30/2024

Step 3: Analysis of Practicable Alternatives

Identify and evaluate practicable alternatives to locating the proposed action in a floodplain (including alternate sites, actions, and the “no action” option). If a practicable alternative exists outside the floodplain, FEMA must located the proposed action at the alternative site (44 CFR Section 9.9).

Alternative Options

Is there a practicable alternative site location outside the 100-year floodplain (or 500-year floodplain for critical actions?)

Yes ☐ No ☑ Not Applicable ☐

If yes, describe the alternative site:

Is there an alternative action which has less potential to affect or be affected by the floodplain?

Yes ☐ No ☑ Not Applicable ☐

If yes, describe the alternative action:

Is the "no action" alternative the most practicable alternative?

Yes ☐ No ☑ Not Applicable ☐

If any answer is yes, that FEMA shall take that action and the review is concluded.

Floodway

Is the action new construction (i.e. construction of new structure, demolition/ rebuilding, reconstruction, replacement) or substantial improvement (for structures damaged in equal or excess of 50% of its market value or the total replacement cost of the structure)?

Yes ☐ No ☐ Not Applicable ☑

If Yes, is the action a functional dependent use (cannot perform its intended purpose unless it is located or carried out in close proximity to water) or a facility or structure that facilitates open space use?

Yes ☐ No ☐ Not Applicable ☐

If yes, explain:

If no, FEMA cannot fund this action

Is the action an alteration of a structure or facility listed on the National Register of Historic Places or a State Inventory of Historic Places?

Yes ☐ No ☐ Not Applicable ☐

If yes, then this is not substantial improvement and the action may proceed as long as it does not cause any increase of flood levels within the community during the occurrence of the base flood discharge.

Coastal High Hazard Zone

Is the action new construction (i.e. construction of new facility or structure, demolition/rebuilding of facilities or structures, reconstruction of facilities or structures, replacement of facilities or structures)?

Yes ☐ No ☑ Not Applicable ☐

If Yes, is the action a functional dependent use (cannot perform its intended purpose unless it is located or carried out in close proximity to water) or a facility or structure that facilitates open space use?

Yes ☐ No ☐ Not Applicable ☐

If yes, explain:

If no, FEMA cannot fund this action.

Step 4: Identify Impacts

Identify the potential direct and indirect impacts associated with the occupancy or modification of the floodplains and the potential direct and indirect support of floodplain development that could result from the proposed action (44 CFR Section 9.10).

Is the proposed action based on incomplete information?

Yes ☐ No ☑ Not Applicable ☐

Is the proposed action in compliance with the NFIP?

Yes ☑ No ☐ Not Applicable ☐

Does the proposed action increase the risk of flood loss?

Yes ☐ No ☑ Not Applicable ☐

Will the proposed action result in an increased base discharge or increase the flood hazard potential to other properties or structures?

Yes ☐ No ☑ Not Applicable ☐

Does the proposed action minimize the impact of floods on human health, safety, or welfare?

Yes ☑ No ☐ Not Applicable ☐

Will the proposed action induce future growth and development, which will potentially adversely affect the floodplain?

Yes ☐ No ☑ Not Applicable ☐

Does the proposed action involve dredging and/or filling of a floodplain?

Yes ☑ No ☐ Not Applicable ☐

Will the proposed action result in the discharge of pollutants into the floodplain?

Yes ☐ No ☑ Not Applicable ☐

Does the proposed action avoid the long and short term impacts associate with the occupancy and modification of floodplains?

Yes ☐ No ☐ Not Applicable ☑

Note: If wetlands are near or potentially affected, refer review to an Environmental Specialist.

Will the proposed action forego an opportunity to restore the natural and beneficial values served by floodplains?

Yes ☐ No ☑ Not Applicable ☐

Does the proposed action restore and/or preserve the natural and beneficial values served by floodplains?

Yes ☑ No ☐ Not Applicable ☐

Will the proposed action result in an increase to the useful life of a structure or facility?

Yes ☑ No ☐ Not Applicable ☐

Will the action encroach on the Floodway in manner that causes any increase of flood levels within the community during the occurrence of the base flood discharge?

Yes ☐ No ☑ Not Applicable ☐

Step 4 Remarks:

Step 5: Minimize Impacts

Minimize the potential adverse impacts and support to or within floodplains as identified under Step 4; restore and preserve the natural and beneficial values served by floodplains (44 CFR Section 9.11).

Minimization Measures

Were flood hazard reduction techniques (see NFIP technical bulletins) applied to the proposed action to minimize flood impacts? Note: New construction or substantial improvement of a structure (i.e. walled or roofed building) requires elevation or flood proofing (non-residential), except for listed Historical Structures.

Yes ☐ No ☐ Not Applicable ☑

Identify any flood hazard reduction techniques required as a condition of the grant:

Were avoidance and minimization measures applied to the proposed action to minimize the short-term and long-term impacts on the floodplain?

Yes ☐ No ☐ Not Applicable ☑

Identify minimization measures required as a condition of the grant:

Were measures implemented to restore and preserve the natural and beneficial values of the floodplain?

Yes ☐ No ☐ Not Applicable ☑

Identify any restoration or preservation measures required as a condition of the grant:

Floodway/Coastal High Hazard Areas

Is there a practicable alternative site location or action outside of the Floodway or coastal high hazard area (CHHA) (but within the floodplain)?

Yes ☐ No ☐ Not Applicable ☑

Site Location: ____________

Is there a practicable alternative action outside of the Floodway or CHHA that will not affect the Floodway or CHHA?

Yes ☐ No ☑ Not Applicable ☐

Alternative Action:

Are functional dependent new construction in the CHHA elevated on adequately anchored pilings or columns such that lowest portion of the structural members of the lowest floor are above base flood elevation? (**Note: The use of fill for elevation is prohibited in the CHHA**)

Yes ☐ No ☐ Not Applicable ☑

Step 5 Remarks:

Step 6: Reevaluate Practicable Alternatives

Reevaluate the proposed action to first determine if it is still practicable in light of its exposure to flood hazards, the extent to which it will aggravate the hazards to others, and its potential to disrupt floodplain values. Second, evaluate if alternatives preliminarily rejected at Step 3 are practicable in light of the information gained in Steps 4 and 5. FEMA shall not act in a floodplain unless it is the only practicable location (44 CFR Section 9.9)

Is the action still practicable at a floodplain site in light of the exposure to flood risk and ensuing disruption of natural values?

Yes ☑ No ☐ Not Applicable ☐

Is the floodplain site the only practicable alternative?

Yes ☑ No ☐ Not Applicable ☐

Is there any potential to limit the scope or size of the action to increase the practicability of previously-rejected non-floodplain sites or alternative actions?

Yes ☐ No ☑ Not Applicable ☐

Can minimization of harm to or within the floodplain be achieved using all practicable means?

Yes ☑ No ☐ Not Applicable ☐

Does the need for action in a floodplain clearly outweigh the requirements of Executive Order 11988?

Yes ☑ No ☐ Not Applicable ☐

Step 6 Remarks:

The purpose of the proposed action is beach and dune restoration along shoreline areas that have been severely impacted by DR-4673 and DR-4680. Construction of the proposed action will provide storm damage reduction benefits along the project shoreline. The proposed project is functionally dependent and is the only practicable

Step 7: Final Public Notice

Prepare and provide the public with a finding and public explanation of any final decision that the floodplain is the only practicable alternative (44 CFR Section 9.12).

Was notice provided as part of a disaster cumulative notice?

Yes ☑ No ☐ Not Applicable ☐

Was a project specific notice provided?

Yes ☑ No ☐ Not Applicable ☐

If yes, select the type of notice:

☐ Newspaper, name:

☐ Post Site, location:

☐ Broadcast, station:

☐ Direct Mailing, area:

☐ Public Meeting: dates:

☑ Other: https://www.saj.usace.army.mil/Missions/Regulatory/Public-Notices/Article/3891502/saj-2019-02065-sp-tmm/

Date of Public Notice: 8/30/24

After providing the final notice, FEMA shall, without good cause shown, wait at least 15 days before carrying out the proposed action.

Step 8: Implementation

Review the implementation and post-implementation phases of the proposed action to ensure that the requirements state in 44 CFR Section 9.11 are fully implemented. Oversight responsibility shall be integrated into existing processes.

Was grant conditioned on review of implementation and post-implementation phases to ensure compliance of Executive Order 11988?

Yes ☐ No ☑ Not Applicable ☐

The following conditions are not reflected in the Scope of Work and are required: