FOLLY RIVER NAVIGATION PROJECT
OPERATION & MAINTENANCE DREDGING
CHARLESTON COUNTY, SOUTH CAROLINA

Draft Supplemental Environmental Assessment

U.S. ARMY CORPS OF ENGINEERS
CHARLESTON DISTRICT

CHARLESTON, SOUTH CAROLINA

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

TABLE OF ACRONYMS

APE	Area of Potential Effects
BA	Biological Assessment
BU	Beneficial Use
CAA	Clean Air Act

CBIA	Coastal Barrier Improvement Act
CBRA	Coastal Barrier Resources Act
CBRS	Coastal Barrier Resource System
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CMP	Coastal Migratory Pelagic
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
DPS	Distinct Population Segment
EA	Environmental Assessment
EFH	Essential Fish Habitat
EO	Executive Order
EP	Engineer Pamphlet
EPA	U.S. Environmental Protection Agency
ER	Engineer Regulation
ESA	Endangered Species Act
ETL	Engineer Technical Letter
FMC	Fishery Management Councils
FMP	Fisheries Management Plan
FONSI	Finding of No Significant Impact
FR	Federal Register
FRNP	Folly River Navigation Project
FWCA	Fish and Wildlife Coordination Act
HAPC	Habitat Areas of Particular Concern
HMS	Highly Migratory Species
MAFMC	Mid-Atlantic Fishery Management Council
MALAA	May Affect, Likely to Adversely Affect
MANLAA	May Affect, Not Likely to Adversely Affect
MBTA	Migratory Bird Treaty Act
MLLW	Mean Lower Low Water
MSFCMA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAGPRA	Native American Graves Protection and Repatriation Act
NEPA	National Environmental Policy Act
NGVD	National Geodetic Vertical Datum
NHPA	National Historic Preservation Act
NM	Nautical Miles

NMFS	U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Services
NOAA	U.S. Department of Commerce, National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit
NTU	Nephelometric Turbidity Units
O&M	Operations and Maintenance
PA	Programmatic Agreement
PDC	Project Design Criteria
PRD	U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Services, Protected Resources Division
RPM	Reasonable and Prudent Measures
SAFMC	South Atlantic Fishery Management Council
SARBO	South Atlantic Regional Biological Opinion
SCDHEC	South Carolina Department of Health and Environmental Control
SCDNR	South Carolina Department of Natural Resources
SCIAA	South Carolina Institute of Archeology and Anthropology
SHPO	South Carolina State Historic Preservation Office
SLC	Sea Level Change
T&C	Terms & Conditions
U.S.C.	United States Code
USACE	U.S. Department of the Army, Army Corps of Engineers
USFWS	U.S. Department of the Interior, Fish and Wildlife Services
WQC	Water Quality Certification
WRDA	Water Resources Development Act

1 INTRODUCTION

1.1 DESCRIPTION OF DOCUMENT

This Supplemental Environmental Assessment (EA) has been prepared by the U.S. Army Corps of Engineers (USACE), Charleston District, pursuant to the National Environmental Policy Act (NEPA), 42 U.S.C. §§ 4321 – 4370f, and its implementing regulations, 40 C.F.R. §§ 1500 – 1508 and 33 C.F.R. Part 230, in coordination with Federal and State resource agencies, to evaluate newly considered alternatives to actions previously analyzed in *Environmental Assessment & Findings of No Significant Impact for Folly River Navigation Project* (USACE 1997). Previous analyses concerning the Folly River Navigation Project (FRNP) also included an EA appended to the *Folly River Navigation Study* (USACE 1977), which provided evaluation of impacts from original construction and projected operations and maintenance (O&M). If the impacts are considered insignificant, and the proposed action does not represent either a substantial change to the FRNP relevant to environmental concerns, or present significant new circumstances or information relevant to environmental concerns, a Finding of No Significant Impact (FONSI) would be issued.

1.2 PROJECT AUTHORIZATION / PROJECT AREA

The FRNP was originally authorized on December 23, 1977, under Section 107 of the River and Harbor Act of 1960, as amended. Project construction was completed in September 1979.The FRNP is located in Charleston County along the landward side of Folly Island about six miles south of the entrance to Charleston Harbor (Figure 1) and consists of three channels, the entrance channel, Folly River channel, and Folly Creek channel (Figure 2).

The O&M of the FRNP is authorized as stated above, while other authorities below provide for options concerning how products of O&M are managed. Section 107(e) of the River and Harbor Act of 1960 (Public Law 86-645) states as follows:

> *"[E]ach project for which money is allotted under this section shall be complete in itself and not commit the United States to any additional improvement to insure its successful operation, other than routine maintenance, and except as may result from the normal procedure applying to projects authorized after submission of survey reports, and projects constructed under the authority of this section shall be considered as authorized projects.*"

In addition, Section 2037 of the Water Resources Development Act (WRDA) 2007 (Public Law 110-114, 121 Stat. 1096), provided an amendment to Section 204 of WRDA 1992, wherein Section 204(a)(3), as amended, states as follows:

> *"[t]he purposes of using sediment for the construction, repair, modification, or rehabilitation of Federal water resource projects are—(A) to reduce storm*

> *damage to property; (B) to protect, restore, and create aquatic and ecologically related habitats, including wetlands; and (C) to transport and place suitable sediment".*

Section 204(d)(1), as amended, also states:

> "…*the Secretary may select, with the consent of the non-Federal interest, a disposal method that is not the least cost option if the Secretary determines that the incremental costs of the disposal method are reasonable in relation to the environmental benefits, including the benefits to the aquatic environment to be derived from the creation of wetlands and control of shoreline erosion*."

Furthermore, in making a determination of the Federal standard (see discussion below under 2), 33 U.S.C. § 2326g requires that the economic benefits and efficiencies from the beneficial use (BU) of dredged material must be taken into account.

The last cycles of maintenance dredging performed on the FRNP were conducted in 2006 and 2021, respectively, in the Folly River channel and entrance channel. In 2006, approximately 40,000 yd^3 of material was dredged from the entrance channel using a sidecast dredge and 84,354 yd^3 from inside shoals of the Folly River channel using a cutterhead dredge. Most recently in 2021, approximately 60,000 yd^3 of material was dredged from the entrance channel using a modified hopper dredge as part of a pilot project (USACE 2020). Notably, there is also considerable overlap of dredged areas between the FRNP and Folly Beach Shore Protection Project within the areas of the Folly River channel and Folly River borrow area, respectively (USACE 2017).

This EA updates previous NEPA analysis for the continued operation and maintenance (O&M) of the FRNP, and evaluates impacts associated with alternative methods to increase beneficial use (BU) of dredged sediment and provide ecological and economic benefits.

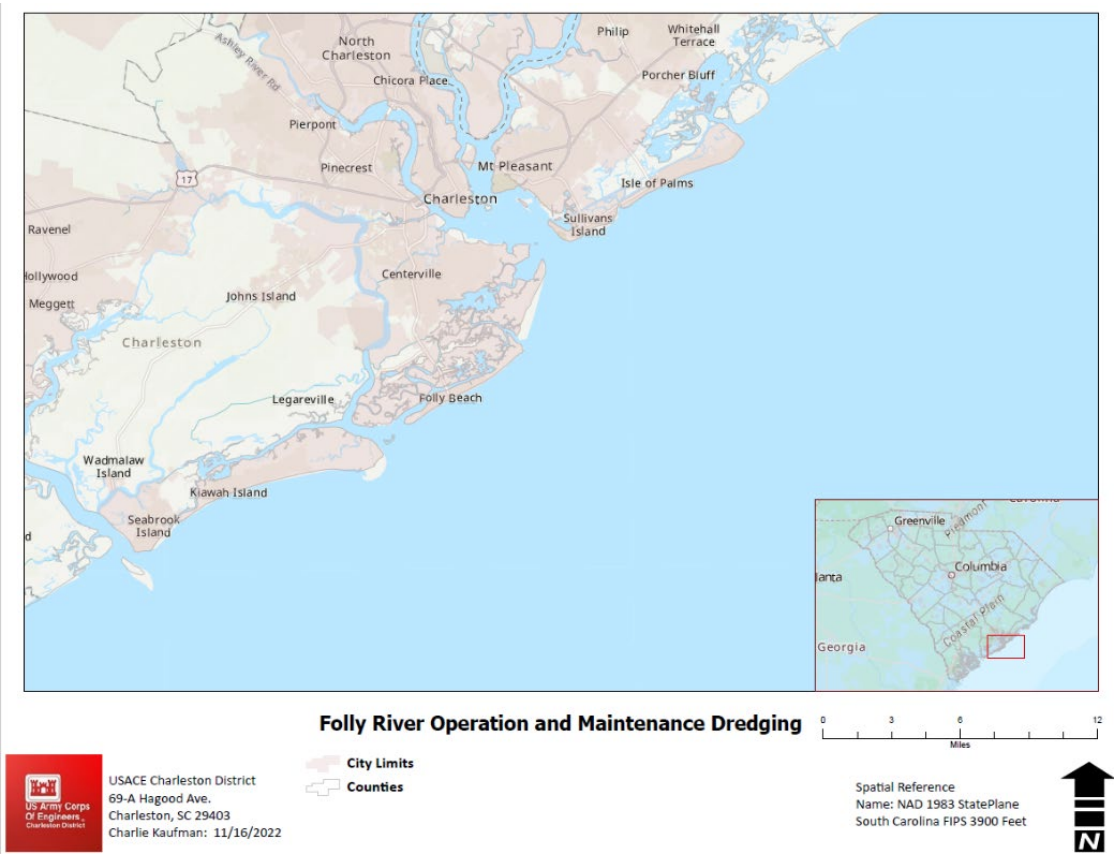

Figure 1 Regional scale view of FRNP vicinity

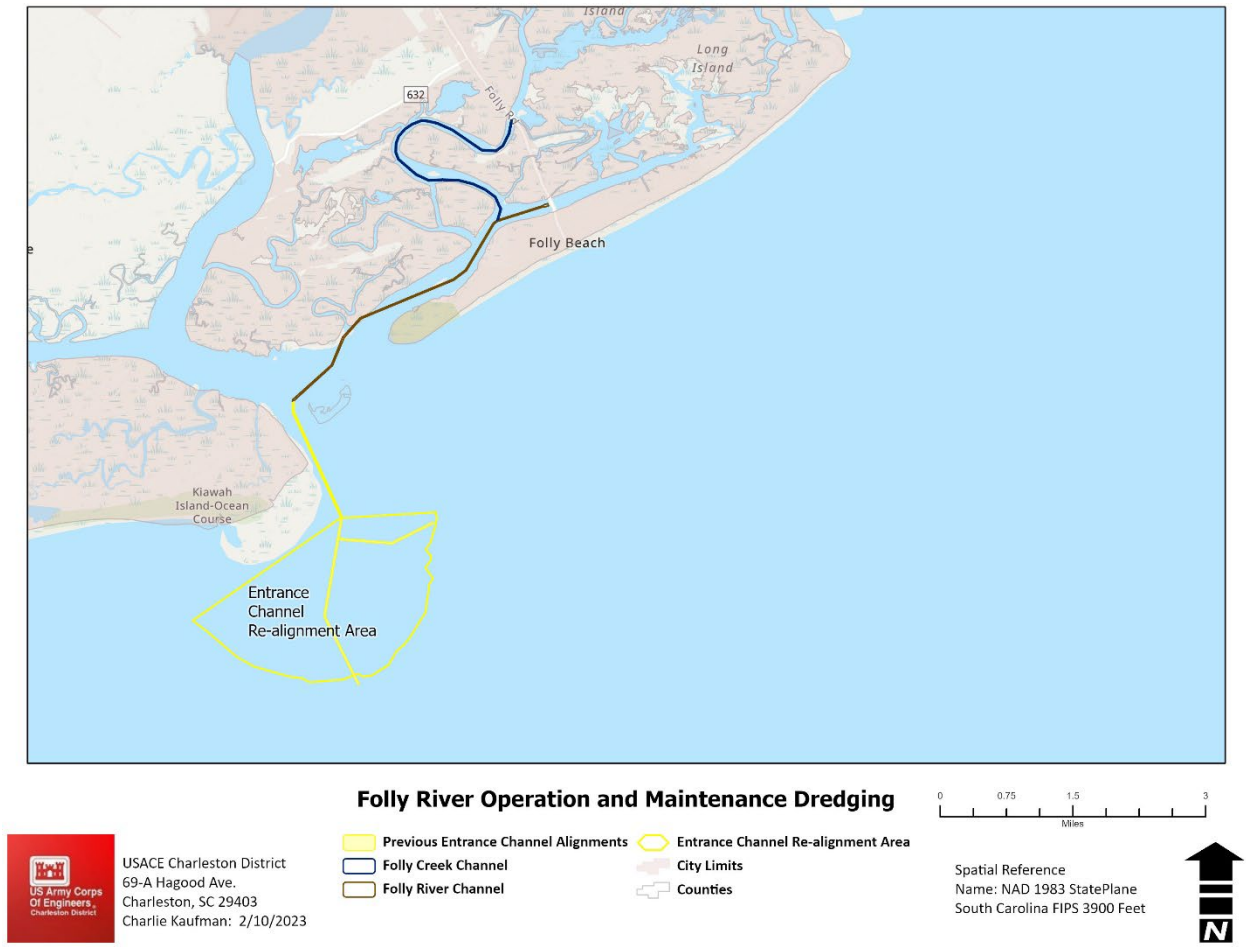

Figure 2 Local scale view of the FRNP area

1.2.1 Entrance Channel

The FRNP entrance channel is 11’ deep by 100’ wide extending from the Stono River 11’ contour through the ebb delta lying off the river mouth. The entrance channel has an extent up to approximately 3 nautical miles (NM) from the inlet and has had varied alignments. In 1997, under the same authorities of Section 107 of the River and Harbor Act of 1960, as amended, the entrance channel was re-aligned in order to take advantage of natural channel development and/or migration and reduce the scale of maintenance needs. Since then, re-alignment has occurred during dredge maintenance cycles in keeping with the natural channel development and/or migration. In Figure 2, the area outlined as “Entrance Channel Re-alignment Area” illustrates the area wherein re-alignment may occur to maintain the navigation channel with ongoing natural channel development and/or migration.

1.2.2 Folly River Channel

Folly River is a natural tidal river serving as an outlet for an extensive marsh area. Several tidal streams feed into the river, the largest of which is Folly Creek. Typical depths range from 30’+ at the mouth of Folly Creek to <4’ across shoals near the

confluence of the Stono River. The navigational reach consists of a 9’ deep and 80’ wide navigation channel linking the entrance channel and Folly Creek, while also extending from Highway 171 to the confluence of Folly and Stono Rivers; approximately 3 NM.

1.2.3 Folly Creek Channel

This creek is the main tributary to Folly River. Typical depths range from 12-28’ and shoaling does not create navigation problems for local commercial fishing vessels. This navigational reach consists of a 9’ deep and 80’ wide channel originating from its northern terminus near Highway 171 to the confluence with Folly River; a distance of approximately 3 NM.

1.2.4 Bird Key Stono Seabird Sanctuary (Bird Key Stono)

Bird Key Stono is a sandy island located where the Folly River intersects with the Stono River (Figure 3). When the FRNP was originally constructed, Bird Key Stono was referred to as Bird Key and was located in Stono Inlet between Folly and Kiawah Islands. In the winter of 1994/1995, a storm eroded much of the island and is believed to have carried sediment towards Folly Beach creating another area called Skimmer Flats (Figure 4). Sediment in the tidal delta has continued to shift through time, nevertheless the existing island is now referred to as Bird Key Stono and is owned by the South Carolina Department of Natural Resources (SCDNR), Heritage Trust Division and is a Bird Sanctuary protected under the 2015 South Carolina Code of Laws Section 50-11-860. It is one of only three Heritage Preserve coastal islands in South Carolina that protect seabird and shorebird nesting. Since inception of the FRNP, USACE has continually partnered with SCDNR (formerly South Carolina Wildlife and Marine Resources Department) in working to maintain habitat for seabird and shorebird nesting on Bird Key Stono.

1.2.5 Folly Beach

For the purposes of this EA, Folly Beach refers to the front beach placement area of Folly Island (extent outlined in Figure 3) and is located within the City of Folly Beach. The southwest end of Folly Island is managed by the Charleston County Parks and Recreation Commission as the Folly Beach County Park (Figures 4 & 5). The Folly Beach County Park has been the previous extent of where dredged sediment was pipelined to from Folly River channel for BU beach placement (Figure 5).

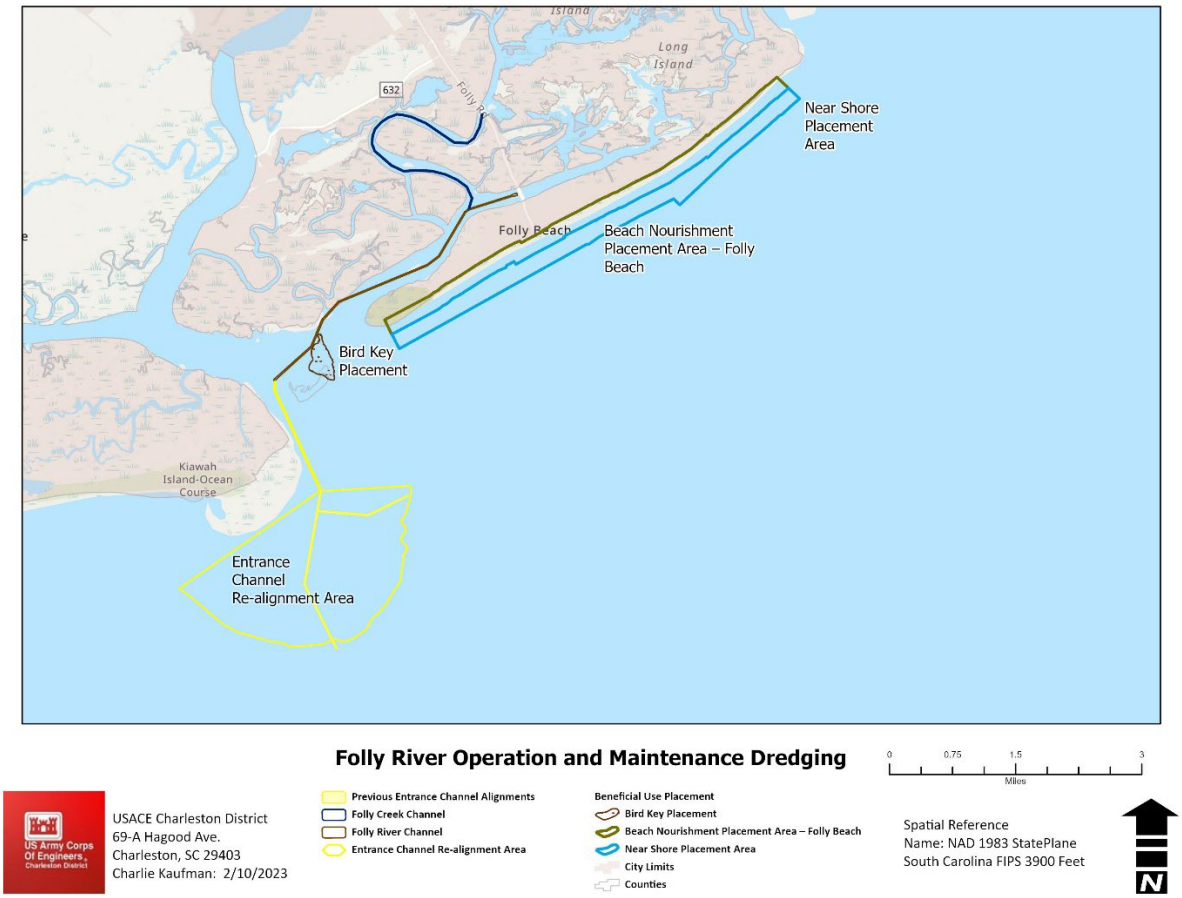

Figure 3 Local scale view of FRNP and placement areas including Bird Key Stono, Folly Beach and nearshore

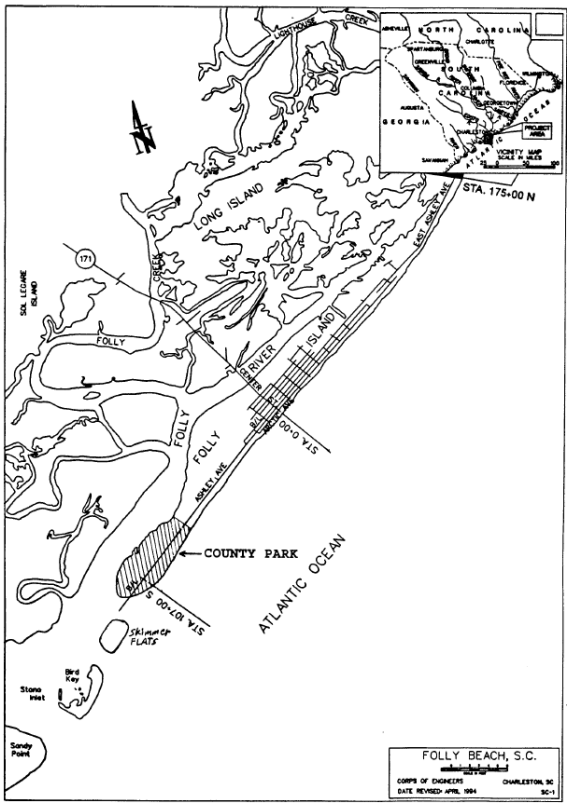

Figure 4 USACE (1997) illustration of previous FRNP project area including location of county park and locations of previous Skimmer Flats and remaining Bird Key

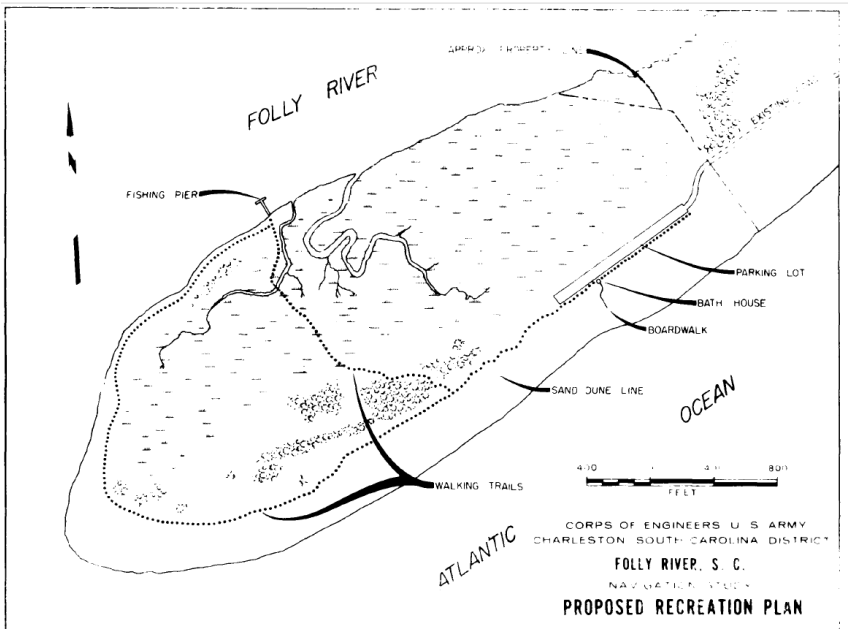

Figure 5 USACE (1979) illustration of design for Folly Beach County Park on western end of Folly Island. [Dotted] boundary area indicates where dredged sediment was previously pipelined from Folly River channel

1.3 PURPOSE AND NEED FOR ACTION

The purpose of maintenance dredging is to continue to provide safe, shallow navigation for recreational, commercial fishing, and shrimping boats. Migrating shoals create shallow depths in the inlet and the lower portion of the Folly River, which forces operators of commercial shrimp trawlers and large pleasure boats to time their entry and exit with the tides to avoid vessel damage and grounding. Based on sediment transport models by USACE (2021*c*), sediment supplies to the Folly River [borrow] area (overlaps with most of Folly River channel) mainly come from the nearshore Folly Beach area, which are carried by the longshore current turning around the southwest tip of Folly Island. The actual dredged portion in the Stono Inlet Throat [borrow] area (overlaps with most of entrance channel re-alignment area) receives large amount of sediment from neighboring undredged shallow area. Hydrographic surveys conducted in April 2022 showed approximately 149,125 yd^3 of shoaling in the Folly River channel was creating depths as shallow as <1 ft (Figure 6) along the nearshore of Folly Beach and <2 ft in upstream portions and behind Bird Key Stono. Within the entrance channel, the current alignment has approximately 127,724 yd^3 of shoaling creating depths as shallow as 1-2 ft (Figure 7). These figures represent points on a scale of potential volumes to be dredged throughout the Folly River channel and entrance channel re-alignment area necessary to maintain navigation.

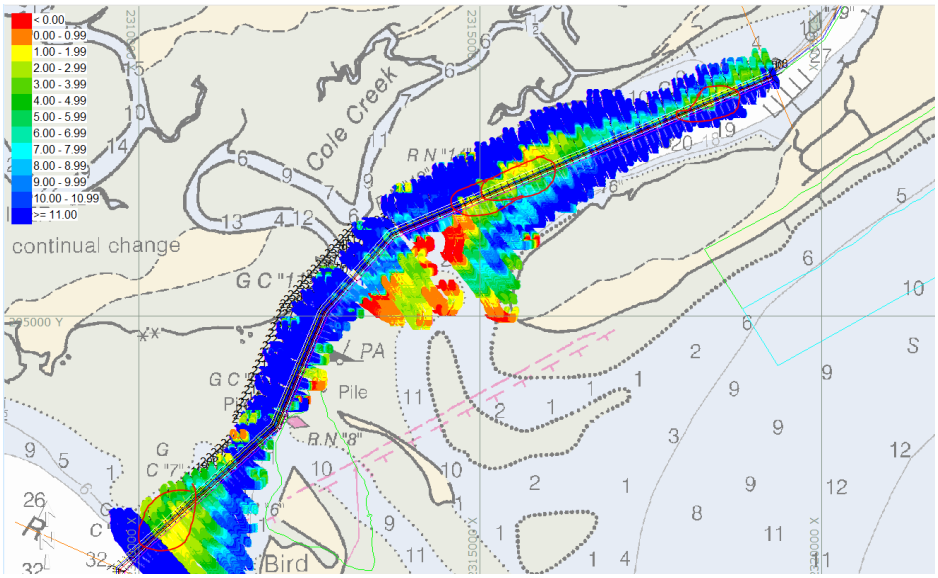

Figure 6. Hydrographic survey from April 2022 showing depths (in ft) created by sediment depositing throughout the Folly River with cooler colors indicating deeper areas and warmer colors indicating more shallow areas. The Folly River channel is drawn as a rectangular polygon through the Folly River and areas of shoaling to be dredged are circled in red

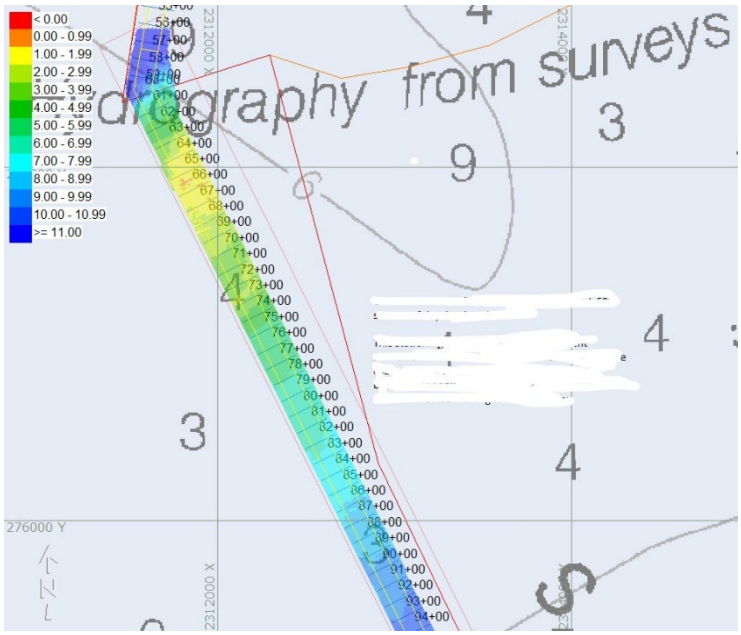

Figure 7. Hydrographic survey from April 2022 showing depths (in ft) created by sediment depositing in the FRNP entrance channel with cooler colors indicating deeper areas and warmer colors indicating more shallow areas

Aside from needs related to navigation on the FRNP, sediment management is an important part of the O&M scoping process. In past O&M cycles on the FRNP, dredged sediments from the Folly River channel were pipelined to either Folly Beach County Park or Bird Key/Skimmer Flat (now Bird Key Stono), while sediment from the entrance channel was sidecast into adjacent waters. Sidecasting sediment, although efficient and economical, provides little BU relative to other means such as beach placement or nearshore placement and requires more frequent dredging as sediment remains within closer proximity to the navigation channel. This EA outlines actions to use dredged sediments for the purposes of mitigating shoreline erosion and storm damage for adjacent property owners and public infrastructure and wildlife habitat along Folly Beach and Bird Key Stono. In combination with other projects, including the Folly Beach Shore Protection Project, alternatives presented here may provide some protection for the projected 2.1 million yd^3 of sediment from Folly Beach that is subject to erosion every 12 years (USACE 2021*c*).

1.4 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

USACE has prepared this EA in compliance with NEPA and associated implementing regulations to evaluate the potential environmental effects of the alternatives considered herein to the following environmental resources:

- Aesthetics
- Aquatic Resources/Wetlands
- Essential Fish Habitat
- Threatened & Endangered Species
- Coastal Barrier Resources System

- Coastal Zone Resources
- Terrestrial Biological Resources
- Cultural Resources
- Floodplains
- Navigation
- Noise
- Water Quality
- Climate Change
- Recreational Environment
- Socioeconomics and Environmental Justice

The following resources were eliminated from detailed analysis because they were not considered relevant to the actions outlined in each alternative (Table 1):

Table 1 Resources dismissed from detailed analysis

Dismissed Resource	Reasoning
Air Quality	According to the U.S. Environmental Protection Agency (EPA) Greenbook website (https://www3.epa.gov/airquality/greenbook/anayo_sc.html) and AirNow.gov; Charleston County is in attainment for fine particles, ozone, and sulfur dioxide pursuant to the National Ambient Air Quality Standards (NAAQS), Section 176(c)(1) of the Clean Air Act (CAA). All dredge equipment will be compliant with air emissions standards under the CAA and will not impact Charleston County's attainment status for air quality.
Invasive Species	No invasive species have been identified within the project area.
Hazardous, Toxic and Radioactive Waste	Dredged material from USACE projects is excluded from the definitions of hazardous waste, 40 Code of Federal Regulation (CFR) 261.4; 33 CFR 336.1, 336.2. Pursuant to Engineering Regulation (ER) 1165-2-132, dredged materials and sediments beneath navigable waters proposed for dredging qualify as hazardous or toxic wastes only if they are within the boundaries of a site designated by the EPA or a state for a response action (either a removal action or remedial action) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). None of the Placement sites are designated CERCLA sites and no potential hazardous, toxic and radioactive waste in or around channels and placement locations were identified.
Geological Resources	The geology of the proposed project area will remain unaffected under any alternative. No unique or noteworthy geological features will be permanently impacted.

1.5 RELATED ENVIRONMENTAL REVIEWS

Folly River Navigation Study (USACE 1977). This original study was completed prior to the FRNP construction and evaluated environmental and economic impacts of design and construction alternatives. An EA was included in the study appendices.

Environmental Assessment and Finding of No Significant Impact (FONSI) for Folly River Navigation Project, Charleston County, South Carolina (USACE 1997). This EA re-evaluated O&M of the FRNP with consideration of natural changes to Bird Key Stono (previously Bird Key and Skimmer Flat) and the entrance channel.

U.S. Fish and Wildlife Services, Biological Opinion, Folly River Navigation Project (USFWS 2006). This biological opinion was issued by USFWS during Endangered Species Act (ESA) Section 7 consultation for the FRNP in response to a BA submitted that addressed ESA species listed after 1997.

Environmental Assessment Folly Beach Shore Protection Project: Folly River Borrow Area, Charleston County, South Carolina (USACE 2017). This EA evaluated environmental consequences of utilizing sediment from Folly River to nourish Folly Beach and Bird Key Stono.

U.S. Fish and Wildlife Services, Biological Opinion, Folly Beach Renourishment and Groin Rehabilitation Project (USFWS 2018). This biological opinion of the USFWS was issued during ESA Section 7 consultation for the Folly Beach Shore Protection Project regarding beach nourishment and groin rehabilitation at Folly Beach and northeast Bird Key Stono in 2018.

National Marines Fisheries Service, 2020 South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (NMFS 2020). The South Atlantic Regional Biological Opinion (SARBO) covers both maintenance dredging and material placement on a list of USACE projects. FRNP O&M activities will be conducted in accordance with terms of the SARBO.

Sediment Transport Modeling at Stono Inlet and Adjacent Beach, South Carolina (USACE 2021*c*). This document included sediment transport modeling to analyze impacts of using borrow areas in the Folly River and Stono Inlet on sediment transport throughout the area during regular intervals of time and adverse weather events.

2 ALTERNATIVES

Alternatives concerning USACE actions on the FRNP were considered and evaluated based on compliance with environmental laws and regulations, compliance with executive orders, and impacts to the environment including those to climate change, water quality, aquatic resources / wetlands, terrestrial biological resources, noise, cultural resources, threatened & endangered species, socioeconomics and environmental justice, sediment, navigation, floodplains, essential fish habitat, recreational environment, aesthetics, coastal barrier resources systems, coastal zone

resources, cost effectiveness, engineering feasibility, and the ability of the alternative to meet the purpose and needs of the project. Alternatives were also evaluated to determine whether they met *the Federal standard* (see 33 C.F.R. Parts 335-338) – the Federal standard is the dredged material disposal alternative or alternatives identified by USACE which represent the least costly alternatives consistent with sound engineering practices and environmental standards established by the 404(b)(1) evaluation process or ocean dumping criteria. In reviewing alternatives, USACE considered whether they would be technically feasible (engineering); cost effective; and compliant with applicable environmental laws, regulations, and executive orders; and whether they would have less than significant environmental impacts. Only Alternative B (Past Approach) and Alternative C (Proposed Action Alternative) were found to meet the criteria outlined above. Alternative A (No Action Alternative), while it would not meet the purpose and need for action, was included in the evaluation to provide a baseline for environmental impacts, as required by NEPA.

2.1 ALTERNATIVE A (NO ACTION ALTERNATIVE)

Alternative A, the No Action Alternative, represents the most probable future condition if no action is taken.

2.2 ALTERNATIVE B (PAST APPROACH)

Under Alternative B, USACE would continue with the same course of actions as outlined by USACE (1997). Table 2 below summarizes the actions outlined by USACE (1997) as would [continue to] occur under Alternative B. The Folly River channel would be maintained to navigation depth using cutterhead pipeline dredging and sediments would be pipelined to the front shores of either Folly Beach County Park, Bird Key Stono, or both. In addition, the entrance channel could continue to be re-aligned within the outlined re-alignment area and dredged to depth with a sidecast dredge. Dredged sediment from the entrance channel would be sidecast outside the channel.

2.3 ALTERNATIVE C (PROPOSED ACTION ALTERNATIVE)

Under Alternative C, the Proposed Action Alternative, USACE actions would include all actions outlined in Alternative B and include expansion of available sediment placement locations and dredge types (Table 2). More specifically, actions covered under Alternative C include maintenance to navigation depth of: (1) Folly River channel using cutterhead pipeline dredging and disposal of dredged sediment to any individual, or combination thereof, placement areas (i.e., Bird Key Stono, the expanded front beach placement area for Folly Beach, or nearshore along Folly Beach); and (2) the FRNP entrance channel using any individual, or combination thereof, of the following dredge types: sidecast, modified hopper, or cutterhead pipeline and disposal of dredged sediment to any individual, or combination thereof, placement area (i.e., the area adjacent to the entrance channel, the expanded front beach placement area for Folly Beach, and/or nearshore along Folly Beach or Bird Key Stono).

Table 2. Compared summary of actions taken by USACE (1997) and those falling under scope of Alternative B and actions within scope of Alternative C.

Reach	Shoaling (yd^3)	Dredging Frequency (years)	Placement Location(s)	Dredge Type(s)
Folly River	Up to 300,000	~3	**Alternatives B & C:** • Front Beach (Folly Beach County Park only) • Bird Key Stono **Alternative C (Only):** • Front Beach (all Folly Beach) • Nearshore Folly Beach	**Alternatives B & C:** • Cutterhead Pipeline
Entrance Channel	Up to 300,000	~2	**Alternatives B & C:** • Entrance Channel **Alternative C (Only):** • Front Beach (all Folly Beach) • Nearshore Folly Beach • Bird Key Stono	**Alternatives B & C:** • Sidecast **Alternative C (Only):** • Modified Hopper • Cutterhead Pipeline

3 METHODS & SCOPE OF PROJECT NEEDS

3.1 DREDGE TYPES

3.1.1 Cutterhead Pipeline Dredge (Available under Alternatives B & C)

A cutterhead pipeline dredge is a type of hydraulic cutter-suction dredge that uses a rotating cutterhead to loosen and lift materials while skimming along the sediment surface in the bottom of waterways and uses pumps to move dredged sediment through a pipeline to a placement area (Figure 8). Typically, pipelines are 18-24” diameter, operate 24 hours per day, and have the capability to remove larger volumes of materials. The suction power of a small non-ocean certified cutterhead dredge usually ranges between 1,300 – 2,000 horsepower. Cutterhead pipeline dredges are capable of dredging in shallow or deep water and have accurate bottom and side slope cutting capability. Limitations of these dredges include relative lack of mobility, long mobilization and demobilization, inability to work in high wave action and currents, and they are impractical in high traffic areas. Considering that the cutterhead is typically buried in the sediment to promote operational efficiency; thus, limiting exposure in the water column to the suction field, cutterhead dredging has historically resulted in significantly lower takes of ESA-listed species than hopper dredges (NMFS 2020).

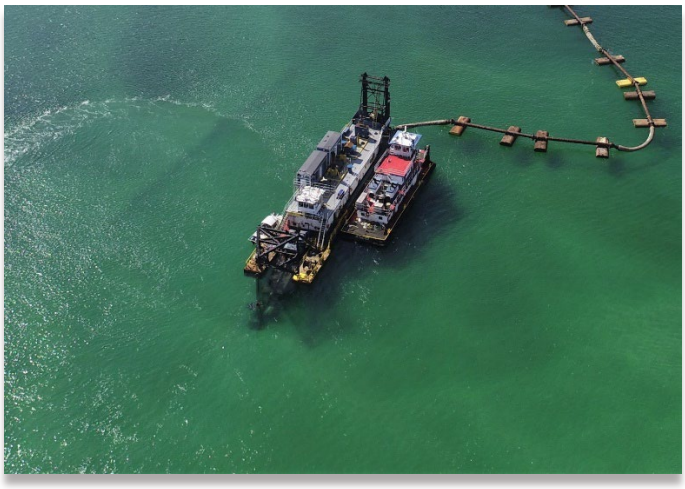

Figure 8 Pipeline dredging by the KELLY in the Gulf Coast Waterway. USACE 2018.

Pipelines placed on the sea floor must either be of sufficient weight to remain in place or be anchored or weighted. Floating pipelines are anchored to the sea floor and may require booster pumps if the length of the pipeline is too long for the dredge to push the material to the placement location. Pipelines are typically placed in the same pipeline corridor for each recurring event to minimize the potential damage to resources in the area.

3.1.2 Sidecast Dredge (Available under Alternatives B & C)

A sidecast dredge is capable of dredging in depths from about 5-25’ and is typically used in shallow areas for shoal removal. This dredge type has two articulated dredging pipes known as dragarms that extend to the seabed and dragheads that scoop sediment from the surface and, with an available160 horsepower, pumps it up a 12”-diameter, 80’ long discharge pipe with a 10’ extension (Figure 9). Dredged sediment is cast up to 100’ from the centerline of the vessel into adjacent open waters where predominant currents can then carry it away from the channel.

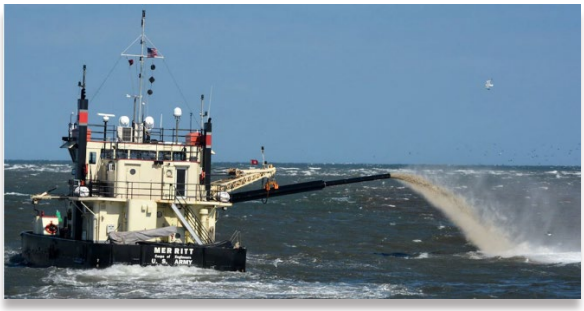

Figure 9 Sidecast dredge MERRITT at Oregon Inlet. Photo by: Hand Heusinkveld

3.1.3 Modified Hopper Dredge (Available under Alternative C Only)

A modified hopper dredge, like sidecast dredges, pulls dragheads along the sediment surface and sucks sedimentary material through articulated pipes; but instead of discharging dredged sediment, this dredge type allows for storage and transport in the

hull of the vessel (up to 300-500 yd^3) (Figure 10). Unlike traditional hopper dredge equipment, modified equipment utilizes smaller dragheads (2'x2' or 2'x3'), openings (5"x5" or 5"x8") and intake pipes (10"-14") and operating suction power is limited to 100-110 horsepower. Once filled, stored sediment is transported to the placement area(s) where the split-hull opens and deposits sediment.

For the purposes of this project, this dredge type operates best between 5.5'-8' mean lower low water (MLLW) in small and/or isolated shoaling locations. Under Alternative C, a modified hopper dredge would be used to dredge and transport sediment from the entrance channel to the nearshore area of Folly Beach.

Figure 10 Modified hopper dredge, MURDEN dredging the Barnegat Inlet, NJ in April 2014. Photo by Tim Boyle

3.2 REACHES TO BE DREDGED

Under Alternatives B & C, at all FRNP reaches during any O&M dredge cycle, selection of dredge types and placement areas are dependent on mixed variables including equipment availability, sediment composition, logistics, and cost. However, as discussed above, dredge type and placement area options are more limited under Alternative B.

3.2.1 Entrance Channel (Alternatives B & C)

The FRNP entrance channel re-alignment area consists of an approximately 1,659-ac area designated to allow for "following the deep" where natural shifts in ocean topography can be surveyed to align the channel and maintain navigation depth of 11' and a width of 100'. This design method allows for significant reductions in the volume of dredged sediments required to maintain the entrance channel, extending periods of safe, efficient navigation. On average, O&M of the entrance channel re-alignment area has required removal of approximately 300,000 yd^3 of sediment in 2-year intervals. Dredging, however, would occur under Alternatives B & C when necessary and funding is available.

3.2.2 Folly River Channel (Alternatives B & C)

The Folly River channel consists of a total area of approximately 41.3 ac within Folly River. Similar to that of the entrance channel, the exact location of the alignment of the federal channel may shift slightly through time in order to provide for the most efficient maintenance of navigation conditions; however, this variation is relatively small in scale compared to that of the entrance channel. On average, O&M of channel dimensions of 9’ depth and 80’ width have required approximately 300,000 yd^3 to be removed in 3-year intervals. As is with the entrance channel, dredging would occur when necessary and funding is available.

3.3 PLACEMENT LOCATIONS

3.3.1 Entrance Channel Re-alignment Area (Alternatives B & C)

Historically, O&M of the entrance channel was achieved using sidecast dredging and is the only dredge type where the area adjacent to the entrance channel will serve as the placement area. This method will continue to be available under Alternatives B & C. However, under Alternative B, O&M of the entrance channel may only occur through use of a sidecast dredge. Under circumstances where a sidecast dredge is to be used (either as necessary under Alternative B or when necessary and determined to be most advantageous under Alternative C), sediment will be dredged from the channel and discharged overboard through a 100’ pipe into the littoral zone downgradient.

3.3.2 Folly Beach Nearshore Placement (Alternative C Only)

Where nearshore placement is determined to be advantageous, sediment from both the Folly River channel and entrance channel may be deposited between the 6’-13’ MLLW contour within the Folly Beach nearshore area outlined above. This may be achieved through use of either modified hopper or cutterhead pipeline dredge as described above. Material would be deposited as a “feeder berm” comprised of individual deposits in an array of elongated mounds with a maximum height of approximately 2 ft.

3.3.3 BU Beach Placement (Folly Beach County Park) (Alternatives B & C) / Folly Beach (Alternative C Only)

Dredge materials from within the Folly River channel and entrance channel would be pumped via a pipeline and discharged on the front beach. Temporary training dikes of sand will be used to contain the discharge and control the fill placement. Fill sections will be graded by land-based equipment, such as bulldozers, articulated front-end loaders, and other equipment as necessary to achieve the desired placement profile (Figure 12).

Figure 12 Folly Beach Pipeline Placement Operations 2019. Photo by: Sara Corbett

3.3.4 BU Beach Placement (Bird Key Stono) (Alternatives B & C)

Bird Key Stono is an island within the Stono Inlet (as described above) protected for shorebird nesting, foraging and roosting. During strong storm events, Bird Key Stono has been covered with water and/or the sand has shifted closer to Folly Island. Historically, Bird Key Stono has received dredge materials from the Folly River channel by pipeline placement, as needed, and in agreement with the SCDNR in order to maintain Bird Key Stono as viable bird habitat.

3.4 REAL ESTATE

Folly Beach falls within the City of Folly Beach. USACE will meet with the City of Folly Beach at the beginning of each dredge cycle to coordinate placement locations for O&M dredge materials on Folly Beach. Similarly, USACE will meet with Charleston County Parks and Recreation at the beginning of each dredge cycle to coordinate placement locations for O&M dredge materials on Folly Beach County Park.

Bird Key Stono is managed by SCDNR. USACE will meet with SCDNR at the beginning of each dredge cycle to coordinate placement locations and timeframes on Bird Key Stono.

4 EXISTING CONDITIONS

4.1 AESTHETICS

The visible character of a place is composed of visual resources that can include both natural and artificial attributes. Visual resources influence how an observer experiences a particular location and distinguishes it from other locations.

Folly Beach is considered a beautiful beach resort town, with commercial and recreational fishing resources in the Folly River. The area has many visually pleasing attributes including open water, beaches, and undeveloped marsh. Most development on Folly Beach consists of single-family, residential homes. The south end of Folly

Island is maintained by the Charleston County as a park. Bird Key Stono Island is a bird sanctuary for bird watchers to visit via boat.

4.2 AQUATIC RESOURCES / WETLANDS

The FRNP project area is comprised entirely of marine, estuarine and riverine wetland/deepwater habitats, generally of which can be categorized as subtidal or intertidal. Subtidal and intertidal habitats of the FRNP support diverse communities of benthos (bottom-dwelling organisms), invertebrates, plankton (nonmobile organisms in the water column), fish, marine mammals, and aquatic plants.

Benthic Community:
The benthic zone is the lowest ecological region of a body of water, including the sediment surface and sub-surface layers. Organisms living in this zone are referred to as benthos and generally include epifaunal organisms consisting largely of annelid worms and echinoderms along with some fish, crabs and groups of microorganisms (bacteria and fungi), filter and detritus feeding invertebrates (amphipods, bivalves), and polychaetes (marine worms).

Infauna refers to aquatic organisms that live on or in the substrate of a body of water. Infauna include clams, snails, polychaete worms, flatworms, and small crustaceans. Infauna are either filter feeders, processing particles floating in the water column or deposit feeders consuming organic matter lying on or in the sediment. Some infaunal invertebrates, especially among the crustaceans, are capable of a high degree of lateral mobility, however, the majority of infaunal invertebrates are predominately sedentary. This sedentary nature makes these organisms susceptible to tidal fluctuation, storm events, predation, poor habitat conditions such as low dissolved oxygen, and habitat conversion or destruction.

The epifaunal and floral communities of sandy bottom environments, such as those in the project area, tend to be relatively low in diversity, consisting mostly of microorganisms. This is partially attributable to the coarse and active sediments of sandy bottom environments which are typically unsuitable for attachment by sessile invertebrates. In addition, sand bottoms such as those found in the inlet, are depositional and the continual inflow of sediment can submerse sessile invertebrates. These substrata are more suitable for supporting diatoms, other unicellular algae, protistans and attached multicellular algae. Invertebrates primarily include motile deposit feeders, such as polychaete worms, sea cucumbers, and sand dollars who are dependent on ocean currents and wave actions for mobility. Some fish and crabs also graze on the bottom.

Plankton:
Plankton are mainly composed of unicellular algae, larval stages of many fish and invertebrates and the adult stages of several microscopic invertebrates. Adult stages of several macroinvertebrates such as jellyfish (e.g., *Chrysaora* spp.*, Cyanea* spp.*, Stomolophus* spp.*, Rhopilema* spp.) and comb-jellies (*Mnemiopsis* spp.) are also an important part of the plankton community.

Nekton:
Nekton collectively refers to aquatic organisms capable of controlling their location through active moment and do not rely on the water current or tide for movement. Fish are the principal nektonic species although some crustaceans such as portunid crabs, penaeid shrimp and some mollusks, such as the squid spend at least a portion of their life as nekton. A number of fish species are considered to be estuarine dependent and utilize the coastal estuaries for at least a portion of their life cycle. Fish species commonly observed in the project area include spotted seatrout (*Cynoscion nebulosus*), weakfish (*Cynoscion regalis*), bluefish (*Pomatomus saltatrix*), red drum (*Sciaenops ocellata*), black drum (*Pogonias cromis*), spot (*Leiostomus xanthurus*), croaker (*Micropoganius undulatus*), sheepshead (*Archosargus probatocephalus*), menhaden (*Brevoortia tyrannus*), gizzard shad (*Dorosoma cepedianum*), mullet (*Mugil cephalus*), flounder (*Paralichthys sp.*), silversides (*Atherinidae*), and sea catfish (*Ariidae*).

Commercial Shellfish:
The FRNP occurs within Shellfish Management Area 10A, which is managed under SCDNR Office of Fisheries Management. Four state shellfish grounds occur nearby the federal channels of the FRNP, including S206W intersected by the Folly Creek channel, S196 north of the Folly River channel, S189 at the intersection of the Folly and Stono Rivers, and S194E west of the entrance channel. There is also an area of shellfish where harvest is prohibited south of the Folly River channel.

Wetlands:
The project area has nearby tidal salt marshes along shorelines and island fringes. In general, these marshes are larger in areas that are sheltered from winds and wave actions. The intertidal zone is an important nursery area for larvae and juveniles of many marine species and provides important refuge and foraging habitat for various invertebrates, and marine and shoreline birds.

4.3 ESSENTIAL FISH HABITAT

The 1996 Congressional amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (PL 94-265) set forth new requirements for the National Marine Fisheries Service (NMFS), regional fishery management councils (FMC), and other federal agencies to identify and protect important marine and anadromous fish habitat. These amendments established procedures for the identification of Essential Fish Habitat (EFH) and a requirement for interagency coordination to further the conservation of federally managed fisheries.

EFH is defined in the MSFCMA as "…*those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity*" (16 U.S.C. § 1802(10)). The definition for EFH may include habitat for an individual species or an assemblage of species, whichever is appropriate within each Fisheries Management Plan (FMP). Designated EFH for the project area includes intertidal flats, unconsolidated bottoms, surf zone, estuarine emergent wetlands, oyster habitat, and estuarine and marine water column. Federally managed species known to occur within the project area are provided

in Table 3 below. The project area includes Habitat Areas of Particular Concern (HAPC) for penaeid shrimp and snapper/grouper complex.

Table 3 Federally managed species for the South Atlantic that may occur within the project area

Common Name	Scientific Name	Jurisdiction	FMP[1]
White Shrimp	*Lytopenaeus setiferus*	SAFMC	Shrimp
Brown Shrimp	*Farfantepenaeus aztecus*	SAFMC	Shrimp
Gag Grouper	*Mycteroperca microlepis*	SAFMC	Snapper Grouper
Gray Snapper	*Lutjanus griseus*	SAFMC	Snapper Grouper
Spanish Mackerel	*Scomberomorus maculatus*	SAFMC	CMP
Summer Flounder	*Paralichthys dentatus*	MAFMC	Summer Flounder
Bluefish	*Pomatomus saltatrix*	MAFMC	Bluefish
Bonnethead Shark	*Sphyma tiburo*	NMFS	HMS
Bull Shark	*Carcharhinus leucas*	NMFS	HMS
Sandbar Shark	*Carcharhinus plumbeus*	NMFS	HMS
Finetooth Shark	*Carcharhinus isodon*	NMFS	HMS
Sand Tiger Shark	*Carcharhinus taurus*	NMFS	HMS
Blacktip Shark	*Carcharhinus limbatus*	NMFS	HMS
Atlantic Sharpnose	*Rhyzoprionodon terranovae*	NMFS	HMS
Lemon Shark	*Negaprion brevirostris*	NMFS	HMS
Tiger Shark	*Galeocerdo cuvier*	NMFS	HMS
Scalloped Hammerhead Shark	*Sphyrna lewini*	NMFS	HMS
Blacknose Shark	*Carcharhinus acronotus*	NMFS	HMS
Smoothhound Shark	*Ocyurus chrysurus*	NMFS	HMS
Spinner Shark	*Carcharhinus brevipinna*	NMFS	HMS

[1]Definitions for acronyms used include: SAFMC = South Atlantic Fishery Management Council, CMP = Coastal Migratory Pelagic, HMS = Highly Migratory Species, MAFMC =Mid-Atlantic Fishery Management Council, and FMP = Fishery Management Plan

4.4 THREATENED & ENDANGERED SPECIES

The Endangered Species Act (ESA), as amended (16 U.S.C. §§ 1531 – 1543), was passed to conserve the ecosystems upon which endangered and threatened species depend, and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Section 7 of the ESA requires federal agencies to consult with USFWS and NMFS Protected Resources Division (PRD) when their proposed actions may affect endangered or threatened species or their critical habitats.

Pursuant to Section 7 of the ESA, USACE has evaluated impacts to ESA-listed species from implementation of actions for each of the alternatives considered herein. A list of ESA species known or expected to be on or near project area was obtained using USFWS's Information for Planning and Consultation tool and is included for reference in Table 4. A list of ESA species for the state of South Carolina was obtained from NMFS' website (https://www.fisheries.noaa.gov/southeast/consultations/threatened-and-endangered-species-list-south-carolina) and is included for reference in Table 5. However, the likelihood of a species' occurrence specifically within the project area at

any given time depends on key spatial and temporal factors such as availability of suitable habitat, migratory behavior, prey availability, adverse weather events and more.

Notably, the USFWS and NMFS PRD share jurisdiction of sea turtles, with NMFS having jurisdiction when in the marine environment and USFWS having jurisdiction when in the terrestrial environment.

Table 4 USFWS-listed ESA species known or expected to be on or near project area

Common Name	Species	ESA Status[1]	Present
Mammals			
Northern Long-eared Bat	*Myotis septentrionali*	T	N
West Indian Manatee	*Trichechus manatu*	T	Y
Birds			
Bachman's Warbler	*Vermivora bachmanii*	E	N
Eastern Black Rail	*Laterallus jamaicensis ssp. jamaicensis*	T	N
Piping Plover	*Charadrius melodus*	T	Y
Red Knot	*Calidris canutus rufa*	T	Y
Red-cockaded Woodpecker	*Picoides borealis*	E	N
American Wood Stork	*Mycteria americana*	T	Y
Reptiles[2]			
Green Sea Turtle[3]	*Chelonia mydas*	T	Y
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	Y
Leatherback Sea Turtle	*Dermochelys coriacea*	E	Y
Loggerhead Sea Turtle[4]	*Caretta caretta*	T	Y
Insects			
Monarch Butterfly	*Danaus plexippus*	C	N
Plants			
American Chaffseed	*Schwalbea american*	E	N
Canby's Dropwort	*Oxypolis canbyi*	E	N
Pondberry	*Lindera melissifolia*	E	N

[1]ESA classifications include: T = threatened, E = endangered and C = candidate
[2]Administrative jurisdiction shared between USFWS and NMFS
[3]Consisting of North and South Atlantic DPS
[4]Consisting of Northwest Atlantic Ocean DPS

Table 5 NMFS-listed ESA species list for South Carolina

Common Name	Scientific Name	ESA Status[1]	Present
Marine Mammals			
Sei Whale	*Balaenoptera borealis*	E	N
Blue Whale	*Balaenoptera musculus*	E	N
Fin Whale	*Balaenoptera physalus*	E	N
North Atlantic Right Whale	*Eubalaena glacialis*	E	Y
Sperm Whale	*Physeter macrocephalus*	E	N
Fish			
Atlantic Sturgeon[2]	*Acipenser oxyrinchus*	E	Y
Shortnose Sturgeon	*Acipenser brevirostrum*	E	Y
Oceanic Whitetip Shark	*Carcharhinus melodus*	T	N
Giant Manta Ray	*Manta birostris*	T	N
Sea Turtles[3]			
Green Sea Turtle[4]	*Chelonia mydas*	T	Y
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	Y
Leatherback Sea Turtle	*Dermochelys coriacea*	E	Y
Loggerhead Sea Turtle[5]	*Caretta caretta*	T	Y
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	N

[1]ESA classifications include: T = threatened and E = endangered
[2]Consisting of South Atlantic and Carolina Distinct Population Segments
[3]Administrative jurisdiction shared between USFWS and NMFS
[4]Consisting of North and South Atlantic DPS
[5]Consisting of Northwest Atlantic Ocean DPS

4.4.1 West Indian Manatee

Manatees inhabit both salt and fresh water and can be found in shallow (usually <20'), slow-moving rivers, estuaries, saltwater bays, canals, and coastal areas (USFWS 2001) throughout their range. In South Carolina, manatees occupy fresh, brackish and marine habitats and move freely between salinity extremes. Manatees will move up rivers until the water is too shallow for passage or is blocked by a dam. Manatees are thermally stressed at water temperatures below 18ºC (64.4ºF) (Garrott et al. 1995). For this reason, manatees are only seen in South Carolina in the summer months and there is no critical habitat in South Carolina for the species. Counties in South Carolina in which the manatee is known or believed to occur include Beaufort, Berkeley, Charleston, Colleton, Dorchester, Georgetown, Horry, and Jasper. From 1993-2004, a handful of manatee sightings were reported to SCDNR in the Folly River area annually (https://www.dnr.sc.gov/manatee/distribute/2000.html).

4.4.2 Piping Plover

The piping plover is a migratory shorebird endemic to North America. The piping plover was listed by USFWS as threatened and endangered on December 11, 1985. Preferred habitats for the species are sandy beaches along the ocean and inland lakes, bare areas in dredge disposal sites, and natural alluvial islands in rivers. Shorelines with little vegetation are preferred for both nesting and feeding. These plovers feed primarily on fly larvae, beetles, crustaceans, mollusks, and other invertebrates that they pluck from the sand (Bent 1929). Breeding grounds along the Atlantic Coast range from Newfoundland to North Carolina. Wintering areas on the Atlantic Coast are from North Carolina southward through Florida and in the Bahamas and West Indies. This species occurs on Bird Key Stono as a winter resident. It departs its breeding grounds for wintering areas by early September and returns to its breeding grounds in late March or early April.

4.4.3 Rufa Red Knot

The rufa red knot is another migratory shorebird endemic to North America. In the Western Hemisphere the rufa red knot breeds in the mid to high arctic tundra of Alaska, Canada, and Greenland. Most breeding habitats are near coastal areas, often on islands. Nest sites are generally on dry, sunny, and slightly elevated areas of tundra, frequently on open gravel ridges or slopes. During migration this species switches to coastal beaches usually at or near the mouth of bays, estuaries, or tidal inlets. Staging sites are associated with high wave-energy coastal areas. Wintering sites are generally intertidal habitats such as beaches with significant wave action or currents. Red Knots can be found foraging and roosting on barrier beaches and islands along the eastern shores of South Carolina during the cooler months of the year. During the fall and winter, they feed on clams and during the spring they feed on eggs of horseshoe crabs.

4.4.4 Wood Stork

Wood storks are known to frequent the more protected estuarine areas of the region for both feeding and nesting. Wood stork rookeries and nesting areas are located on hammocks and along edges of marsh behind barrier islands. These birds have a unique feeding technique and require higher prey concentrations than other wading birds. Optimal water regimes for the wood stork involve periods of flooding, during which prey (fish) populations' increase, alternating with drier periods during which receding water levels concentrate fish at high densities.

4.4.5 Atlantic and Shortnose Sturgeon

Atlantic and shortnose sturgeon are anadromous fish which inhabit coastal, estuarine, and riverine environments on the Atlantic coast. Shortnose sturgeon rarely inhabit coastal ocean waters and tend to stay in river systems. It is unlikely that shortnose sturgeon occur in the project area due to lack of historical sightings of the species in the Folly River and Stono Inlet. Atlantic sturgeon migrate to the Atlantic Ocean as sub-adults and return to rivers to spawn. Migrating Atlantic sturgeon may be present in or near Stono Entrance Inlet or the Folly River.

4.4.6 North Atlantic Right Whale

North Atlantic right whales are highly migratory, summering in feeding and nursery grounds in New England waters and northward to the Bay of Fundy and the Scotian Shelf. They migrate southward in winter to the northeastern coast of Florida. Calving grounds primarily occur off of the coast of southern Georgia south to northern Florida, however, calving occasionally occurs as far north as Cape Fear, North Carolina. These calving grounds were designated as critical habitat under the ESA in 2016. During the winter months, right whales are routinely seen close to shore in the critical habitat area.

4.4.7 Sea Turtles

Four species of threatened or endangered sea turtles are found along the South Carolina coast. These include the Kemp's ridley sea turtle, green sea turtle, leatherback turtle and loggerhead turtle. Of these four species, only three would potentially find Folly Beach and Bird Key Stono suitable habitat for nesting: loggerhead, green turtle, and leatherback turtles. Kemp's ridley sea turtles do not nest within the project area, though they may forage there.

4.4.7.1 Green Sea Turtle

Green sea turtles are found in all temperate and tropical waters around the world and stay mainly near the coastline and around islands. They are often found in shallow flats and seagrass meadows during the day and return to scattered rock ledges, oyster beds, and coral reefs in evenings. In U.S. Atlantic waters, green turtles are found from Massachusetts to Texas, the U.S. Virgin Islands, and Puerto Rico. South Carolina is home to predominately green sea turtles of the North Atlantic distinct population segment (DPS) and are designated as federally threatened.

From April through November, juvenile green sea turtles occupy feeding grounds in South Carolina in relatively shallow, sheltered waters where seagrasses and algae are present. They may be found in sheltered estuarine creeks, bays and marshes. The potential exists for nesting along sandy beaches, however, very few cases have been documented by state wildlife agencies. Nesting typically occurs further south between June and September.

Between 2000 and 2019, the SCDNR and the University of Georgia Marine Extension and Georgia Sea Grant conducted nearly 8,000 trawling events during May through most of July between St. Augustine, FL and Winyah Bay, South Carolina, but only captured 21 individual sea turtles. Very little population distribution data exists for this project area. Thus, it is assumed that individuals of green sea turtle may be present in the project area but are expected to be in low or very low densities.

4.4.7.2 Loggerhead Sea Turtles

Loggerhead sea turtles are found in temperate and subtropical waters of the world. They feed in coastal bays, estuaries, and in shallow water along the continental shelves of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles occur throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian oceans and are widely distributed within their range. They can be found hundreds of miles offshore or inshore in bays, lagoons, salt marshes, creeks, ship channels, and the mouths of large rivers. Loggerhead sea turtles primarily feed on mollusks, crustaceans, fish, and other marine animals. Feeding areas often include coral reefs, rocky areas, and shipwrecks.

From early April to early November, juvenile loggerheads utilize estuarine, neritic and coastal shelf waters as foraging grounds. Adult female loggerhead sea turtles inhabit coastal South Carolina (Northwest Atlantic Ocean DPS) generally from mid-May to mid-August during nesting periods. According to SCDNR Sea Turtle Nest Monitoring System (http://www.seaturtle.org/nestdb/index.shtml?year=2023&view_beach=52), statewide, loggerhead sea turtles have averaged 3,378 nests annually over the past 10 years. From 2018-2022, Folly Beach averaged 87 nests annually ranging from 34 in 2018 to 145 in 2019. Nests are constructed between the high tide line and primary dune front.

4.4.7.3 Leatherback Sea Turtles

Leatherback sea turtles are the most widely distributed species of sea turtle, being found throughout the Atlantic, Pacific, and Indian oceans, including areas near Alaska and Labrador. Leatherback turtles are highly migratory and pelagic and can be found at depths more than 3,000 feet. Because of their ability to regulate their body temperature, they can be found in deeper water than other species of sea turtles and can be active in water below 40°F. Leatherback sea turtles primarily feed on jellyfish, but also consume sea urchins, squid, crustaceans, tunicates, fish, blue-green algae, and floating seaweed. The distribution and food habits of post-hatchling and juvenile leatherbacks are unknown, although they may be pelagic and associate with Sargassum weed.

Sub-adult and adult leatherback sea turtles are common in South Carolina's coastal waters in the spring and in smaller numbers in the fall. Nearshore concentrations may occur in South Carolina from April - June during migration when cannonball jellyfish are abundant. From 1997-2007, SCDNR conducted aerial surveys for the species and recorded 1,000 in the state over that timeframe. Nesting is rare in South Carolina and has not been recorded at Folly Beach or Bird Key Stono in the previous 5 years.

4.4.7.4 Kemp's Ridley Sea Turtles

Kemp's ridley turtles inhabit shallow nearshore and inshore waters of the northern Gulf of Mexico, particularly in Texas and Louisiana. During winter, turtles in the northern Gulf may travel to deeper water. Kemp's ridleys are often found in waterbodies associated with salt marshes. Kemp's ridley nesting is essentially limited to the beaches of the western Gulf of Mexico, primarily in Tamaulipas, Mexico. In the US, nesting occurs primarily in Texas (especially Padre Island National Seashore), and occasionally in Florida, Alabama, Georgia, South Carolina and North Carolina. Neonatal Kemp's ridleys feed on Sargassum and infauna or other epipelagic species. Post-pelagic diets include various items such as mollusks, sea horses, cownose rays, jellyfish, crabs, tunicates and fish. Live bottom (sessile invertebrates attached to hard substrate) has been identified as a preferred habitat of neritic juveniles in the coastal waters of western Florida. Hatchlings may become entrained in Gulf of Mexico eddies and dispersed by oceanic surface currents, then enter coastal shallow water habitats when they reach about 20 cm in length.

Similar to the green sea turtle, South Carolina's coastal waters are predominately used as developmental foraging grounds with juveniles generally occupying areas in the summer. The species is often found in nearshore and in-shore salt marsh habitats. Nesting very rarely occurs in South Carolina, with only 3 cases documented - none of which were at Folly Beach. Research conducted from north Florida through central South Carolina by the SCDNR, in partnership with the UGA, captured 260 Kemp's ridley sea turtles between 2000 and 2015. This data would suggest that a low-very low density of this species would be expected occupying the project area.

4.4.8 Critical Habitat

Areas of critical habitat, as described in the Federal Register (FR), that overlap with the project area (Table 6) are described below.

Table 6 Critical Habitats in the Project Area for NMFS and USFWS Species

Species	Jurisdiction	Critical Habitat Present	Critical Habitat Rule/Date
Piping Plover	USFWS	Yes	71 FR 33703 May 19, 2009
Loggerhead sea turtle	USFWS	Yes	79 FR 39755 August 11, 2014
	NMFS	Yes	79 FR 39856 August 11, 2014
North Atlantic Right Whale	NMFS	Yes	59 FR 28793 June 3, 1994
Proposed Critical Habitat			
Rufa Red Knot	USFWS	Yes	86 FR 37410

4.4.8.1 Piping Plover Critical Habitat

Federal Register Vol. 66, No. 132, dated July 10, 2001, *Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Wintering Piping Plovers* designated 1,223 acres around Stono Inlet as Unit SC-9 piping plover critical habitat. This designation includes all of Bird Key Stono.

4.4.8.2 Loggerhead Sea Turtle Critical Habitat

Federal Register Vol. 79, No. 132, dated July 10, 2014, pg. 39756, *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segment of the Loggerhead Sea Turtle; Final Rule* and pg. 39856, *Endangered and Threatened Species: Critical Habitat for the Northwest Atlantic Ocean Loggerhead Sea Turtle Distinct Population Segment (DPS) and Determination Regarding Critical Habitat for the North Pacific Ocean Loggerhead DPS; Final Rule* designated 7 miles of Folly Island shoreline and 1 mile from mean high water seaward from Lighthouse Inlet to Saint Helena Sound as critical habitats as LOGG-T-SC-09 (USFWS jurisdiction) and LOGG-N-7 (NMFS jurisdiction), respectively. The beach front of Folly Beach and Folly Beach County Park fall within LOGG-T-SC-09 and the nearshore placement area for Folly Beach falls within LOGG-N-7.

4.4.8.3 North Atlantic Right Whale Critical Habitat

Federal Register Vol. 81, No. 17, dated January 27, 2016, pg. 4838, *Endangered and Threatened Species; Critical Habitat for Endangered North Atlantic Right Whale* designated waters off the southeast US coast from Brunswick County, North Carolina to Brevard County Florida as North Atlantic Right Whale Critical Habitat Unit 2. The nearshore placement area along Folly Beach and the entirety of the entrance channel re-alignment area both fall within this critical habitat.

4.4.8.4 Rufa Red Knot Proposed Critical Habitat

Federal Register Vol. 86, No. 133, dated July 15, 2021, pg. 37410 *Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Rufa Red Knot (Calidris canutus rufa)* proposes designation of critical habitat for the rufa red knot; including Unit SC-14, consisting of approximately 1,989 acres across the entirety of Folly Beach from MLLW to the toe of dunes of densely vegetated habitat, and Unit SC-15, consisting of 294 ac of Bird Key Stono from MLLW to the toe of dunes of densely vegetated habitat.

4.5 TERRESTRIAL BIOLOGICAL RESOURCES

4.5.1 Terrestrial Habitat and Species

Terrestrial habitats within and adjacent to the project area include tidal marsh, sand and/or mudflats. Nearby terrestrial habitats may include mammals like raccoon

(*Procyon lotor*), river otter (*Lontra canadensis*), marsh rice rat (*Oryzomys palustris*), Virginia opossum (*Didelphis virginiana*), and marsh rabbit (*Sylvilagus palustris*), as well as a variety of reptiles/amphibians (e.g., frogs, toads, lizards, snakes, turtles, alligator). Folly Beach and Bird Key Stono are utilized by waterfowl and shorebirds particularly during the winter months. Bird Key Stono provides breeding habitat for thousands of Brown Pelican(*Pelecanus occidentalis*), Laughing Gull (*Leucophaeus atricilla*), Royal Tern (*Thalasseus maximus*), and Sandwich Tern (*Thalasseus sandvicensis*), as well as some other species including American Oystercatcher (*Haematopus palliatus*), Black Skimmer (*Rynchops niger*), Black-crowned Night Heron (*Nycticorax nycticorax*), Snowy Egret (*Egretta thula*), Tricolored Heron (*Egretta tricolor*), and Wilson's Plover (*Charadrius wilsonia*) (National Audubon Society 2013).

Review of the USFWS Information for Planning and Consultation database (https://ecos.fws.gov/ipac/) resulted in identification of the 41 migratory birds of conservation concern that have the potential to present within the project area.

4.6 CULTURAL RESOURCES

The management of cultural resources is regulated under federal laws such as the National Historic Preservation Act (NHPA) of 1966 (54 U.S.C. § 300101 et seq.), the Archaeological and Historic Preservation Act of 1974 (54 U.S.C. §§ 312501- 312508), the American Indian Religious Freedom Act of 1978 (42 U.S.C. §§1996 and 1996a), the Archeological Resource Protection Act of 1979 (16 U.S.C. §§470aa-470mm), NEPA (42 U.S.C. §4321 et seq.), the Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 (25 U.S.C. §3001 et seq.), the Abandoned Shipwreck Act of 1987 (43 U.S.C. §§2101-2106), and the Sunken Military Craft Act of 2004 (10 U.S.C. § 113 et seq.).

Cultural resources considered in this study are those defined by the NHPA as properties listed, or eligible for listing, on the National Register of Historic Places (NRHP) and are referred to as historic properties. Historic properties include buildings, structures, sites, districts, objects, cultural items, Indian sacred sites, archaeological artifact collections, and archaeological resources (36 CFR 800.16(l)(1)). Cultural resources also include resources with unknown NRHP eligibility status.

4.6.1 Archaeological and Historical Setting

There are no structures, places, or items of historical significance listed on the NRHP in the immediate project area. Prior to European settlement of the Charleston County area, the Stono and Folly Rivers were used primarily by Native American tribes. Both rivers have been used extensively for maritime activities throughout history, being within proximity to the regionally important Charleston Harbor. Shipwrecks and abandonments have occurred in the project area; however, there is likely little to nothing remaining of these due to shifting channels and ongoing channel work conducted by USACE. There is an absence of evidence recovered by USACE and other agencies from numerous surveys conducted in the project area. Natural forces have scoured, redeposited, and

reshaped the area many times to a depth greater than that which is routinely maintained for navigation, making detection of any remains by USACE even less likely.

4.6.2 Inventory of Resources in the Study Area

Cultural resource surveys (i.e., historic research, remote sensing, and dive investigations) have been conducted on/in South Carolina's inland and offshore waters, including within the current Area of Potential Effect (APE). A search of South Carolina's Archaeological Site File (ArchSite) was performed to identify any previously documented sites in Charleston County, South Carolina, in or adjacent to the project area. The most notable site near the project area is the Folly North Site (38CH1213). This area is also home to the Morris Island Lighthouse and Neck Redoubts and Lines Federal Earthwork Fortifications. There are two Civil War era batteries documented near the entrance channel, Battery Delafield and Battery Mahan, however both are over 2 miles outside the dredging footprint.

The area where USACE proposes nearshore placement along Folly Island had not been previously surveyed, and it was identified that there was a potential for undisturbed cultural deposits and underwater resources that could be impacted by the sediment placement. Surveying this area was a stipulation of the Programmatic Agreement (PA) under a separate action (Programmatic Agreement among the U.S. Army Corps of Engineers, Charleston District, the Bureau of Ocean Energy Management, the City of Folly Beach, and the South Carolina State Historic Preservation Office Regarding the Folly Beach Coastal Storm Risk Management Project, September 2021). Any surveys performed for the current undertaking would fulfil the requirements under that PA for this section of Folly Beach.

A search of the National Oceanic and Atmospheric Administration's (NOAA) Wrecks and Obstructions Database revealed the presence of four documented wrecks or obstructions within the APE (Figure 13). Little information is available for two of the wrecks/obstructions in the entrance channel, as there is no history on when they were sunk and their possible association with a vessel name. One wreck in the entrance channel is documented as being the 50-foot shrimper named Pear of Sea. The year that it ran aground is unknown, but it was documented in 1979 as breaking up, so there is likely nothing remaining of this vessel. The undertaking, as proposed, is not anticipated to have any effect on this wreck, as it likely no longer exists in this location. The two wrecks/obstructions noted in the Folly River channel are also unknown in terms of when they were sunk and what association they may have.

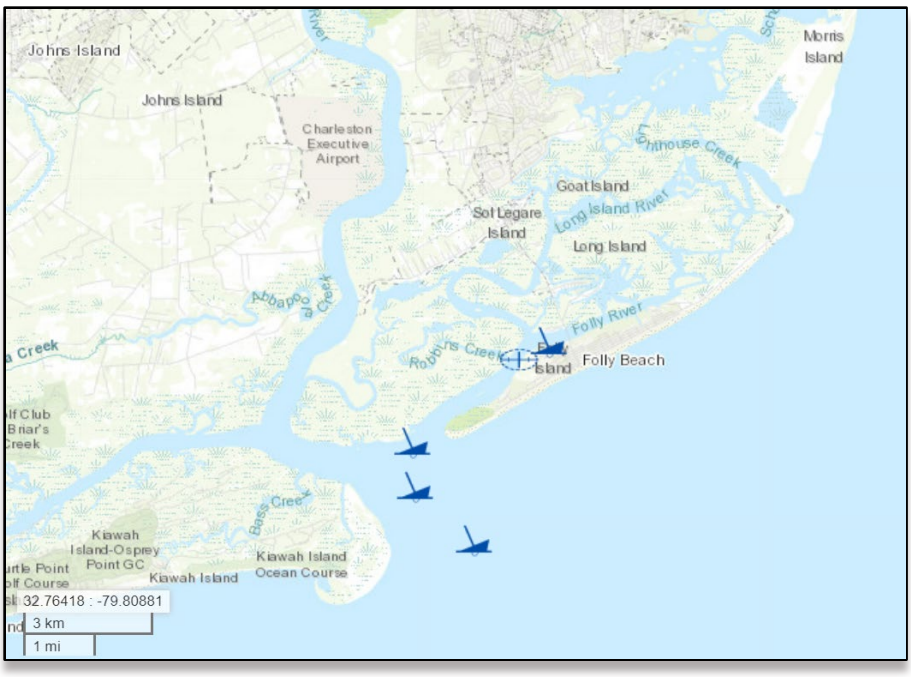

Figure 13 NOAA's Wrecks and Obstruction Database results for FRNP area with three obstructions noted in/near the entrance channel and two additional obstructions in the Folly River.

4.6.3 Cultural Resources Surveys

USACE conducted submerged cultural resources surveys of the nearshore placement area (733 acres) and a portion of the Stono Bar Channel Realignment Area (192 acres) in compliance with NHPA's Section 106 and the Abandoned Shipwreck Act of 1987. The surveys, which consisted of magnetometer, side-scan sonar, and sub bottom profiler, were performed in January 2023. Dive investigations were performed for seven targets of potential cultural significance, and only one of which was determined to be a submerged cultural resource of concern. A possible historic shipwreck was identified within the nearshore placement area, and an avoidance buffer of 150-feet will be implemented to ensure that sediment is not placed directly on this resource. Sediment migration from nearby placement will not adversely impact the resource, but rather aid in its protection.

In February 2023, the survey results were coordinated with the South Carolina State Historic Preservation Office (SHPO), South Carolina Institute of Archaeology and Anthropology (SCIAA), and 12 consulting tribes (Absentee-Shawnee Tribe of Oklahoma, Alabama-Quassarte Tribal Town, Catawba Indian Nation, Chickasaw Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Kialegee Tribal Town, Muscogee Creek Nation, Poarch Band of Creek Indians, Seminole Tribe of Florida, Shawnee Tribe, Thlopthlocco Tribal Town). SHPO concurred in an email dated February 21, 2023, with the determination of no adverse effect with the caveat that the 150-foot buffer remains in place (SHPO Project No. 22-RL0141). SCIAA concurred in an email dated February 17, 2023, that they have no concerns as long as the avoidance buffer is implemented (see responses in Appendix C). No tribal

responses were received to date. Additional Section 106 consultation will be required if any inadvertent discoveries are found or the project scope changes.

Approximately 316 acres of the Stono Bar Channel Realignment Area, which has been identified for advanced maintenance, were not surveyed at this time due to unfavorable conditions. No work will commence in this area until surveys are completed. The results will be coordinated with the SHPO to ensure that all identified shipwrecks and archaeological sites eligible or potentially eligible for listing on the National Register of Historic Places will not be affected by the proposed project.

4.7 FLOODPLAINS

The 100-year floodplain is established by the Federal Emergency Management Agency (FEMA) and is identified on Federal Insurance Rate Maps. Base flood elevations for flood zones and velocity zones are also identified by FEMA, as are designated floodways. All portions of the project area are within the 100-year floodplain. Executive Order 11988 (Floodplain Management) states that federal agencies shall avoid, to the extent possible, the long and short term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative, federal agencies shall take action to reduce the risk of flood loss, and minimize the impacts of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains.

Any placement of material on beaches would occur within the 100-year floodplain and would therefore constitute an alteration of the floodplain, displacing the floodplain seaward. Placement of sediment on Folly Island and Bird Key Stono cannot be accomplished outside the floodplain.

4.8 NAVIGATION

USACE is responsible for maintaining federal navigation channels. Removing shoaling from the FRNP is a routine requirement of O&M. Migrating shoals create shallow depths in the Stono Inlet and the lower portion of the Folly River, which negatively impacts navigation for recreational and commercial fishing vessels moving in and out of channels.

4.9 NOISE

Baseline noise levels within the project area vary throughout the year from operating commercial and recreational boats and naturally occurring noises (wind on the beach, wave action in the surf zone, buzzing of insects, bird calls). Dredging operations generally produce low levels of low frequency sound. Sounds may come from dragarms sliding along the bottom of the channel, pumping of sediments, and engine operation/exhaust. Nevertheless, effects of noise from dredging have been determined to be non-lethal and non-injurious with minimal behavioral effects on aquatic species (McQueen et al. 2018).

Noise along shorelines is also anticipated with the use of construction machinery and vehicles in order to create temporary dikes and level incoming sediment from pipelines. This type of noise is expected to be very localized and insignificant in magnitude and duration.

4.10 WATER QUALITY

The proposed project lies within the Folly Creek Watershed (Hydrologic Unit Code 12 – 030502020204) and Stono River Watershed (030502020205). There are no known pollution sources other than stormwater and nonpoint source pollutants in the general vicinity of Folly River channel and entrance channel. The South Carolina Department of Health and Environmental Control (SCDHEC) routinely tests water to protect the health of consumers of fish and shellfish and to ensure safe recreation. Monitoring includes screening for safe levels of bacteria, dissolved oxygen, pH, nutrients, and temperature. The state uses this data to designate the appropriate uses of water bodies. Designations include safe drinking water, recreation, fishing, propagation of fish, shellfish, game and other aquatic life, wild river, scenic river, and coastal fishing (EPA 2022).

Turbidity, expressed in Nephelometric Turbidity Units (NTU), quantitatively measures the light scattering properties of water. The quality standard for turbidity by SCDHEC for freshwater, shellfish harvesting water, and tidal salt water for primary and secondary contact recreation is 25 NTU (SCDHEC 2014). Suspended solids (fine sediments) are often measured for impact on the amount of light that passes through the water column. Turbidity in coastal waters is usually attributed to the very fine organic particulate matter and sand sized sediments that are re-suspended into the water column by local waves and currents. Higher turbidity levels can usually be expected around inlet areas and estuarine areas due to high nutrient, entrained sediment levels, and shallow waters where wave actions occur.

4.10.1.1 Folly River

Overall, the waters of the Folly Creek Watershed are of good quality, with only a single impaired water source (MD-274) (EPA 2022) (Figure 14). This impaired waterbody is several miles from the FRNP area and is classified as “murky waters” and is a natural form of impairment caused by suspended soils and other organic matter in the water that reduce oxygen levels and make it unsuitable for some aquatic animals and plants. Upstream from the inlet, parts of the river are classified by SCDHEC as Shellfish Harvestable Waters.

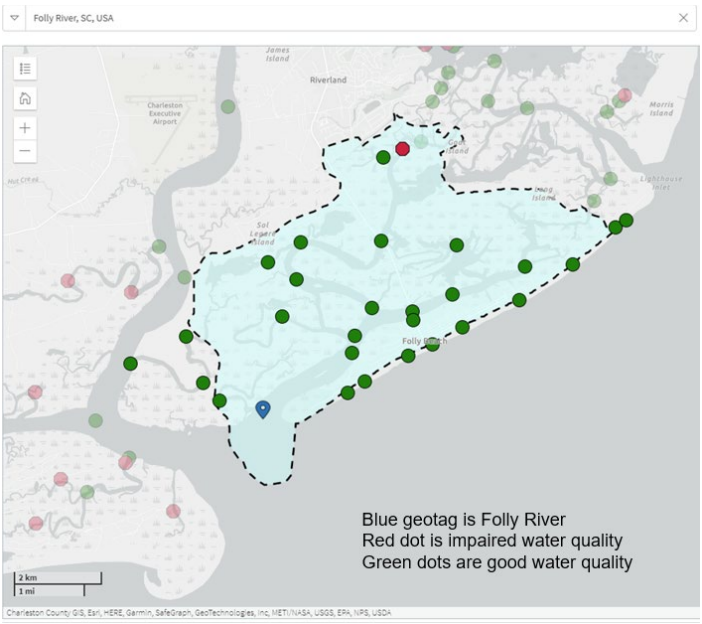

Figure 34 Waterbody sample locations for Folly River watershed

The Folly River drains into the mouth of the Stono Inlet then continues into the Atlantic Ocean. Mixing between riverine flows in the inlet with incoming tides from the Atlantic Ocean creates elevated turbidity in the nearby Folly River channel. Folly River salinity levels are higher downstream closer to the Atlantic Ocean and brackish moving upstream. Sampling in December 2021 by SCDHEC recorded salinity upstream in the Folly River to be 35.65 parts per thousand (ppt) and turbidity at 4.7 NTU (Figure 15).

Figure 15 Salinity and turbidity sampling areas for Folly River

4.10.1.2 Entrance Channel

The entrance channel is influenced by upstream riverine inputs and tidal inputs mixing in the area influencing turbidity and overall water quality. Upstream in the Stono River, SCDHEC testing from 2021 found salinity levels of 29.19 ppt and turbidity of 13 NTU. From water quality sampling stations within the Stono River Watershed, at least ten

consist of good water conditions and eight are rated as impaired (Figure 16). Two of these are impaired for murky waters, one is impaired for low oxygen levels, and the remaining are impaired because of bacterial contamination. Bacteria and other pathogens can be caused by human or animal waste, sewage discharges, farm, feedlots, or manure runoff. These bacteria and pathogens can be harmful to people that eat shellfish from or swim in the impaired waterway (EPA 2022).

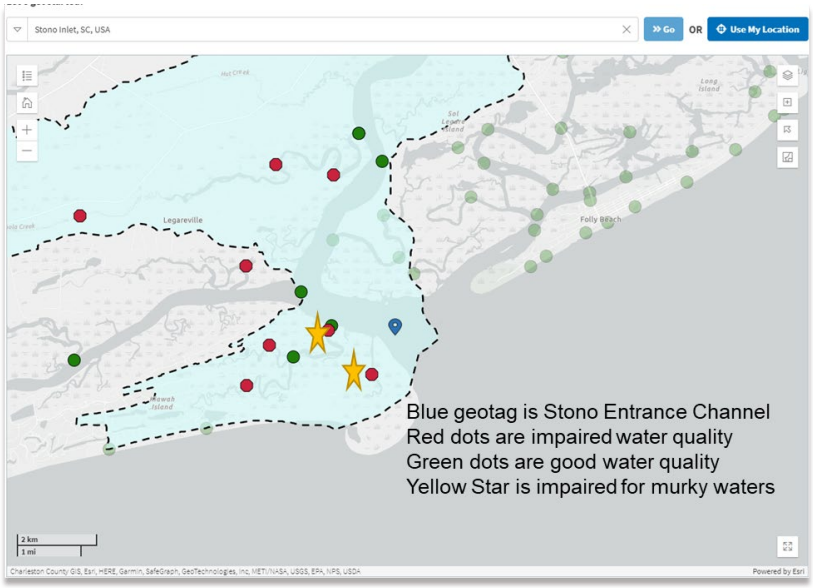

Figure 16 Waterbody sample locations for the entrance channel watershed

4.10.1.3 Folly Beach

The waterbody conditions in the nearshore area of Folly Beach are of good quality (EPA 2022) (Figure 17). Folly Beach is monitored by SCDHEC for *Enterococcus* bacteria to indicate levels of bacteria in the water. The beach is tested from May 1st to October 1st for the safety of swimmers.

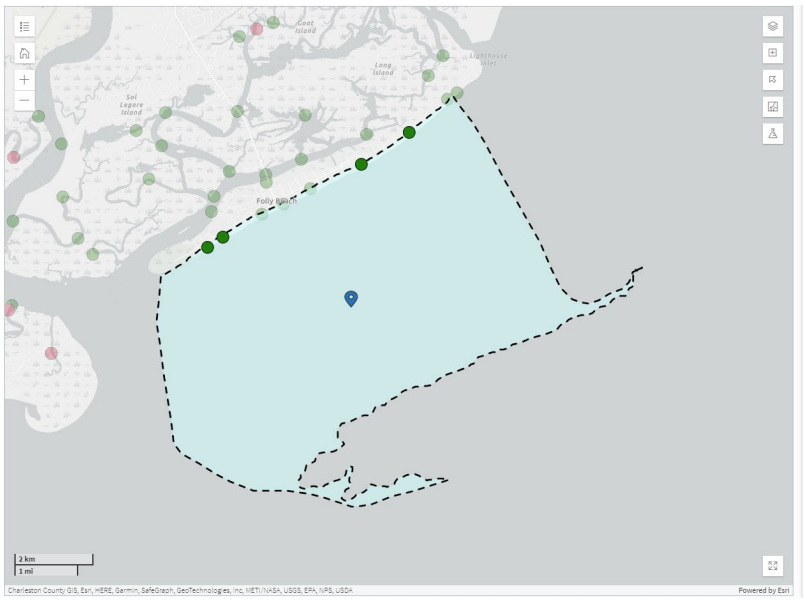

Figure 17 Waterbody sample locations for the entrance channel watershed

4.10.1.4 Bird Key Stono

Bird Key Stono is a protected bird habitat located where the Folly River enters the Stono Inlet. Water conditions are not monitored in this exact location, but it can be assumed that water conditions would be similar to the Folly River and entrance channel discussed above. Although not tested, turbidity can be presumed to be naturally higher around the island due to erosion and wave action.

4.11 SEDIMENT

USACE (2021*a*) compiled Vibracore data from 2012 to 2015 from a Folly River borrow area, spanning 151 ac and comprising a large percentage of the Folly River channel (Figure 18), which found sampled sediment grain sizes ranged from 0.14-0.21 mm (0.16 mm average) and was composed of only around 2.2% fine grain material (<75 µm). USACE (2020) has also compiled data from 2020 of sediment samples collected from the entrance channel (Figure 19). Fine sand made up most of the sample composition, ranging from 85-91% with grain sizes measuring about 0.12-0.25 mm. Very fine sand (63-125 µm) made up 1-5% of samples and silt and clay (<63 µm) made up less than 1%. The State of South Carolina's Coastal Management Program does not include specific requirements for sand used for beach placement projects, however, historical performances in South Carolina and other states have shown that borrow areas containing no more than 10% fines are generally compatible for placement on the beach.

Sediment from Folly River has been used for placement on Folly Beach since original construction of the beach in 1993. Beach nourishment on Folly Beach has also occurred under the Folly Beach Shore Protection Project, most recently in 2018 utilizing 500,000 yd^3 of sediment from the Folly Beach borrow area. Sediment from the Folly River has

also been placed on Bird Key and Folly Beach County Park since inception of the FRNP in 1979.

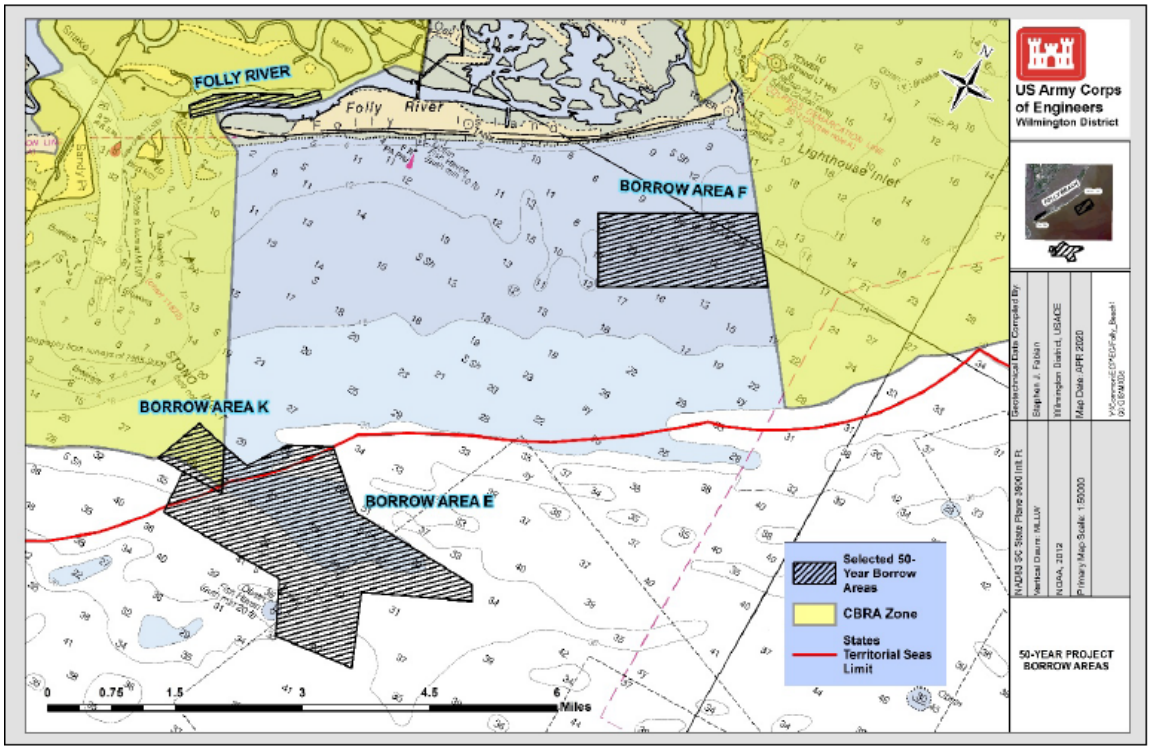

Figure 18 Borrow Area locations as outlined by USACE (2021a)

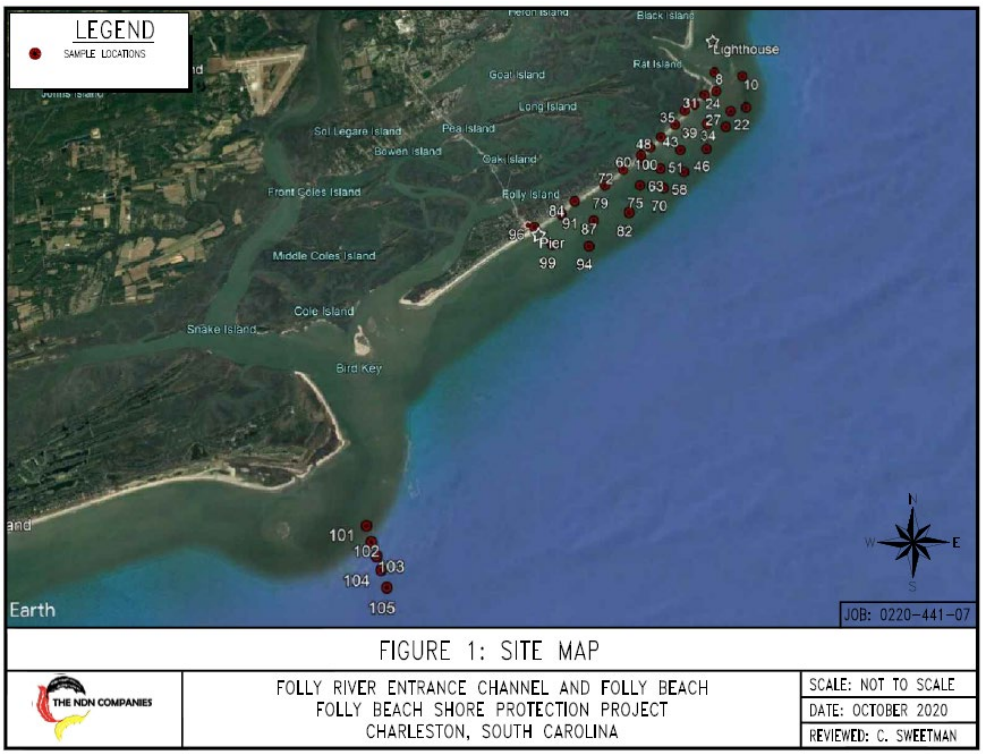

Figure 19 Entrance channel sediment sampling locations by USACE (2020) are numbered as 101-105

4.12 CLIMATE CHANGE

The climate in this region of South Carolina consists of long hot summers and cool winters. Summers are warm and humid (average July high and low temperatures are 92°F and 71°F, respectively), and winters are relatively mild (average January high and low temperatures are 58°F and 35°F, respectively). In general, the state has warmed by 0.5-1° (F) over the last century and the sea is rising about 1-1.5” every decade (EPA 2016). Precipitation occurs chiefly as rainfall and averages about 49.5”/year with approximately one-third of that total occurring during the months of June, July, and August. It is expected that in the coming decades changing climate in South Carolina will lead to an increase in the number of unpleasantly hot days, an increase in heat related illness, an increase in inland flooding, a decrease in crop yields, and harm to livestock (EPA 2016). Sea level rise is the biggest climate change concern in the project area. Due to sea level rise, there is an increased risk of coastal storm surge and potential damages to resources located in the project area.

USACE Engineer Pamphlet (EP) 1100-2-1, Engineer Regulation (ER) 1100-2-8162 and Engineer Technical Letter (ETL) 1100-2-1 provide both a methodology and a procedure for evaluating sea level change (SLC). This guidance is used for incorporating the potential direct and indirect physical effects of projected future sea level change in the engineering, planning, design and management of USACE projects. Three estimates are required by the guidance, a low (baseline or historic rate) estimate representing the minimum expected sea level change, an intermediate estimate, and a high estimate representing the maximum expected sea level change. In coordination with the USACE Climate Preparedness and Resilience Community of Practice, USACE predicted intermediate rate was selected for the Charleston Peninsula Coastal Storm Risk Management Feasibility Study and is similarly used in this analysis. This rate was selected because the 19-year mean sea level moving averaged trended most accurately with the intermediate rate curve (USACE 2002). The guidance was used to evaluate the future sea levels and the impacts to Folly Beach and Bird Key Stono.

This analysis was based on the NOAA tide gauge located in Charleston, South Carolina (Station #8665530), approximately 8 miles north of Folly Beach. This gauge was selected to represent the project site since it was the closest compliant gauge to the project location. The gauge is active and compliant with data from 1901 to present. The linear relative sea level trend for this gauge is 3.39 mm/year (0.01112 ft/year) with a 95% confidence interval of +/- 0.19 mm/year (0.00062 ft/year) based on monthly mean sea level data from 1905 to 2021 (Figure 20). The NOAA relative SLC change trend shows a total change of +0.01112 ft/yr. for a total change of +0.56 ft over 50-years.

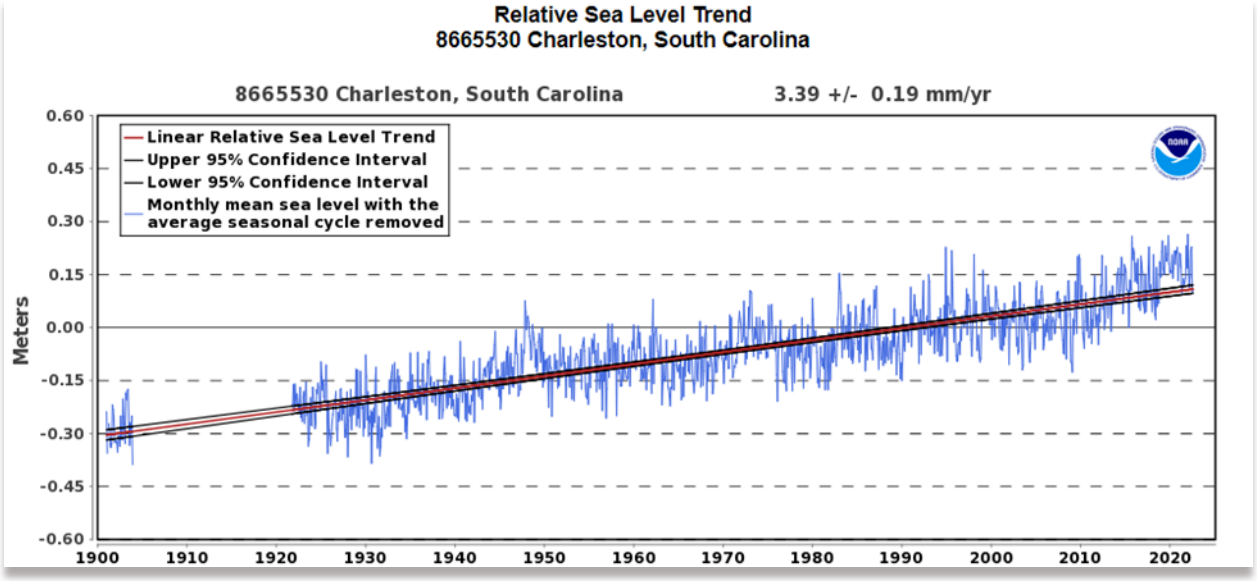

Figure 20 Relative sea level trend for Charleston, South Carolina

The USACE online tool Sea Level Tracker was used to determine the current rate of sea level change (SLC) observed and the projected future trends in the rate of SLC. A link to the tool is provided below. The Sea Level Tracker is used to compare actual mean sea level (MSL) values and trends for specific NOAA tide gauges with the USACE SLC scenarios as described in ER 1100-2-8162 and ETL 1100-2-1. The Sea Level Tracker tool calculates the USACE Low, Intermediate and High sea level change scenarios based on global and local change effects. Historical MSL can be represented by either 19-year or 5-year midpoint moving averages (https://climate.sec.usace.army.mil/slr_app/). SLC values for the USACE scenarios have an origin year of 1992 (the midpoint of latest National Tidal Datum epoch) and use the 2022 NOAA SLC rate of 3.39 mm/yr (0.01112 ft/yr). Predictions for the year 2074 at Charleston, South Carolina are 0.69, 1.29, and 3.18 feet NAVD88 under the USACE low, intermediate, and high SLC projections (Figure 21).

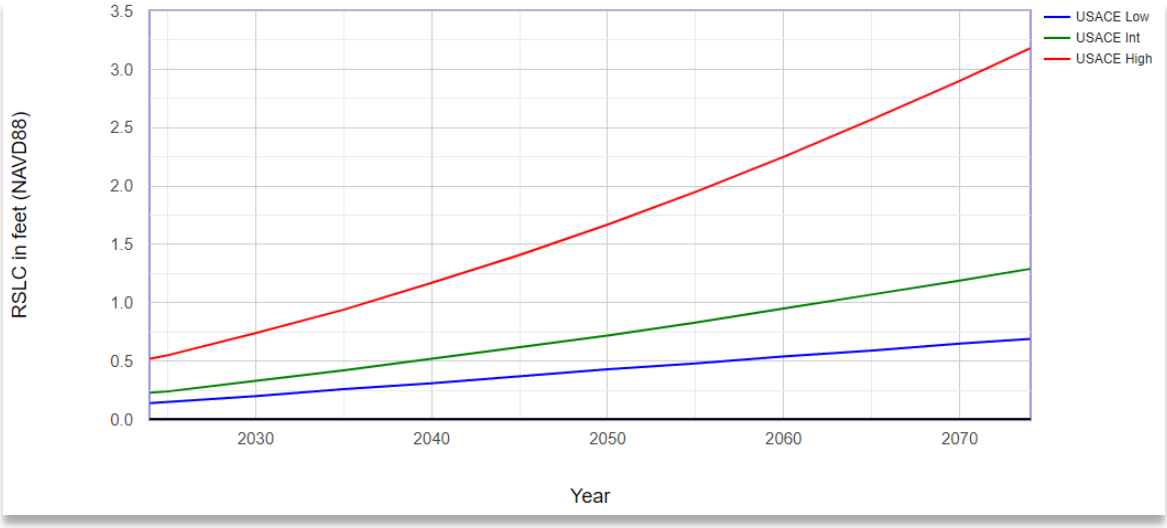

Figure 21 Estimated relative sea level change projections - Gauge: 8665530, Charleston, SC

4.13 RECREATION RESOURCES

The project area is a prime sport fishing area which is enjoyed by hundreds of individuals each year. Principal species found in the sport fisherman's catch are spot, croaker, flounder, black and red drum, seatrout, black sea bass, whiting, sheepshead, and sharks. Other activities around the project area may include water skiing, sailing, recreational boating, crabbing, and shrimping. A public oyster gathering area is located just east of the Folly River bridge and a public boat launching ramp is located on the west side of the bridge. Bird Key Stono is also used for fishing and bird watching by recreationalists outside the nesting season. The island is closed from public use from March 15 thru October 15. Dogs and camping are prohibited year around.

When construction of the FRNP was originally completed in 1979, the Charleston County Park and Recreation Commission purchased the recurved spit on the west end of Folly Island and partnered with USACE to develop a beach access/biological observation park utilizing sediment dredged from the Folly River channel. Facilities include parking for automobiles, boardwalks across the sand dune for beach access, a bathhouse, and restrooms. Special accommodations have also been made for handicap access and beach usage. The rest of Folly Beach is also used for a variety of recreational activities, including sunbathing, swimming, surfing, kite boarding, fishing, dog walking, walking, and running.

4.14 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

In accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies must assess whether disproportionately high and adverse effects would be imposed on minority or low-income areas by federal actions. In addition, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires

federal agencies to assess the environmental health and safety risk of their actions on children. Section 112(b)(1) of WRDA 2020 (P.L. 166-260) requires the formulation of water resource projects to comply with "*any existing Executive Order regarding environmental justice*." Moreover, Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, Section 219 directs federal agencies to *"[develop] programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities*".

4.14.1 Socioeconomics of Project Area

According to the U.S. Census Bureau, data from the 2020 decennial census indicated that Folly Beach has a population of 2,078, with 94.03% of those surveyed reporting to be white and 93.89% as not Hispanic or Latino. Data from the 2021 American Community Survey 5-year Estimates indicated those from Folly Beach that were sampled,1.7% were age 5 to 14 years, 0.0% were age 15 to 17, and 3.4% were under age 18, while 96.6% were 18 years and over.

The American Community Survey also included economic data for Folly Beach. For instance, median household income of Folly Beach is $76,250 - higher when compared to that of South Carolina at $59,318. Of the population for whom poverty status is determined, 16.2% were below the poverty line in the past 12 months, including 0.0% of those under 18 years old, 21.0% of those 18-64 years of age, 6.5% of those 65 years or older, and all of which identified as white alone, not Hispanic or Latino.

Using the Council on Environmental Quality's (CEQ) Climate and Economic Justice Screening Tool revealed neither of the two census tracts that encompass the project area (45019002004 and 45019002003) are identified as disadvantaged. Communities are identified as disadvantaged in the health burden category if at or above the 90th percentile for asthma, diabetes, or heart disease, or at or above the 90th percentile for low life expectancy, above the 65th percentile for low income, and 80% or more of adults 15 or older are not enrolled in higher education.

4.15 COASTAL BARRIER RESOURCES SYSTEM

The Coastal Barrier Resources Act (CBRA) of 1982 (19 U.S.C. §3501 et. Seq.), as amended by the Coastal Barrier Improvement Act (CBIA) of 1990 limits Federally-subsidized development within CBRA Units to minimize the loss of human life by discouraging development in high risk areas and to protect undeveloped coastal barriers along the Atlantic and Gulf Coasts, including islands, spits, tombolos, and bay barriers that are subject to wind, waves, and tides such as estuaries and nearshore waters. There is one CBRA Unit, Bird Key Complex Unit M07/M07P, within the study area and it encompasses all reaches to be dredged, as well as some placement locations (Figure 22).

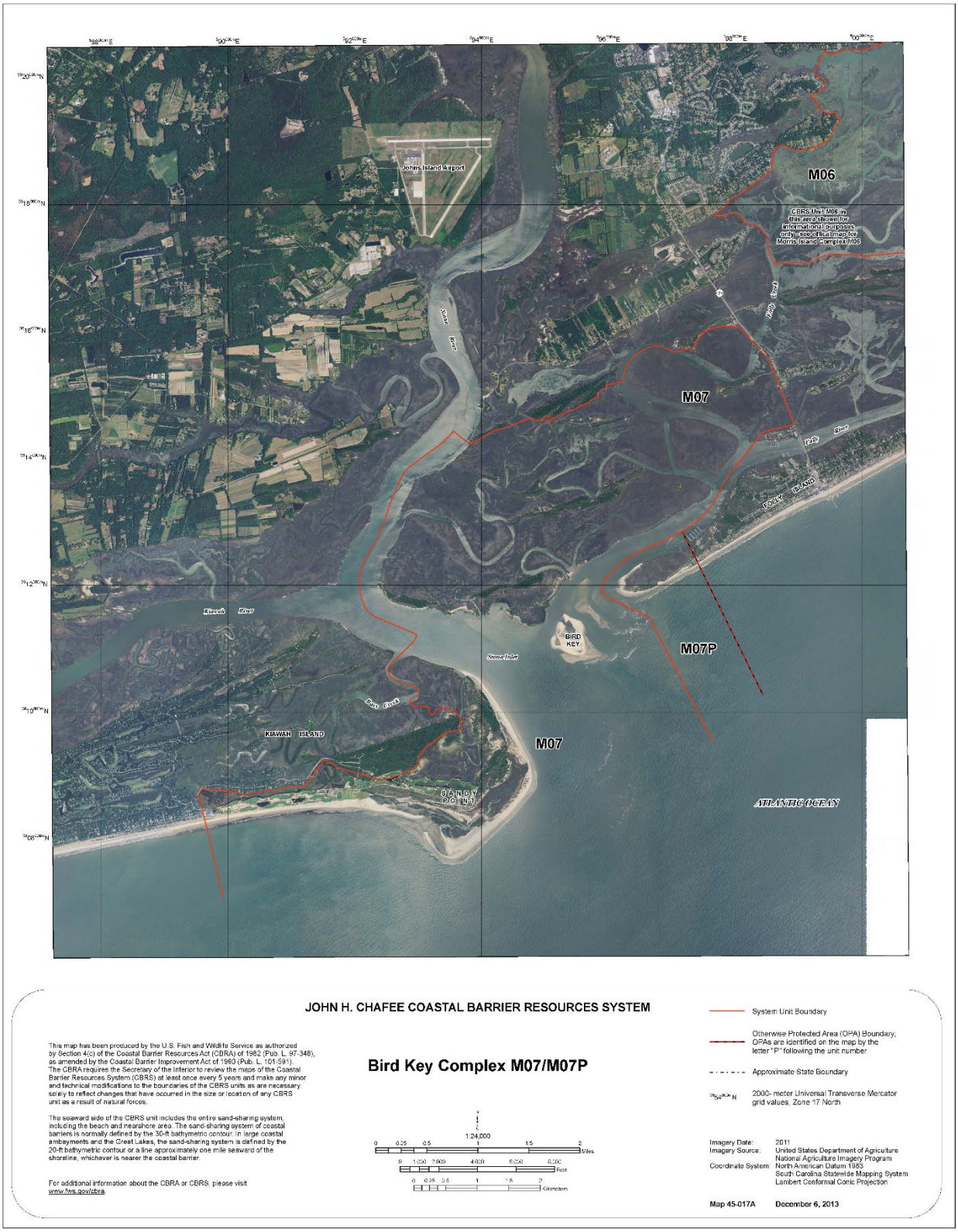

Figure 22 Boundaries of CBRA unit M07/M07P (Bird Key Complex)

4.16 COASTAL ZONE RESOURCES

The Coastal Zone Management Act (CZMA) of 1972 (16 U.S.C. §1451 to §1466) was established as a national policy to preserve, protect, develop, and where possible, restore or enhance, the resources of the Nation's coastal zone for current and future generations. The South Carolina Coastal Management Program was established per the CZMA and was authorized in 1977 under SC's Coastal Tidelands and Wetlands Act. The FRNP is within South Carolina's designated Coastal Zone Management Area.

5 ENVIRONMENTAL CONSEQUENCES

This section describes the potential effects on the existing conditions for considered resources from implementation of the alternatives.

5.1 AESTHETICS

5.1.1 Environmental Consequences of Alternative A on Aesthetics

Under Alternative A, the proposed maintenance dredging would not occur. Although, there are no direct impacts to aesthetics from this alternative, indirect impacts would occur including those associated with reduction of recreation and fishing opportunities in and around the project area, viewing of wildlife at Bird Key Stono and Folly Beach County Park (biological observation park), and to visual resources of Folly Beach County Park and the remainder of Folly Beach. Navigation channels would become increasingly limited in scale and capacity for supporting these types of activities, and the benefits received by Bird Key Stono and beaches along Folly Island from depositing of dredged sediments would no longer be available and would increase the likelihood of these valued recreational areas becoming diminished from coastal erosion associated with tidal action and storm events.

5.1.2 Environmental Consequences of Alternative B on Aesthetics

Under Alternative B, visual resources and aesthetics of the project area will be temporarily impacted while O&M occurs. O&M will occur throughout the project on an as needed basis and can include use of cutterhead pipeline dredging or sidecast dredging. While a cutterhead pipeline dredge is in operation, the aesthetics of Folly River channel will be temporarily affected. However, maritime traffic is common in the channel and the temporary presence of the dredge should have little additive effect above baseline. The same level of impact from use of dredging equipment is expected project wide. Pipelines from cutterhead dredge vessels may be floated to the placement areas on Bird Key Stono and Folly Beach (Folly Beach County Park only) where temporary dikes may be constructed, and heavy machinery will be used to actively level incoming sediment. Presence of all equipment used to accomplish Alternative B is temporary and on an as needed basis, and not expected to have effects significantly above baseline. Furthermore, compared to the Alternative A (No Action Alternative), net benefits to aesthetics are expected as the visual resources of Folly Beach County Park and Bird

Key Stono will be conserved, and recreation and fishing opportunities throughout the project area will be conserved.

5.1.3 Environmental Consequences of Alternative C on Aesthetics

Under Alternative C, impacts to aesthetics are expected to be the same as Alternative B but less than Alternative A for the same reasons outlined for Alternative B. However, compared to Alternative B, net benefits to aesthetics are expected to be greater as dredge types available to conduct O&M are less limited and allow for greater efficiency and expediency, having reduced duration of impacts to aesthetics. Additionally, the option to utilize sediments dredged from both Folly River and the entrance channel for nearshore placement and front beach placement along the entirety of the Folly Beach front beach and nearshore placement areas, and not being limited to Folly Beach County Park, provides a greatly expanded insurance of visual resources throughout Folly Island that would, under Alternatives A and B, continue to be affected by loss from erosion and storm activities.

5.2 AQUATIC RESOURCES / WETLANDS

5.2.1 Environmental Consequences of Alternative A on Aquatic Resources / Wetlands

Under Alternative A, the proposed maintenance dredging would not occur. This alternative would likely result in the net conversion of some estuarine wetland and intertidal habitat to subtidal aquatic habitat as tidal erosion and storm damage through time would reduce existing shorelines and tidal flats otherwise maintained through BU beach placement at Bird Key Stono and Folly Beach County Park (Alternatives B & C). Furthermore, the opportunity to increase availability of intertidal habitat further north on Folly Beach throughout the outlined placement area (Alternative C) would be eliminated and would indirectly contribute to further conversion of intertidal habitat to subtidal habitat. The loss of intertidal habitat would affect benthic communities and have trophic impacts including effects to shorebirds. Areas that would otherwise be dredged to maintain dimensions of navigation channels would be backfilled through time and may result in riverine, estuarine, and/or coastal habitat structure and function changes likely benefiting organisms which utilize shoaling and shallow water and reducing benefits for organisms which value deep channels (Alternatives B & C). However, under other projects, dredging areas of shoaling and available beach-quality sand from the project area may continue and minimize changes that would occur as a result of USACE no longer taking action on the FRNP.

5.2.2 Environmental Consequences of Alternative B on Aquatic Resources / Wetlands

Aquatic Resources

Direct impacts will occur to benthic species during dredging cycles as they are removed from sand bottoms or buried during placement activities. Following completion of dredging, early successional benthic organisms will soon re-colonize the dredged footprint (Naqvi and Pullen 1982, Bowen and Marsh 1988, Jutte and Van Dolah 2000, Jutte et al. 2002, Wilber and Clark 2007). Following placement of dredged sediments on

beaches, burial and suffocation of invertebrate species will occur, impacting approximately one mile of shoreline. Timeframes projected for benthic recruitment and re-establishment following beach placements are between 6 months to 2 years (Thrush et al. 1996, Peterson et al. 2000, Zajac and Whitlatch 2003, Bishop et al. 2006, Peterson et al. 2006, Hill-Spanik et al. 2019). On Bird Key Stono, the sand is typically placed above the high tide line on a small section of the island, which will limit impacts to intertidal foraging habitat.

Some planktonic and nektonic organisms entrained by operating dredges will suffer injury or mortality. Compared to other sources of entrainment (e.g., hydroelectric dams), rates for eggs and larval fish entrained by dredging are generally thought to represent a minor proportion of the total fish production (Reine and Clarke 1998, Reine et al. 1998). Entrainment rates of mobile fish species are low but are highest for benthic species or those in high densities (Reine et al. 1998, Drabble 2012). Fish may also avoid areas that are repeatedly dredged (Appleby & Scarratt 1989). Resulting turbidity may reduce primary productivity by phytoplankton and reduce dissolved oxygen in the immediate vicinity of pluming. Increasing the concentration and exposure time to suspended sediment, generally increases severity of fish response, however, this may vary widely across species (Wenger et al. 2017).

Effects on plankton and nekton are expected to be of limited impact given the short durations of localized impact and small percentage of fine-grained material in dredged sediments. Dredging may take up to approximately four months to complete for each dredging cycle depending on necessary quantities of dredged sediment. Disturbances would be minor within a very localized area around the dredging area, of which nekton can avoid given their mobility. Therefore, dredging is not anticipated to adversely impact fish in the area.

Wetlands
Direct and indirect impacts to wetlands would be limited to those described above for intertidal habitat. No other types of wetland impact are expected.

5.2.3 Environmental Consequences of Alternative C on Aquatic Resources / Wetlands

Aquatic Resources:
Under Alternative C, effects to aquatic resources / wetlands are largely expected to be the same as under Alternative B given the overlap in dredge types and placement areas. Alternative C also involves nearshore placement of dredged material. However, effects from suspended sediments and potential for burial/smothering are anticipated to be similar to that at dredging sites and beach placement sites, respectively, as well as those anticipated from disposal via sidecast dredge. Given the small quantities of sand material placed from each hopper dredge load (250-300 yd^3), it is unlikely that intertidal benthic communities that are resilient in high energy environments will be significantly impacted by sand placements within the shallow water area (Van Dolah et al. 1984, Dauvin et al. 2022). Smothering and mortality may occur in lesser mobile species (e.g., amphipods and polychaetes) within the area of placement.

5.3 AFFECTED ENVIRONMENT – ESSENTIAL FISH HABITAT

5.3.1 Environmental Consequences of Alternative A on Essential Fish Habitat

Under Alternative A, the proposed maintenance dredging would not occur. This alternative would likely have adverse effects on EFH in the area, as sediment would backfill within the channels and erosion of Bird Key Stono and along Folly Island would only be mitigated through other means. More erosion would reduce the amount of shallow water environments and littoral gradients that support EFH habitats.

5.3.2 Environmental Consequences of Alternative B on Essential Fish Habitat

Dredging under Alternative B will involve impacts to marine and estuarine water column and unconsolidated bottoms; however, these impacts are expected to be short term and minor based on the dredging operations to be employed. Dredging will avoid impacts to nearby estuarine emergent wetlands and oyster reefs/shell bank habitats in the project vicinity. Placement activities may result in negative effects on intertidal macrofauna, increased turbidity in the surf zone, or changes in the sand grain size or beach profile; however, these effects would be localized in the vicinity of placement operations and the use of best management practices should limit the extent and duration of impacts. USACE is currently in consultation with NMFS to complete a programmatic consultation that will apply to maintenance dredging for the FRNP. USACE intends to comply with the conservation recommendations and best management practices included in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina* (Appendix A). Therefore, impacts to EFH and HAPC are expected to be temporary and will not result in significant direct and indirect effects on managed species.

5.3.3 Environmental Consequences of Alternative C on Essential Fish Habitat

Under Alternative C, USACE intends to comply with the conservation recommendations and best management practices included in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina* (Appendix A) and therefore, actions will generally have the same insignificant direct and indirect effects as Alternative B.

5.4 THREATENED & ENDANGERED SPECIES

A preliminary analysis of impacts to threatened and endangered species in the project area under the jurisdiction of USFWS is provided in Table 7. These preliminary impacts have been analyzed based on dredging type and placement area rather than based on alternatives (in recognition that Alternatives B and C have overlap). Species that are not present in the project area (see Table 4) have received a “No Effect” determination and are not included in Table 7. Species and their critical habitats under the jurisdiction of NMFS (see Table 5) are also not included in Table 7. Impacts to species and their critical habitats under NMFS jurisdiction have been previously analyzed in the South Atlantic Regional Biological Opinion (NMFS 2020). USACE will adhere to all applicable

project design criteria (PDC); therefore, no further consultation with NMFS under ESA is required.

O&M dredging of the FRNP entrance channel with modified hopper dredge equipment and subsequent nearshore placement along Folly Beach is scheduled to occur within the next 6 months. To support this, USACE has initiated informal consultation with USFWS particularly for this proposed action (see Appendix B). Dredging of the Folly River channel is not scheduled to occur for approximately 2 years; therefore, USACE is deferring formal consultation with USFWS regarding O&M dredging of the Folly River channel until approximately 6 months before dredging occurs (will be added to Appendix B following consultation).

Table 7 Summary of preliminary effects determinations for USFWS-listed ESA species from implementation of alternatives

Dredging Activity & Placement Area	Species	Status	Preliminary Effects Determination	Preliminary Critical Habitat Effects Determination
Sidecast dredging with sidecast placement (Alternative B) & modified hopper dredging and cutterhead dredging with nearshore placement (Alternatives B & C)	West Indian Manatee	T	MANLAA	N/A
	Piping Plover	T	MANLAA	NE
	Rufa Red Knot	T	MANLAA	MANLAM
	Wood Stork	T	NE	N/A
	Leatherback Sea Turtle	E	MANLAA	N/A
	Loggerhead Sea Turtle	T	MANLAA	MANLAM
	Kemp's Ridley Sea Turtle	E	NE	N/A
	Green Sea Turtle	T	NE	N/A
Cutterhead dredging with beach placement on Folly Beach (Alternatives B & C)	West Indian Manatee	T	MANLAA	N/A
	Piping Plover	T	MANLAA	NE
	Rufa Red Knot	T	MALAA	MANLAM
	Wood Stork	T	MANLAA	N/A
	Leatherback Sea Turtle	E	MANLAA	N/A
	Loggerhead Sea Turtle	T	MALAA	MANLAM
	Kemp's Ridley Sea Turtle	E	MANLAA	N/A
	Green Sea Turtle	T	MANLAA	N/A
Cutterhead dredging with Bird Key Stono placement (Alternatives B & C)	West Indian Manatee	T	MANLAA	N/A
	Piping Plover	T	MALAA	MANLAM
	Rufa Red Knot	T	MALAA	MANLAM
	Wood Stork	T	MANLAA	N/A
	Leatherback Sea Turtle	E	NE	N/A
	Loggerhead Sea Turtle	T	NE	N/A
	Kemp's Ridley Sea Turtle	E	NE	N/A
	Green Sea Turtle	T	NE	N/A

5.4.1 Environmental Consequences of Alternative A on Threatened & Endangered Species

Under Alternative A, the proposed maintenance dredging would not occur. The effects of continued erosion of Folly Beach, Folly Beach County Park and Bird Key Stono and vulnerability to storm damages would be increased and only mitigated through other means/projects. Therefore, Alternative A would likely have indirect adverse effects for listed species and their critical habitats including loggerhead sea turtle, piping plover and rufa red knot. This may also be true for leatherback sea turtles which have had several documented instances of nesting on Folly Beach (USFWS 2018). Alternative A

would not have any likely benefits or adverse effects to any of the other listed species as the outlined changes in intertidal habitat would be likely to have no measurable impacts to these species.

5.4.2 Environmental Consequences of Alternatives B & C on Threatened & Endangered Species

Under Alternative B, USACE will continue actions under project design as outlined by USACE (1997), for which effects to ESA species have been previously analyzed.

Under Alternative C, USACE will expand actions beyond the scope of those previously analyzed by USACE (1997). Specifically, USACE will increase the available dredge types to accomplish O&M of the FRNP and the available placement areas for dredged sediments in keeping with goals of regional sediment management. As shown in Table 7, USACE has made new (i.e., new from those by USACE [1997, 2006] in previous NEPA for the FRNP) preliminary effects determinations to listed species under the jurisdiction of USFWS for Alternatives B & C based on the criteria below. As noted above, species and their critical habitats under the jurisdiction of NMFS (see Table 5) are also not included in Table 7. Impacts to species under NMFS jurisdiction have been previously analyzed in the SARBO (NMFS 2020). USACE will adhere to all applicable project design criteria (PDC); therefore, no further consultation with NMFS under ESA is required.

5.4.2.1 West Indian Manatee

Under Alternatives B & C, manatees may be present in waters around the dredging vessels during warmer months of the year, although they are rarely seen in the project area. Guidelines for Avoiding Impacts to the West Indian Manatee published by the USFWS provides precautionary measures which will be implemented for all project-related vessels (USFWS 2017), thus ensuring protection of any manatees which may come within the vicinity of project operations. Habitat and food supply of the manatee will not be significantly impacted, as dredging is only occurring in areas of shoaling, as needed, and for short durations, and placement areas under any of the alternatives do not contain any manatee habitat. Therefore, based on the limited potential for direct impact to the species, USACE has made a preliminary *may affect, but not likely to adversely affect* determination for this species under Alternatives B & C.

5.4.2.2 Nesting Sea Turtles

As noted above in Section 4.4, the USFWS and NMFS PRD share jurisdiction of sea turtles, with NMFS having jurisdiction when in the marine environment and USFWS having jurisdiction when in the terrestrial environment. Under Alternatives B & C, effects to nesting turtles and/or their habitat under the jurisdiction of USFWS may occur as a result of any of the dredged sediment placement methods with the exception of sidecasting the entrance channel. Beach placement is available as a placement method under Alternative B at Bird Key Stono and Folly Beach County Park, and additionally

Folly Beach under Alterative C. Nearshore placement of dredged sediment from the entrance channel is only available under Alternative C.

Operation of the proposed dredge equipment have not historically resulted in entrainment (NMFS 2020). As previously mentioned, the equipment used by both the side-cast dredge and the modified hopper dredge has smaller draghead sizes and openings, as well as lower suction horsepower than conventional hopper dredges. In 1998, North Carolina Wildlife Resources Commission and USACE conducted a test to determine whether or not these vessels could take sea turtles. The findings concluded that these dredges do not pose a significant threat to sea turtles (USACE 1998). As of 2018, there are no records of take associated with the use of these vessels (SARBO 2020). As noted above, modified hopper dredging does not necessitate the need for a protected species observer to monitor dredged material for the potential presence of take and, therefore, the risk of entrainment from modified hopper dredging is expected to be discountable and no future minimization measures are needed to limit entrainment. Accordingly, as noted above and consistent with the SARBO (2020), impacts to sea turtles as a result of the dredging operation are expected to be minimal (regardless of the time of year when the work is conducted).

Nearshore Placement

Nearshore placement would only occur under Alternative C, thus no effects from nearshore placement would occur under Alternative B. Potential effects to nesting turtles from the placement of dredged sediments nearshore are well summarized by the T&C issued in the SARBO by NMFS (2020):

"…all work, including equipment, staging areas, and placement of materials, will be done in a manner that does not block access of ESA-listed species from moving around or past construction. Sand placed on the beach or in the nearshore littoral areas will be placed in a manner that does not create mounds or berms that could prevent nesting sea turtles or hatchlings from entering or exiting the beach from nearshore waters. All placement, will not create an obstruction of species movement in the area (e.g., does not create a mound that would deter or prevent species from moving through the area)."

Once placed, beach-quality sand that is incorporated into the beach area may become available for nesting opportunities or otherwise potentially enhance existing habitat and provide a buffer against storms and damaging wave action for species like loggerhead sea turtle and potentially leatherback sea turtle. However, species which have not historically made nesting efforts along Folly Beach and Bird Key Stono will realize no benefits. Therefore, USACE has made preliminary *may affect, not likely to adversely affect* determinations for loggerhead sea turtle (USFWS jurisdiction) and leatherback sea turtle (USFWS jurisdiction), and preliminary *no effect* determinations for green sea turtles (USFWS jurisdiction) and Kemp's ridley sea turtles (USFWS jurisdiction). Furthermore, a preliminary determination of *may affect, not likely to adversely modify* has also been made for loggerhead sea turtle critical habitat (USFWS jurisdiction) since

some habitat expansion or conservation is a potential outcome of nearshore placement, while damage to critical habitat is not likely.

Beneficial Use Beach Placement

Actions outlined under Alternatives B & C pertaining to beneficial use beach placement will occur after formal consultation with USFWS has been completed. The effects determination for those actions on nesting loggerhead sea turtle when formal consultation is initiated with USFWS will likely be *may affect, likely to adversely affect*, while that for green sea turtle, leatherback sea turtle, and Kemp's ridley sea turtle is likely to be *may affect, not likely to adversely affect* due to the likelihood of the species utilizing the habitat even if not for nesting. Beneficial use beach placement can affect [nesting] sea turtles when (1) the pipeline route running parallel to the shoreline may impede nesting sea turtles from accessing suitable nesting sites; (2) operation of heavy equipment on the beach may impact nesting females and incubating nests; (3) associated lighting impacts from nighttime operations and the increased beach profile elevation may deter nesting females from coming ashore and may disorient emerging hatchlings; (4) burial of existing nests may occur if missed by monitoring efforts; (5) escarpment formations could result in impediments to nesting females as well as potential losses to the beach equilibration process; (6) relocation efforts could reduce nest success rates; and (7) sediment density (compaction), shear resistance (hardness), sediment moisture content, beach slope, sediment color, sediment grain size, sediment grain shape, and sediment grain mineral content may be altered, potentially affecting the nesting and incubating environment (USFWS 2018).

USFWS issued a Biological Opinion in 2018 for actions outlined under the Folly Beach Shore Protection Project, wherein USACE placed sediments from a borrow area in the Folly River on Folly Beach as a nourishment project (USFWS 2018). The conclusions drawn by USFWS in this BO were that the action was not likely to jeopardize continued existence of the loggerhead sea turtle or its critical habitat due to: (1) nesting within the Northern Recovery Unit (NRU) (loggerheads originating from nesting beaches from the FL-GA border through southern VA) appears to be increasing despite current threats; (2) nesting within the action area is following the same trend as the NRU despite current threats and environmental conditions; and (3) effects due to construction activities are expected to be short term and become beneficial once construction is completed. USFWS (2018) further explained that "take" of sea turtles will be minimized by implementation of the RPM, and T&C outlined in Section 9 of the BO. These measures have been shown to help minimize adverse impacts to sea turtles. USACE anticipates similar RPM and T&C to be conditional for actions being deferred for consultation.

5.4.2.3 Piping Plover & Rufa Red Knot

The piping plover and rufa red knot may occur in foraging or roosting habitat along shorelines of Bird Key Stono and predominately the western end of Folly Island while overwintering or migrating. Bird Key Stono is also designated critical habitat for piping plover, while both Folly Island and Bird Key Stono are proposed as critical habitat for

rufa red knot. Under Alternatives B & C, actions associated with nearshore placement and/or beach placement may affect these species directly or indirectly.

Nearshore Placement

Nearshore placement would only occur under Alternative C and along Folly Beach Neither species nor their critical habitat would be directly affected by nearshore placement along Folly Beach. However, they may benefit indirectly from the long-term reduction in erosion of the western end of Folly Beach, as foraging and roosting habitat would be made available in greater quantity or duration than would be without this form of regional sediment management.

Beneficial Use Beach Placement

Actions outlined under Alternatives B & C pertaining to beneficial use beach placement will occur after formal consultation with USFWS has been completed. The effects determination for those actions on piping plover and rufa red knot when formal consultation is initiated will likely be *may affect, likely to adversely affect*. This is likely because beach placement can affect piping plover and rufa red knot by (1) heavy machinery and equipment (e.g., trucks and bulldozers operating on project area beaches, sand excavation, and berm construction) may adversely affect migrating and wintering piping plovers and rufa red knot in the project area by disturbance and disruption of normal activities such as roosting and foraging, and possibly forcing birds to expend valuable energy reserves to seek available habitat elsewhere.; (2) burial and suffocation of invertebrate species will occur during each placement cycle (USFWS 2018).

USFWS (2018) issued a BO for USACE actions including beach nourishment on Folly Beach and Bird Key Stono using sediments from the Folly River on the Folly Beach Shoreline Protection Project. Given the near exact overlap in actions outlined under Alternatives B & C, USACE has adapted the conclusions drawn from this BO to speculate impacts as a result of implementation of the alternatives herein. In the BO, USWFS concluded that when beach nourishment were to occur any time of year on Bird Key Stono and parts of Folly Beach, impacts to both piping plover and rufa red knot may include (1) decreased fitness and survivorship due to a temporary loss and degradation of a section of foraging habitat; and (2) decreased fitness and survivorship attempting to migrate to breeding grounds due to a temporary loss and degradation of a section of foraging habitat. USFWS concluded that the actions are not likely to jeopardize the continued existence of the piping plover and rufa red knot or the critical habitat of piping plover because effects due to construction activities are expected to be short term and become beneficial once construction is completed. They further explained that “take” of piping plover and rufa red knot will be minimized by implementation of the RPM, and T&C outlined in Section 9 of the BO. These measures have been shown to help minimize adverse impacts to piping plover and rufa red knot. USACE anticipates similar RPM and T&C to be conditional for actions being deferred for consultation. Additionally, USACE will coordinate placement times and locations on Bird Key Stono with USFWS

and SCDNR following formal consultation and prior to placement of any dredged sediments, ensuring that activities only occur under oversight of the agencies.

5.4.2.4 Wood Stork

Potential effects to wood stork may occur when O&M dredging occurs in the Folly River channel. During that phase of construction, the effects determination is likely to be *may affect, not likely to adversely affect*, while during the initial phase no overlap with activities and potential presence of wood stork will occur and a *no effect* determination has been made. Wood stork are possible in shallow waters along the edges of the Folly River, where there is limited foraging habitat (USFWS 2018). Dredging operations may temporarily disrupt foraging behavior while the vessel is operating, however, the effects are expected to be short in duration and magnitude of impacts (i.e., noise, averted attention, etc.) from construction are not expected to differ significantly from baseline.

5.5 TERRESTRIAL BIOLOGICAL RESOURCES

5.5.1 Environmental Consequences of Alternative A on Terrestrial Biological Resources

Under Alternative A, the proposed maintenance dredging would not occur. Although, there are no direct impacts to terrestrial biological resources from this alternative, indirect impacts would occur including those associated with reduction of shoreline habitats in and around the project area, including those of Bird Key Stono, Folly Beach County Park, and the remainder of Folly Beach. Navigation channels would become increasingly limiting in scale and capacity for supporting these types of activities, and the benefits received by Bird Key Stono and beaches along Folly Island from depositing of dredged sediments would no longer be available and would increase the likelihood of these valued recreational areas becoming diminished from coastal erosion associated with tidal action and storm events.

5.5.2 Environmental Consequences of Alternative B on Terrestrial Biological Resources

Under Alternative B, there will be insignificant effects to the existing terrestrial biological resources in the area. USACE will continue to conduct O&M on the FRNP. Birds that use the areas as feeding grounds may be temporarily impacted by the presence of dredge equipment during dredging activities but would quickly return when dredge equipment leaves (USACE 2021*b*).

Sediment placement directly on Folly Beach and Bird Key Stono requires heavy earth moving equipment (i.e., bulldozers) to place and shape the sediments. The presence of this equipment can serve as a temporary nuisance to shore birds. Although the project area is heavily developed and sustains heavy recreational use, migratory shorebirds could still use the project area for foraging and roosting habitat. Beach placement activities could have a temporary direct effect on the roosting and intertidal macro-fauna foraging habitat, however, the effect would be insignificant due to the fact that material

is compatible with existing beach sediment and the habitat recovery often occurs within one to two years.

Nesting season for most migratory birds in the area is March 15 through October 15. Measures that are taken by USACE to reduce the direct effects on nesting birds include conducting sediment placement during non-nesting season or in coordination with the SCDNR and USFWS. There may be direct benefits of beach placement for both Bird Key Stono and Folly Beach on nesting shorebirds from expansion of and protection of habitat from overwash and erosion.

Overall, under Alternative B, there would be insignificant direct and indirect effects to terrestrial biological resources.

5.5.3 Environmental Consequences of Alternative C on Terrestrial Biological Resources

Since both Alternatives B and C involve the presence of dredging equipment, dredging Alternative C will generally have the same insignificant direct and indirect effects as Alternative B on terrestrial biological resources. Nearshore placement would have no additional effect on terrestrial biological resources beyond the presence of the dredge equipment. USACE would follow the same measures to reduce direct effects on the nesting birds as discussed for Alternative B above.

5.6 CULTURAL RESOURCES

Federal agencies are required by Section 106 of the NHPA and by NEPA to consider the possible effects of their undertakings on historic properties. For cultural resources, the threshold for significant impacts includes any disturbance that cannot be mitigated and affects the integrity of a historic property (i.e., a cultural resource that is eligible for the NRHP). The threshold also applies to any cultural resource that has not yet been evaluated for its eligibility to the NRHP or disturbs a resource that has importance to a traditional group under the American Indian Religious Freedom Act, EO 13007, and NAGPRA.

Analysis of potential impacts to cultural resources considers both direct and indirect impacts. Direct impacts may be the result of physically altering, damaging, or destroying all or part of a resource, altering characteristics of the surrounding environment by introducing visual or audible elements that are out of character for the period the resource represents, or neglecting the resource to the extent that it deteriorates or is destroyed. Indirect impacts are those that may occur as a result of the completed project, such as increased vessel traffic in the vicinity of the resource and the associated hydrologic changes associated with this increase.

5.6.1 Environmental Consequences of Alternative A on Cultural Resources

Under Alternative A, the proposed maintenance dredging would not occur. The proposed dredging and subsequent sediment placement would not occur; therefore, no direct or indirect project related impacts on cultural resources would occur.

5.6.2 Environmental Consequences of Alternative B & C on Cultural Resources

The APE for Alternatives B and C has been defined as the entrance channel, Folly River channel and shorelines surrounding channels, Bird Key Stono and Folly Beach. Actions anticipated within the APE would consist of dredging in the channel(s) and placement of dredged material for beneficial use along shorelines. Impacts to cultural resources could result from activities which include (1) soil disturbance, (2) soil compaction, (3) rut formation, (4) damage to submerged and/or above-ground structures and features, (5) visual impacts and (6) vandalism and looting.

To comply with NHPA's Section 106 and the Abandoned Shipwreck Act of 1987, USACE conducted submerged cultural resources remote sensing surveys of the area subject to sediment placement, as well as a portion of the advanced maintenance area. The results were coordinated with the SHPO, SCIAA, and consulting tribes to ensure that all identified shipwrecks and archaeological sites potentially eligible for listing on the National Register of Historic Places will not be affected by the proposed project. One target of concern was identified as a potential historic shipwreck. SHPO concurred with the determination of no adverse effect with the caveat of a 150-foot buffer for that resource (see Appendix C). Sediment migration from nearby placement will serve to protect, rather than threaten, this resource.

Future surveys are planned for the remaining portion of the Stono Bar Channel Realignment Area, which has been identified for advanced maintenance. Results of that survey will be coordinated under Section 106 prior to any work being performed in that APE.

5.7 FLOODPLAINS

5.7.1 Environmental Consequences of Alternative A on Floodplains

Under Alternative A, the proposed maintenance dredging would not occur; therefore, no direct or indirect project related impacts on floodplains would result.

5.7.2 Environmental Consequences of Alternative B on Floodplains

Under Alternative B, actions will continue as previously analyzed by USACE (1997). Beach placement would have some direct benefit to floodplains by increasing resiliency of beaches and alleviating beach erosion. Sidecast dredging will have no direct or indirect impact on floodplains as the sediments will remain in the littoral zone. The existing hydrology of the floodplain will not be significantly changed.

5.7.3 Environmental Consequences of Alternative C on Floodplains

Under Alternative C, effects to floodplains will be nearly identical to those of Alterative B, however, placement of entrance channel sediments nearshore along Folly Beach would likely provide additional reduction in effects from shoreline erosion and sea level rise. Alternative C would likely have direct beneficial effects on floodplains in the area, however, existing hydrology of the floodplain is not likely to significantly change.

5.8 NAVIGATION

5.8.1 Environmental Consequences of Alternative A on Navigation

Under Alternative A, the proposed maintenance dredging would not occur. The Folly River and entrance channels would continue to shoal in, and maritime traffic would be further limited. Migrating shoals would continue to create shallow depths in the inlet and the lower portion of Folly River, which forces operators of commercial shrimp trawlers and large pleasure boats to time their entry and exit with the tides to avoid vessel damage and grounding.

5.8.2 Environmental Consequences of Alternative B on Navigation

Under Alternative B, navigation conditions would be maintained and result in no net impact.

5.8.3 Environmental Consequences of Alternative C on Navigation

Under Alternative C, navigation would generally be impacted to the same degree as Alternative B. However, maintenance of channels could occur with additional dredge types and one additional placement site providing flexibility in logistics and feasibility during each dredge cycle. Increased flexibility is likely to improve the frequency and efficiency of dredging cycles and to optimize navigation conditions.

5.9 NOISE

5.9.1 Environmental Consequences of Alternative A on Noise

Under Alternative A, the proposed maintenance dredging would not occur. Noise would be expected to be lower than would be under Alternatives B & C, although impacts to noise under any of the alternatives is not expected to be significantly different from baseline.

5.9.2 Environmental Consequences of Alternative B & C on Noise

Under Alternative B, actions on the FRNP will continue as previously analyzed by USACE (1997). Noise levels could potentially be elevated from dredging activities up to 24 hours a day, however this is not expected to be significantly above baseline. Dredging activities may have a short-term direct effect on feeding, mating, spawning, and other behaviors of aquatic species; however, mobile aquatic species are expected to avoid the disturbance, and the effects would only occur within a very localized area around operational equipment (USACE 2021*b*). Under Alternative C, additional dredge

types and placement areas available for O&M are not expected to be different in impact to noise.

5.10 WATER QUALITY

5.10.1 Environmental Consequences of Alternative A on Water Quality

Under Alternative A, the proposed maintenance dredging would not occur. No measurable or significant effect to water quality is expected to result from this alternative.

5.10.2 Environmental Consequences of Alternative B on Water Quality

Under Alternative B, both dredging and placement activities would similarly result in temporary, localized turbidity and lowered dissolved oxygen. Sediments occurring in shoaled areas to be dredged have high sand content with less than 10% of fines. Sandy material has a rapid settling rate, and therefore, increases in turbidity are expected to be insignificant and of a short-term duration. Maintenance dredging can also temporarily impact dissolved oxygen levels at the site of the active dredging. Generally, dredging is believed to reduce dissolved oxygen levels as it disperses sediment in the water column, thereby increasing sediment oxygen demand. Impacts to dissolved oxygen are expected to be similar as described for turbidity. Therefore, any impacts to dissolved oxygen are similar to turbidity; localized, temporary, and minor. Overall, any impacts to water quality would not be significant and would normalize quickly at the conclusion of O&M.

A 401 Water Quality Certification (WQC) was issued for the FRNP on January 24, 1984, which was determined to be still in effect for the 1997 EA by SCDHEC. The WQC covered placement of sediments on shorelines of Folly Beach County Park and Bird Key Stono. Since dredging and disposal methods for Alternative B have not changed and no new disposal locations are proposed for this alternative, USACE considers the previous water quality certification to still be valid.

5.10.3 Environmental Consequences of Alternative C on Water Quality

Under Alternative C, impacts to water quality are not expected to have significantly different net impacts on water quality. However, because dredge type and placement locations are expanded from that considered in SCDHEC's last review in 1997, USACE will be requesting an amendment to the existing WQC (for Alternative B) to include the addition of nearshore placement on Folly Beach. Once issued, all WQC conditions, as well as standard best management practices will be implemented to minimize migration of sediments on and off the placement areas during and after construction. Therefore, no permanent degradation of water quality will occur in the nearshore environment.

5.11 SEDIMENT

5.11.1 Environmental Consequences of Alternative A on Sediments

Under Alternative A, the proposed maintenance dredging would not occur. No direct or indirect project related impacts, or the lack thereof are expected.

5.11.2 Environmental Consequences of Alternative B on Sediments

Historically, dredge materials from the FRNP have been used for beach placement on Folly Beach County Park, Bird Key Stono, sidecast into the entrance channel. Sediments in the Folly River and overlapping areas of the Folly River channel have also been dredged and used for beach nourishment for Bird Key Stono and Folly Beach under similar USACE projects including the Folly Beach Shore Protection Project. Under Alternative B, actions would continue as previously analyzed and result in no net changes to sediment. The sediment characteristics of Folly Beach County Park, Bird Key Stono and the entrance channel placement sites are similar to those of the source areas to be dredged.

5.11.3 Environmental Consequences of Alternative C on Sediments

Under Alternative C, effects to sediment characteristics will not differ from that of Alternative B. The effects of nearshore placement and beach placement along most of Folly Beach are not expected to significantly differ from those considered under Alternative B. The sediments to be dredged within Folly River and the entrance channel are similar to those on Folly Beach. The combination of nearshore placement and beach placement along most of Folly Beach should reduce impacts of erosion and increase beach resiliency. Therefore, no negative direct or indirect effects on sediment are expected, however increased beneficial effects to Folly Beach may result from additional nearshore placement and beach placement.

At the Nearshore Placement Workshop in 2019, participants from the U.S. Army Engineer Research and Development Center (ERDC) noted that although it is difficult to determine sediment pathways of nearshore placements in the field and laboratory, and that physical mechanisms may only be inferred from before/after sediment distribution; where onshore migration occurs, benefits may include slowing shoreline erosion, protecting coastal structures, and decreasing long-term maintenance and repair costs (Krafft et al. 2020). Onshore or offshore migration can be modeled and predicted using a combination of methods, with some modeling approaches being more appropriate depending on wave characteristics within nearshore placement areas. McFall et al. (2021) demonstrated the application of various modeling approaches that included variables of effective wave height, wave period, grain size, sediment density, and water density to successfully predict sediment migration from twenty nearshore placement case studies. Thus, a host of source and placement site variables need to be measured to assert what will be the predominant direction of flow of sediment once placed. Nevertheless, some general findings indicate that larger-grain sediments and sediments placed closer to shore are more likely to be “active” and smaller-grain sediments and sediments placed farther from shore are likely to remain static (McFall et al. 2021). Furthermore, Krafft et al. (2020) acknowledge that “*From a holistic perspective, participants noted that sediment is a valuable resource that is lost from the littoral system when placed in an Ocean Dredged Material Disposal Site (ODMDS) or Confined*

Disposal Facility (CDF). Furthermore, nearshore placements are generally a side effect of required navigation dredging, and keeping sediment in the littoral system benefits the regional sediment budget."

Under Alternative C, whereby dredged sediment from Folly River channel and/or entrance channel is placed nearshore within the outlined placement area, a majority of sediment is likely to be active. USACE (2021*c*) modeled sediment transport at Folly Beach and noted that the dominant flow and sediment transport directions are from the northeast to the southwest while net sediment gain occurs in the central and southwest sections of Folly Island.

5.12 CLIMATE CHANGE

5.12.1 Environmental Consequences of Alternative A on Climate Change

Under Alternative A, the proposed maintenance dredging would not occur. Projected erosion would continue along Folly Island and Bird Key Stono and would be mitigated only through other actions. Long-term sea level rise and changes in the frequency/magnitude of storm damage as a result of climate change will likely have greater consequences for communities in the existing project area under this alternative.

5.12.2 Environmental Consequences of Alternative B on Climate Change

USACE intermediate high projection predicts a relative SLC of +1.06 ft by 2074. Continued O&M in the FRNP would ensure some regional sediment continues to be used to combat erosion on Bird Key Stono and Folly Beach County Park. It is expected that maintaining beach elevations will be beneficial to the area into the future and would have a positive effect on the environment and community of Folly Island.

5.12.3 Environmental Consequences of Alternative C on Climate Change

Under Alternative C, effects to climate change are expected to be similar to Alternative B. However, Alternative C would further allow for nearshore placement along Folly Beach and expand opportunity to reduce erosion and reduce frequency of required beach renourishment, maintaining beach elevations and reducing flooding impacts. This would have a positive effect for the local environment and community of Folly Island.

5.13 AFFECTED ENVIRONMENT - RECREATION RESOURCES

5.13.1 Environmental Consequences of Alternative A on Recreation Resources

Under Alternative A, the proposed maintenance dredging would not occur. The recreational opportunities provided by access between Stono inlet and the rest of the FRNP would become limited as shoaling continues to create navigation problems. The opportunity to continue or begin utilizing sediments from the FRNP for BU along Bird Key Stono, Folly Beach County Park or Folly Beach would be limited to those from other projects. Therefore, projected erosion of Folly Beach and Folly Beach County Park

would no longer be mitigated by this project, indirectly affecting the recreation opportunities of these locations.

5.13.2 Environmental Consequences of Alternative B on Recreation Resources

Under Alternative B, intermittent cycles of dredging would continue in the FRNP, whereby dredged sediment would continue to be placed directly on Folly Beach County Park and Bird Key Stono, which would directly affect recreational use of small-scale portions of the navigation channels and beaches for the temporary duration of construction. However, this alternative would provide long term indirect positive effects by reducing the impacts of shoaling to navigation and projected erosion of the beaches.

5.13.3 Environmental Consequences of Alternative C on Recreation Resources

Under Alternative C, impacts to recreational opportunities would be the same as Alternative B, but the area of impacts to recreation resources would be expanded to the full extent of Folly Beach.

5.14 SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE

5.14.1 Environmental Consequences of Alternative A on Socioeconomics and Environmental Justice

Under Alternative A, the proposed maintenance dredging would not occur. Where no other actions are taken to mitigate it, the areas of consistent shoaling in the inlet and lower portions of the Folly River would continue to shoal in and maritime traffic would become increasingly restrictive. Timing of entry and exit to the Folly River by commercial shrimp trawlers and large pleasure boats may become more necessary to avoid vessel damage and grounding. These impacts would incur indirect costs to the local shrimping and fishing industry through reduced productivity, potential for damage to vessels, and even loss of life in serious instances. The local economy may suffer losses in demand for local real estate and marketed goods, in turn affecting local tax revenue as well. Additionally, U.S. Coast Guard may respond to more rescues and strandings in the area, creating additional costs.

5.14.2 Environmental Consequences of Alternative B on Socioeconomics and Environmental Justice

Under Alternative B, the FRNP would continue to have a favorable economic impact on the area. Recreational and commercial opportunities would continue to be available in the area and continue to provide opportunity to expand the industrial and commercial base that currently exists. This will directly and indirectly have a beneficial effect on the local, state, and national economy. Indirect benefits may continue to accrue in the area through maintained or increased business activity, employment, property values, and tax revenues. Other continued benefits for the commercial fishing and tourism industry would also be expected to occur.

Actions outlined under Alternative B would not have a disproportionate effect on low-income and minority populations, would not have adverse effects to the environmental health and safety for children, or affect disadvantaged communities.

5.14.3 Environmental Consequences of Alternative C on Socioeconomics and Environmental Justice

The environmental consequences of Alternative C on socioeconomics and environmental justice would be like those under Alternative B. However, greater benefits like those described under Alternative B are expected from this alternative as regional sediment management would be more favorable for the entirety of Folly Beach.

Actions outlined under Alternative C would not have a disproportionate effect on low-income and minority populations, would not have adverse effects to the environmental health and safety for children, or affect disadvantaged communities.

5.15 COASTAL ZONE RESOURCES

5.15.1 Environmental Consequences of Alternative A on Coastal Zone Resources

Under Alternative A, the proposed maintenance dredging would not occur. Therefore, no direct or indirect project related impacts on coastal zone resources would result. The placement areas will not receive additional material, nor will beaches receive additional protection from erosion.

5.15.2 Environmental Consequences of Alternatives B & C on Coastal Zone Resources

Alternatives B & C have been evaluated by USACE and the associated actions have been determined to be consistent with the South Carolina Coastal Management program; however, consultation with the South Carolina Department of Environmental Control-Office of Ocean and Coastal Resource Management is ongoing.

5.16 COASTAL BARRIER RESOURCES SYSTEM

5.16.1 Environmental Consequences of Alternative A on Coastal Barrier Resources System

Under Alternative A, the proposed maintenance dredging would not occur. Therefore, no direct or indirect project related impacts on the coastal barrier resources system would result. The placement areas will not receive additional material, nor will beaches receive additional protection from erosion.

5.16.2 Environmental Consequences of Alternatives B & C on Coastal Barrier Resources System

O&M dredging of the FRNP entrance channel with modified hopper dredge equipment and subsequent nearshore placement along Folly Beach is scheduled to occur within

the next 6 months. To support this, USACE has completed CBRA consultation with USFWS particularly for this proposed action. Exception 16 U.S.C. 3505(a)(2) for the maintenance or construction of improvements of existing federal channels applies to this project. On February 22, 2023, USFWS concurred that the project meets this exception (Appendix E).

Dredging of the Folly River channel is not scheduled to occur for approximately 2 years; therefore, USACE is deferring CBRA consultation with USFWS regarding O&M dredging of the Folly River channel until approximately 6 months before dredging occurs.

6 CUMULATIVE EFFECTS

Cumulative impacts are defined by 40 CFR 1508.1(g)(3) NEPA regulations as follows:

> Cumulative effects, which are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time.

40 C.F.R. 1508.1(g)(3). The following paragraphs summarize the cumulative impacts expected from the proposed action.

6.1 PAST, PRESENT, AND REASONABLY FORESEEABLE FUTURE ACTIONS

O&M of the FRNP has occurred periodically since the project was completed in 1979. Other projects with project areas overlapping the FRNP are briefly described below. These other projects generally have similar objectives, being to renourish and stabilize Folly Beach and/or Bird Key Stono to mitigate impacts of erosion and storm events.

Folly Beach Shore Protection Project: In 1993, USACE placed an initial 738,500 yd^3 of dredged material in a protective berm and 1,742,700 yd^3 of dredged material for advanced nourishment plus overfill. Sand for this initial construction was removed from the lower Folly River channel.

Subsequent renourishments occurred in 2005 and 2014, and two partial emergency renourishments occurred in 2007 and 2018. Also included in the authorized project was groin rehabilitation. USACE rehabilitated nine deteriorated groins, made of wood or large rocks, which were initially constructed by the South Carolina Department of Transportation. USACE has completed rehabilitation of these groins; therefore, per the 1992 Local Cooperation 8 Folly Beach, Charleston County, SC, Final General Reevaluation Report and Environmental Assessment Agreement, the City of Folly Beach is now the owner and responsible entity for operating, maintaining, repairing, and rehabilitating these groins (USACE 2021*a*).

Coastal Storm Risk Management Project: In 2021, an Integrated Feasibility Report and Environmental Assessment was completed for storm damage repairs to Folly Beach. As part of the feasibility study, sediment borrow areas were identified for suitability for Folly Beach sediments. One of the locations identified as a suitable borrow area was the Folly River. To mitigate damages from storm events, sediments may be removed from the Folly River and used to repair and renourish Folly Beach.

Charleston Harbor: The Charleston Harbor navigation project is located approximately 7.5 miles north of Folly Beach. The Charleston Harbor project is a deep-draft navigation project that was originally authorized in 1878. It has been deepened and expanded many times since its original authorization and has recently undergone an additional deepening project. Dredging of this project occurs on an annual basis in different parts of the approximately 38.5-mile-long navigation channel. Dredged material is placed either in the ocean dredged material disposal site or in various upland, confined dredged material placement areas.

Charleston Harbor Jetties: In 1987, the USACE report, *Evaluation of the Impacts of Charleston Harbor Jetties on Folly Island, South Carolina*, addressed the issue of shoreline damage attributable to the federal navigation project. The study found that the littoral sediments transport from the north has been blocked by the Charleston Harbor jetties causing a decreased sediment supply to Folly Island and to offshore areas.

Both the Folly Beach Shore Protection Project and the Coastal Storm Risk Management projects have the same objectives, to renourish and stabilize Folly Beach to prevent erosion and reduce impacts from storm events. These projects would have similar direct and indirect impacts to the area; therefore, the cumulative effects would be the impacts from the frequency of dredging and placing of materials. With the addition of nearshore placement for Folly Beach from the FRNP entrance channel, it is anticipated that the need for renourishment and repairs after storm events will be reduced in the future reducing the cumulative effects on the environment in the Folly River Channel, entrance channel, and Folly Beach.

6.2 RESOURCE AREAS EVALUATED FOR CUMULATIVE EFFECTS

Implementation of Alternative C (Proposed Action Alternative) would have no effects or negligible effects on aquatic resources / wetlands, terrestrial biological resources, cultural resources, aesthetics, air quality, invasive species, floodplains, geological resources, noise, hazardous waste, socioeconomics & environmental justice, climate change, recreational resources, water quality, coastal barrier resources systems, and coastal zone resources. As such, these resources were not carried forward into the cumulative effects analysis. Implementation of Alternative C will have minor impacts to the resources further discussed below.

Essential Fish Habitat

Alternative C, when considered with past, present, and reasonably foreseeable future projects, would not result in significant impacts to EFH. USACE is currently in consultation with NMFS to complete a programmatic consultation that will apply to

maintenance dredging for the FRNP. USACE intends to follow the conservation measures set forth in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina* in order to avoid significant individual or cumulative adverse effects on EFH or living marine resources under the jurisdiction of NMFS. See Appendix A for additional information.

Threatened & Endangered Species
Alternative C, when considered with past, present, and reasonably foreseeable future projects, would not result in significant impacts to listed species. While actions may affect some listed species, the work will be performed in compliance with all applicable laws and will follow all minimization measures and conditions that are a result of ESA consultation. Additionally, the project may help provide and protect habitat for some listed species. Individuals may be temporarily affected by dredging and placement activities; however, the cumulative adverse impacts will not jeopardize the existence of any ESA species.

In summary, no adverse cumulative impacts are expected as a result of implementing Alternative C (Proposed Action Alternative).

7 COMPLIANCE WITH ENVIRONMENTAL LAWS, STATUTES AND EXECUTIVE ORDERS

7.1 CLEAN AIR ACT OF 1972

The CAA sets goals and standards for the quality and purity of air. It requires the EPA to set NAAQS for pollutants considered harmful to public health and the environment. Charleston County is designated as in attainment for all principal pollutants. The short-term effects to air quality from operation of project equipment would not result in permanent adverse effects to air quality in Charleston County. Air quality permits would not be required for this project.

7.2 CLEAN WATER ACT OF 1972 – SECTION 401 AND SECTION 404

The Clean Water Act (CWA) sets and maintains goals and standards for water quality and purity. A 401 WQC was issued for the FRNP on January 24, 1984, which was determined to be still in effect for the 1997 EA by SCDHEC. That WQC covered placement of sediments on Folly Beach County Park, Bird Key Stono and within the entrance channel. USACE is requesting a new WQC for all actions associated with the FRNP which will be included in Appendix D of the final draft of this EA.

A 404(b)(1) Analysis of the project has been completed and is included in Appendix D.

7.3 COASTAL BARRIER RESOURCES ACT OF 1982

The CBRA provides for a Coastal Barrier Resources System (CBRS) of undeveloped coastal barriers along the Atlantic and Gulf Coasts, including islands, spits, tombolos, and bay barriers that are subject to wind, waves, and tides such as estuaries and

nearshore waters. Resources in the system are to be protected by restricting Federal expenditures that have the effect of encouraging development of coastal barriers. Within the FRNP project area, Bird Key Stono Unit M-07/M-07P, is considered a CBRS.

The CBRA exempts the maintenance or construction of improvements of existing Federal navigation channels and related structures (such as jetties), including the disposal of dredge materials related to maintenance or construction. O&M of the existing FRNP and disposal of beach quality sand on placement areas are considered within this exemption. USACE is required to coordinate with USFWS at the beginning of each dredge cycle for quantities and locations of sediment placements.

7.4 COASTAL ZONE MANAGEMENT ACT OF 1972

The CZMA requires that

> "…*each federal agency conducting or supporting activities directly affecting the coastal zone shall conduct or support those activities in a manner which is, to the maximum extent practicable, consistent with approved state management programs*."

Per the Coastal Tidelands and Wetlands Act (S.C. Code Ann.) USACE is currently seeking concurrence from the SCDHEC, Office of Ocean and Coastal Resource Management that the project will be consistent with the Coastal Zone Management Program. A record of concurrence will be included in the final draft of the EA in Appendix F.

7.5 ENDANGERED SPECIES ACT OF 1973

The ESA is designed to protect and recover threatened and endangered species of fish, wildlife, and plants. Suitable habitat is present within the project area for the following federally listed species: wood stork, piping plover, rufa red knot, West Indian manatee, green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, loggerhead sea turtle, North Atlantic right whale, Atlantic sturgeon and shortnose sturgeon.

O&M dredging of the FRNP entrance channel with modified hopper dredge equipment and subsequent nearshore placement along Folly Beach is scheduled to occur within the next 6 months. To support this, USACE has initiated informal consultation with USFWS particularly for this proposed action (see Appendix B). Dredging of the Folly River channel is not scheduled to occur for approximately 2 years; therefore, USACE is deferring formal consultation with USFWS regarding O&M dredging of the Folly River channel until approximately 6 months before dredging occurs (will be added to Appendix B of final draft following consultation. For actions addressed in informal consultation with USFWS, USACE has made determinations of a *may affect, but not likely to adversely affect* determination for piping plover, rufa red knot, West Indian manatee, loggerhead sea turtle (USFWS purview) and leatherback sea turtle (USFWS purview), and *may affect, not likely to adversely modify* for rufa red knot proposed

critical habitat and loggerhead critical habitat (USFWS purview). The project would be implemented in compliance with the SARBO (2020) issued by NMFS.

7.6 ENVIRONMENTAL JUSTICE (EO 12898)

In accordance with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, federal agencies must assess whether disproportionately high and adverse effects would be imposed on minority or low-income areas by federal actions. In addition, Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, requires federal agencies to assess the environmental health and safety risk of their actions on children. Section 112(b)(1) of WRDA 2020 (P.L. 166-260) requires the formulation of water resource projects to comply with "any existing Executive Order regarding environmental justice." Moreover, Executive Order 14008, Tackling the Climate Crisis at Home and Abroad, Section 219 directs federal agencies to "[develop] programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities".

As noted above, total minority populations (i.e., all non-white and Hispanic or Latino racial groups) combined comprise approximately 6 percent of the population in the project area. Furthermore, children (under age 18) and impoverished (below poverty line for at least 12 months) comprise a small percentage of the affected communities. No significant impacts are anticipated.

7.7 FISH AND WILDLIFE COORDINATION ACT OF 1934

The Fish and Wildlife Coordination Act (FWCA) provides authority for USFWS involvement in evaluating impacts to fish and wildlife from proposed water resource development projects. It requires that fish and wildlife resources receive equal consideration to other project features and requires that federal agencies consult with USFWS, NMFS, and state resource agencies on the proposed project. This coordination is being conducted concurrent with the public review of the draft EA.

7.8 FLOODPLAIN MANAGEMENT (EO 11988)

To comply with Executive Order 11988, the policy of USACE is to formulate projects that, to the extent possible, avoid or minimize adverse effects associated with the use of the floodplain and avoid inducing development in the floodplain unless there is no practicable alternative. Projects that involve beneficial use of dredged material and beach nourishment are inherently located within the floodplain. USACE intends to prioritize beneficial use of dredged material wherever and whenever possible. Beach placement helps alleviate problems associated with erosion, including the enhancement of habitat within the floodplain. For the reasons stated above, the project is in compliance with EO 11988, Floodplain Management.

7.9 PROTECTION OF WETLANDS (EO 11990)

This Executive Order requires, among other things, that Federal agencies avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. No wetlands would be affected by the proposed project. This project is in compliance with the goals of this Executive Order.

7.10 MIGRATORY BIRD TREATY ACT AND EO 13186

The Migratory Bird Treaty Act (MBTA) of 1918 is the domestic law that affirms, or implements, the United States' commitment to four international conventions with Canada, Japan, Mexico, and Russia for the protection of shared migratory bird resources. The MBTA governs the taking, killing, possessing, transporting, and importing of migratory birds, their eggs, parts, and nests. EO 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs federal agencies to take certain actions to further implement the MBTA, including evaluating the effects of actions on migratory birds. Measures will be taken to minimize and avoid impacts to migratory birds, such as timing of activities. Migratory birds may benefit from the beneficial placement of material which may enhance and protect sea and shore bird habitat.

7.11 NATIONAL WILD AND SCENIC RIVERS

The National Wild and Scenic Rivers System was created by Congress in 1968 (Public Law 90-542; 16 U.S.C. 1271 et seq.) to preserve certain rivers with outstanding natural, cultural, and recreational values in a free-flowing condition for the enjoyment of present and future generations. Actions herein would not affect a stream or portion of a stream that is included in the National Wild and Scenic Rivers system.

7.12 NATIONAL HISTORIC PRESERVATION ACT OF 1966

Section 106 of the National Historic Preservation Act requires Federal agencies to take into account the effects of their undertakings on historic properties and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment on such undertakings. In accordance with 36 C.F.R. §800.4(d)(1), USACE conducted surveys and consultation with the SHPO, SCIAA, and consulting tribes. Concurrence was provided for a no adverse effect determination for one historic site (i.e., shipwreck), which requires a 150-foot buffer and avoidance zone for sediment placement (see Appendix C). Additional surveys will be performed and consulted on in accordance with 36 C.F.R. §800.4(d)(1), along with any inadvertent discoveries and/or project scope changes.

7.13 PUBLIC INVOLVEMENT AND COORDINATION

The CEQ regulations require that federal agencies *"(a) make diligent efforts to involve the public in preparing and implementing their NEPA procedures and (b) provide public*

notice of NEPA-related hearings, public meetings, and the availability of environmental documents so as to inform those persons and agencies who may be interested or affected" (40 CFR 1506.6(a) and (b)). As such, a draft of this document was shared with Federal, State, Tribal, and local government entities having jurisdictional responsibilities, or otherwise having an interest in the project, as well as members of the public. All comments received during the comment period and USACE responses will be included in Appendix G of the final EA.

8 LIST OF AGENCIES AND PERSONS CONSULTED:

8.1 TRIBES

Consultation was initiated with 13 Tribes on September 19, 2022:
Absentee-Shawnee Tribe of Oklahoma,
Alabama-Quassarte Tribal Town,
Catawba Indian Nation,
Chickasaw Nation,
Delaware Tribe of Indians,
Eastern Band of Cherokee Indians,
Eastern Shawnee Tribe of Oklahoma,
Kialegee Tribal Town,
Muscogee (Creek) Nation,
Poarch Band of Creek Indians,
Seminole Tribe of Florida,
Shawnee Tribe, and
Thlopthlocco Tribal Town.

Two tribal responses were received directly in response to this undertaking, and one response received indirectly related to the undertaking. The Catawba Indian Nation responded in a letter dated October 18, 2022, stating that there were no immediate concerns with regard to traditional cultural properties, sacred sites, or archaeological sites within the APE (22-1-73). The Eastern Shawnee Tribe of Oklahoma responded in a letter dated October 26, 2022, stating that the project proposes no adverse effect or endangerment to sites of interest to their tribe (EST Reference Number: 4620). Both tribes requested to be consulted in the event of inadvertent discoveries or project scope changes. The Delaware Tribe of Indians provided a response to a similar undertaking, stating that South Carolina is no longer within their Area of Interest, so they were removed from future consultation related to this undertaking.

The survey results were provided to the tribes in a letter dated February 15, 2023. No responses to the results have been received to date.

No tribes requested to be consulting parties to the programmatic agreement associated with the Folly Beach Coastal Storm Risk Management Project, which is a separate action that has an overlapping project area.

8.2 FEDERAL AGENCIES

U.S. Environmental Protection Agency (EPA Region 4)
U.S. Fish and Wildlife Services (USFWS)
National Marine Fisheries Services (NMFS)
Advisory Council on Historic Preservation

8.3 STATE AGENCIES

South Carolina Department of Health and Environmental Control (SCDHEC)
South Carolina Department of Natural Resources (SCDNR)
South Carolina State Historic Preservation Office (SHPO)
South Carolina Institute of Archeology and Anthropology (SCIAA)

South Carolina Institute of Archeology and Anthropology (SCIAA) was consulted on the results of the submerged cultural resources surveys. SCIAA concurred on February 17, 2023, that they have no concerns as long as the avoidance buffer is implemented for the historic shipwreck site.

Consultation with the SHPO was initiated on September 19, 2022, and survey results were provided in February 2023. SHPO concurred on February 21, 2023, with the determination of no adverse effect with the caveat that the 150-foot buffer remains in place). Consultation for the advanced maintenance area and related surveys are ongoing.

8.4 LOCAL AGENCIES

Charleston County Park Service
The City of Folly Beach

9 ENVIRONMENTAL COMMITMENTS

USACE employs standard practices when conducting dredging activities. Some of the more specific measures which would be applied to reduce the potential for adverse environmental effects during implementation of the project are as follows:

- Adherence to the appropriate PDC identified in the 2020 South Atlantic Regional Biological Opinion (SARBO).

- The standard manatee conditions will be implemented from April 15 to October 31. The Contractor will be instructed to take necessary precautions to avoid any contact with manatees. If manatees are sighted within 100 yards of the dredging area, all appropriate precautions will be implemented to insure protection of the manatee. The Contractor will stop, alter course, or maneuver as necessary to avoid operating moving equipment (including watercraft) any closer than 100 yards of the manatee. Operation of equipment closer than 50 feet to a manatee will necessitate immediate shutdown of that equipment.

- Adherence to the appropriate RPM and T&C of USFWS Biological Opinion upon completion of formal consultation.

- Adherence to the appropriate conservation recommendations and best management practices included in the *Programmatic Essential Fish Habitat Consultation for USACE Activities and Projects Regularly Undertaken in South Carolina.*

- Adherence to the appropriate avoidance measures resulting from consultation with SHPO.

- To the maximum extent practicable, USACE will prioritize BU of dredged sediment at Bird Key Stono during O&M cycles within the Folly River channel, unless SCDNR and USFWS determine materials are not needed at that time.

- A 150-foot avoidance buffer will need to be implemented for sediment placement near the historic shipwreck site.

10 LIST OF PREPARERS

Table 7 List of Preparers

Name	Affiliate	Discipline/Role
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Andrea Farmer	USACE Planning Environmental	Archeologist/Co-Author
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Appendix A
NMFS Programmatic EFH Consultation

Programmatic Essential Fish Habitat Consultation for United States Army Corps of Engineers Activities and Projects Regularly Undertaken in South Carolina

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Table of Contents

1. Introduction

Section 305(b)(2) of the Magnuson-Stevens Fishery Conservation and Management Act (MSA) requires federal action agencies such as the U.S. Army Corps of Engineers (USACE) to consult with the National Oceanic and Atmospheric Administration/National Marine Fisheries Service (NMFS) for any action they authorize, fund or undertake that may adversely affect Essential Fish Habitat (EFH). A programmatic consultation is often appropriate for funding programs, large-scale planning efforts, and other instances where sufficient information is available to address all reasonably foreseeable adverse effects on EFH of an entire program, parts of a program, or a number of similar individual actions occurring within a given geographic area. The outcome of a programmatic consultation, at minimum, should result in equal or greater protection to EFH than would have been realized through the otherwise required individual project level EFH consultation. The programmatic consultation process consolidates effort and time upfront while realizing the time saving and coordination benefits later.

This Programmatic EFH Consultation, in partnership with the USACE, Charleston District (Charleston District) covers certain Charleston District civil works activities and projects regularly undertaken in South Carolina. This document provides an assessment of the potential effects of dredging, dredged material transportation and dredged material placement activities, including beneficial uses, of federal operations and maintenance dredging projects in the action area, and issues conservation recommendations for those effects. This Programmatic EFH Consultation will reduce the number of individual EFH consultations while satisfying EFH consultation requirements of the MSA.

1.1 Background Statutory and Regulatory Information

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104- 267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a federal Fisheries Management Plan (FMP). Section 305(b)(2) of the MSA requires federal agencies to consult with NMFS on any actions they authorize, fund or undertake that may adversely affect EFH. An adverse effect to EFH is any direct or indirect effect that reduces the quality and/or quantity of the designated habitat. NMFS provides advice and recommendations to the federal agency to avoid, minimize, or mitigate for these adverse effects. Conservation Recommendations, such as Best Management Practices, address all reasonably foreseeable adverse impacts on EFH by the proposed action(s).

1.2 Programmatic Consultation Process

The EFH Coordination, Consultation, and Recommendations (50 CFR §§ 600.5– 600.930) outline the process for federal agencies, the NMFS, and the Fishery Management Councils (Councils) to satisfy the EFH consultation requirement under MSA Section 305(b)(2)-(4)). Based

on the EFH regulations at 50 CFR § 600.920(j), the programmatic consultation is an effective and efficient method to consult on a large number of minimal impact projects the Charleston District routinely authorizes, and to develop programmatic conservation recommendations that will address reasonably foreseeable adverse impacts to EFH. The scope of the programmatic consultation remains limited to those activity types that will not have a substantial adverse effect both individually and cumulatively on EFH. Activities not specifically covered by the programmatic consultation will have to be addressed through individual consultation.

The *Programmatic Essential Fish Habitat Consultation for United States Army Corps of Engineers Activities and Projects Regularly Undertaken in South Carolina* between the NMFS and the Charleston District, hereinafter referred to as the Programmatic EFH Consultation, addresses numerous in-water and near-shore activities conducted by the Charleston District.

Through this Programmatic EFH Consultation, NMFS has determined certain Charleston District civil works projects and activities, both individually and cumulatively, will not have a substantial adverse effect on EFH; these projects and activities are described herein. Activities and projects not explicitly included in this Programmatic EFH Consultation will be considered separately as an individual consultation. Through the implementation of this programmatic consultation, if NMFS or the USACE determines that other projects and activities may be considered for inclusion in future revisions of the Programmatic EFH Consultation, these projects and activities will be considered jointly, but with NMFS making the final determination on whether programmatic consultation is appropriate. Through the implementation of this programmatic consultation, there will be increased and more productive engagement between staff from both agencies and increased efficiencies in allowing projects to move forward in a timely manner.

2. Action Area and Proposed Actions

2.1 Description of Action Area

Figure 1. Overview of Navigation Projects under the Programmatic EFH Consultation

Charleston District dredging activities under this programmatic consultation would occur in areas designated EFH for various life stages of fish species managed by the Councils and NMFS and in areas that support prey species and anadromous fish. USACE conducts several kinds of routine and repetitive activities and projects that typically result in predictable effects. The geographic scope of this programmatic consultation includes tidally influenced areas designated EFH in South Carolina as provided below. Specifically, the geographic scope encompasses estuarine/inshore and wetland areas, as well as marine/coastal ocean areas such as nearshore waters adjacent to coastal beaches and the Atlantic Intracoastal Waterway (Figure 1).

2.2 Proposed Actions

USACE has been responsible for the development and maintenance of navigable waterways in the U.S. since the 1800s. The USACE provides safe, reliable, efficient, and environmentally sustainable waterborne transportation systems (channels, harbors, and waterways) for the movement of commerce, national security needs, and recreation. For more details on the USACE navigation dredging program and dredged equipment and dredged material management including placement and habitat development, please refer to USACE Engineering Manual (EM) 1110-2-5025 (Dredging and Dredged Material Management).

2.2.1 Navigation Dredging

This action includes Congressionally authorized and federally-sponsored (i.e., federally-funded or partially federally-funded) dredging for maintenance of Charleston District coastal navigation channels (including Murrells Inlet, Town Creek (McClellanville), Folly River, and the Atlantic Intracoastal Waterway (from the North Carolina state line to Port Royal Sound, South Carolina).

See Appendix A for detailed descriptions of authorized dredging projects covered under this Programmatic EFH Consultation.

2.2.2 Transportation of Dredged Material

This action includes transportation of dredged material via modified hopper dredge, or pump out pipeline. Specifically, the transportation of material from the dredging of navigation channels covered under this Programmatic EFH Consultation includes transportation for: (a) placement alongside or downdrift of the channel being dredged; (b) open water placement in an approved nearshore disposal site; (c) a confined (diked) placement; and/or (d) beneficial uses of dredged material including beach or nearshore placement and habitat restoration.

2.2.3 Navigation Dredged Material Placement

After both dredging and transportation of dredged material, the material is typically placed into a predetermined area for disposal or to serve a beneficial use. This action includes the placement of material from the dredging of navigation channels: (a) alongside or downdrift of the channel being dredged; (b) open water placement area; (c) in a confined (diked) placement area; and/or (d) in beneficial use locations as provided under Section 2.2.4.

2.2.4 Beneficial Use Placement

This action includes the placement of sand in the nearshore or beach area to nourish the littoral zone and/or habitat restoration projects. Sand sources for these placement actions may include dredged navigation channels, and/or nearshore deposition basin areas (see Appendix A for approved areas). Current federal beach, nearshore, and habitat restoration projects covered under this Programmatic EFH Consultation include:

- Charleston District Beach Placement Projects
  Folly Beach, Garden City Beach, Huntington Beach State Park, Bird Key

- Charleston District Nearshore Placement Projects
  Folly Beach, Lighthouse Island (Cape Romain),

- Ecosystem Restoration Placement Projects
  Bird Key

See Appendix A for additional details regarding these beneficial use projects.

2.2.5 Emergency Dredging

This action includes emergency dredging activities following an unforeseen event for the purpose of maintaining existing navigation channels, or to address a national security concern. The emergency may result from a natural disaster such as a flood event, storm or hurricane or

from a navigation related catastrophe (e.g., a vessel collision with a bridge). USACE is authorized to conduct emergency response actions under the Flood Control and Coastal Emergency Act (Public Law 84-99) or the Stafford Disaster Relief and Emergency Assistance Act (Public Law 93-288).

2.2.6 Minor Channel Modifications

This action includes dredging and disposal activities for minor modifications to existing navigation channels that are within the discretionary authority of USACE (i.e., additional Congressional authorization is not required). Consistent with USACE Engineering Regulations and the budget process, certain navigation channel modifications are funded as maintenance activities. These modifications include channel realignments, turn or bend modifications, advanced maintenance opportunities, and overdepth dredging.

This action does NOT include navigation channel improvements beyond the scope of maintenance dredging or maintenance modifications of channels and turning basins to depths or widths not previously authorized throughout the project area. Maintenance dredging is defined as maintaining channels at specified depths and widths, including overdepth and advanced maintenance dredging. Channel improvements involve dredging to increase channel dimensions (length, depth or width) beyond dimensions previously authorized or permitted. Channel improvements are not within the scope of this Programmatic EFH Consultation and will be consulted on individually, as appropriate.

3. Essential Fish Habitat

The MSA requires fishery management councils and NMFS to identify, describe, map, and conserve EFH for each fish species managed under its jurisdiction. EFH is defined in the MSA as "those waters and substrate necessary to fish [and shellfish] for spawning, breeding, feeding or growth to maturity." This broad definition of EFH has led the South Atlantic Fishery Management Council (SAFMC) and the NMFS to identify EFH in most, if not all areas in the South Atlantic Bight, ranging from offshore pelagic areas (Gulf Stream) to all tidally influenced wetlands. This Programmatic EFH Consultation will focus on federally managed species and designated EFH germane to dredging and dredging related projects in South Carolina. Specific plans, amendments, descriptions of EFH and other information can be found at http://safmc.net/, http://www.mafmc.org/, and https://www.fisheries.noaa.gov. Spatial representations of EFH are available at http://safmc.net/ within the SAFMC Atlas and https://www.habitat.noaa.gov/apps/efhmapper/.

3.1 Federally Managed Species

Federally managed species that have a potential to be adversely affected by one or more USACE dredging and dredging related projects in South Carolina are listed in Table 1. Please refer to the relevant FMP available online for detailed descriptions of the federally managed species and their distribution.

Table 1. Federally managed species occurring in South Carolina tidally influenced waters that may be adversely affected by federal navigation activities.

Common Name	Scientific Name	Management Plan Agency	Fishery Management Plan (FMP)
White Shrimp	*Lytopenaeus setiferus*	SAFMC	Shrimp
Brown Shrimp	*Farfantepenaeus aztecus*	SAFMC	Shrimp
Gag Grouper	*Mycteroperca microlepis*	SAFMC	Snapper Grouper
Gray Snapper	*Lutjanus griseus*	SAFMC	Snapper Grouper
Lane Snapper	*Lutjanus synagris*	SAFMC	Snapper Grouper
Black Sea Bass	*Centropristis striata*	SAFMC	Snapper Grouper
Spanish Mackerel	*Scomberomorus maculatus*	SAFMC	Coastal Migratory Pelagic
King Mackerel	*Scomberomorus cavalla*	SAFMC	Coastal Migratory Pelagic
Summer Flounder	*Paralichthys dentatus*	MAFMC	Summer Flounder
Bluefish	*Pomatomus saltatrix*	MAFMC	Bluefish
Scalloped Hammerhead Shark	*Sphyrna lewini*	NMFS	Highly Migratory Species
Bonnethead Shark	*Sphyma tiburo*	NMFS	Highly Migratory Species
Bull Shark	*Carcharhinus leucas*	NMFS	Highly Migratory Species
Sandbar Shark	*Carcharhinus plumbeus*	NMFS	Highly Migratory Species
Finetooth Shark	*Carcharhinus isodon*	NMFS	Highly Migratory Species
Dusky Shark	*Carcharhinus obscures*	NMFS	Highly Migratory Species
Blacktip Shark	*Carcharhinus limbatus*	NMFS	Highly Migratory Species
Atlantic Sharpnose	*Rhyzoprionodon terranovae*	NMFS	Highly Migratory Species
Lemon Shark	*Negaprion brevirostris*	NMFS	Highly Migratory Species

3.2 Essential Fish Habitat in Project Areas

As noted earlier, complete EFH descriptions are available on Councils and NMFS websites. The following section provides only a brief discussion of EFH with specific and direct relevance to Charleston District dredging and dredging related projects in South Carolina. *Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council* provides a useful summary and clarifications to designations and is available at

https://safmc.net/documents/2022/05/efh-user-guide.pdf/. Additional information on EFH descriptions for species identified by NMFS or the MAFMC can be found at the EFH Mapper (https://www.habitat.noaa.gov/apps/efhmapper/). This section is not an exhaustive or complete description of EFH and should not be treated as such.

Essential fish habitats identified by the SAFMC, MAFMC, and NMFS and likely to be within the project areas covered by this Programmatic EFH Consultation are listed below.

Estuarine Areas

- Estuarine Emergent Wetlands (Salt Marsh and Brackish Marsh)
- Intertidal Non-vegetated Flats
- Estuarine Water Column
- Soft Bottom/Subtidal
- Estuarine Scrub/Shrub

Tidally Influenced Areas

- Tidal Creeks

Marine Areas

- Marine Water Column
- Offshore Marine Habitats: Spawning Grounds

HAPCs

- Coastal Inlets
- Oyster Reefs/Shell Banks

3.2.1 Estuarine Emergent Wetlands (Salt Marsh and Brackish Marsh)

Salt marshes are transitional areas between land and water, occurring along the intertidal estuarine shorelines where salinity ranges from near ocean strength to near fresh in upriver marshes. The estuarine wetland is described as tidal wetlands in low-wave-energy environments, where the salinity is greater than 0.5 parts per thousand and is variable owing to evaporation and the mixing of seawater and freshwater (SAFMC Habitat Plan 1998). Estuarine emergent marshes protect shorelines from erosion, produce detritus, filter overland runoff, and function as a vital nursery area for various fish and many other species. Estuarine emergent wetlands are characterized by the presence of erect, rooted, herbaceous hydrophytes dominated by salt-tolerant perennial plants.

The structure and function of a salt marsh are influenced by tide, salinity, nutrients, and temperature. Estuarine intertidal marshes, as well as the network of tidal creeks that salt marshes drain into, provide refuge, forage, and nursery habitat for Council- and NMFS-managed species, other non- managed fishes, shellfish, invertebrates, as well as endangered and threatened species. Estuaries provide major sources of nutrients, nekton, prey fish, and detritus to other ecosystems, which is primarily facilitated by water movement. The cross-habitat transfer of energy and carbon from donor to recipient habitats plays a vital role in shaping food webs and productivity in recipient systems, particularly those supporting additional managed species, such as coastal

migratory pelagics (i.e., mackerels), highly migratory pelagics (i.e., sharks), and species in the snapper grouper complex (Polis et al. 1997). Additionally, salt marsh estuaries provide commercial and economic value to people; it is estimated that 95 percent of finfish and shellfish species harvested commercially in the U.S. are wetland-dependent, thus could be considered estuarine- dependent (SAFMC Habitat Plan 1998)

3.2.2 Intertidal Non-vegetated Flats

Intertidal flats are the unvegetated bottoms of estuaries and sounds that lie between the high and low tide lines. Intertidal flats occur along shorelines, and can emerge in areas unconnected to dry land. Intertidal flats are most extensive where tidal range is greatest, such as near inlets. Sediment composition on intertidal shorelines tends to shift from coarser, sandy sediment on higher portions of the shoreline, with greater wave energy, to finer, muddier sediments in the lower portion of the shoreline, with relatively less wave energy (Peterson and Peterson 1979).

Intertidal flats play an important role in the ecological function of South Atlantic estuarine ecosystems, particularly in primary production, secondary production, and water quality. Although intertidal flats are usually classified as unvegetated, there is actually an extremely productive microalgae community occupying the surface sediments (SAFMC Habitat Plan 1998). Non-vegetative flats serve various functions for many species' life stages such as: feeding grounds, refuge, and nursery areas for many mobile species, as well as the microalgal community that can function as a nutrient (nitrogen and phosphorus) stabilizer between the substrate and water column. The benthic community of an intertidal flat can include polychaetes, decapods, bivalves, and gastropods. This resident benthos is preyed upon by mobile predators that move onto the flats with the flood tide. Primary production of this community can equal or exceed phytoplankton primary production in the water column, and can represent a significant portion of overall estuarine primary productivity (SAFMC Habitat Plan 1998).

Intertidal flats provide the following ecological functions: (1) nursery grounds for early stages of development of many benthically-oriented estuarine dependent species; (2) refuges and feeding grounds for a variety of forage species and juvenile fishes; (3) significant trophic support to fish and shellfish, including oysters and clams (Page and Lastra 2003); (4) stabilization of sediments via the production of exopolymers (Yallop et al. 2000) and (5) modulation of sedimentary nutrient fluxes (Cerco and Seitzinger 1997). Intertidal flats also provide habitat for a large and diverse community of infauna and epifauna, which in turn may become prey for transient fish species utilizing the intertidal flat. A wide variety of important fishes and invertebrates utilize these unvegetated flats as nurseries including the commercially important paralichthid flounders, many members of the drum family including red drum, spotted seatrout, the mullets, gray snapper, the blue crab, and penaeid shrimps (Peterson and Peterson 1979).

3.2.3 Estuarine Water Column

This habitat traditionally comprises four salinity categories: oligohaline (less than eight parts per thousand); mesohaline (eight to 18 parts per thousand); polyhaline waters (18 to 30 parts per thousand), and euhaline water (>30 parts per thousand) around inlets. Saline environments have moving boundaries, but are generally maintained by sea water transported through inlets by tide and wind mixing with fresh water supplied by land runoff. Particulate materials settle from

these mixing waters and accumulate as bottom sediments. Coarser-grained sediments, saline waters, and migrating organisms are introduced from the ocean, while finer grained sediments, nutrients, organic matter, and fresh water are input from rivers and tidal creeks. The sea water component stabilizes the system, with its abundant supply of inorganic chemicals and its relatively conservative temperatures.

The aquatic organisms that flourish in estuaries rely on flow and water movement to: (1) deliver the nutrients and physical water conditions for appropriate food and nursery area development at the opportune time; (2) keep eggs and larvae of pelagic spawners in suspension to enhance survival; (3) transport and distribute eggs, larvae, and juveniles to the appropriate nursery area for optimum food availability and protection from predators; and (4) distribute sediment and affect structures that serve as habitats (i.e., shell bottom, soft bottom) for many fish species. Many fish and shellfish species occupy the estuarine water column at some point in their life cycle. Meroplankton (organisms that spend only part of their life cycle in the plankton), in particular, rely on the corridor function of the water column to transport them to favorable nursery areas.

3.2.4 Soft Bottom/Subtidal

Soft bottom habitat is unconsolidated, unvegetated sediment that occurs in freshwater, estuarine, and marine systems. Soft bottom habitat can be characterized by its geomorphology (the shape and size of the system), sediment type, water depth, hydrography (riverine, intertidal, or subtidal), and/or salinity regime (SAFMC Habitat Plan 1998). The physical and chemical composition of all soft bottom is determined by the underlying geology, basin morphology, and associated physical processes (Riggs et al. 1996). It is important to understand the physical and chemical properties of soft bottom habitat since these affect the benthic organisms that inhabit these areas and, in turn, their value as fish habitat.

Soft bottom habitats are used to some extent by most coastal fishes, especially for planktivores, like the anchovy and menhaden, who feed on benthic microalgae and organisms suspended in the water column by wave action. Many rays, drums, sturgeon, flounder, and crabs forage in soft bottom sediments for invertebrates. Smaller sharks, drums, and sea trout prey on the smaller fish and larger invertebrates in estuarine soft bottom habitat. Additionally, these environments along with intertidal mudflats, provide essential refuge from predators for young and juvenile fishes at low tide when these areas are still submerged, but too shallow for larger predators. The species associated with soft bottom subtidal habitats provide a spectrum of ecosystem services, most widespread are the nutrient cyclers. Polychaete worms, for example, are the most abundant invertebrate in subtidal environments in terms of species and overall abundance, and are constantly exposed to the nutrients and/or other materials present in the sediments. These epibenthic filter feeders maximize their exposure to these materials within the water column as they not only process a large amount of water during feeding, but being an interstitial species, they are in intimate contact with these sediments for their entire lives. These worms are a crucial part of many predators' diets, and act as a nutrient cycler or transfer to other trophic levels. For these reasons, polychaetes have long been an obvious choice to act as representative species in the analysis of the health of benthic communities (Dean 2008).

3.2.5 Estuarine Scrub/Shrub

The class of scrub/shrub wetland includes areas dominated by woody vegetation less than 6 meters (20 feet) tall, and include true shrubs, young trees, and trees and shrubs that are small or stunted because of environmental conditions. Scrub and shrub wetland fall under all water regimes except those subtidal. These wetlands may represent a successional stage leading to a palustrine forested wetland, or they may be relatively stable communities as standalone scrub/ shrub habitat.

The physical environment of the habitat affects the types and distribution of plants occurring in each community type. Salinity and tidal regime are the two most important environmental factors influencing plant compositions and distribution in these estuarine communities (SCDNR 2015). At the less saline end of the estuarine zone (salinity around 0.5 parts per thousand), a mixture of freshwater and brackish plant species is common in the low and high marsh zones. As salinity rises to 10 parts per thousand in the lower marsh zone, species diversity decreases and is typically dominated by smooth cordgrass, which becomes an important component of the salt marsh. This middle area near the marsh-upland border typically is characterized by a canopy of herbaceous shrubs and a mixture of brackish and salt flat species such as: groundsel tree, sea myrtle, marsh elder, sea oxeye, salt grass, glasswort, and sea lavender (SCDNR 2015).

3.2.6 Tidal Creeks

Small tidal creeks begin in upland areas and drain into progressively larger creeks, forming an interconnecting network. These tidal creeks increase in size until they join a tidal river, sound, bay, or harbor, eventually reaching the ocean. Tidal creeks provide critical nursery areas for many species of fish and invertebrates with ample amounts of food and protection, making them ideal nursery grounds (SCDNR 2012). Many Council- and NMFS-managed species including shrimp and snapper-grouper species have cyclic life cycles, where they enter the tidal creeks during their post-larval or young juvenile stage, mature for several months during a maturation season, and then move to progressively deeper water. When the high tide floods the beds of the marsh and tidal creeks, these animals have access to nutrient-rich marsh mud, while the dense growth of cord grass restricts entry of large predators (SCDNR 2012). On the outgoing tide, larger predators such as drums or seatrout wait at the mouths of the creeks feeding on the smaller organisms flushed out of the tidal creeks, providing a valuable food source to Council- and NMFS-managed species.

3.2.7 Marine Water Column

Specific habitats in the water column can best be defined in terms of gradients and discontinuities in temperature, salinity, density, nutrients, etc. These structural components of the water column environment are not static, but change both in time and space. Therefore, there are numerous potentially distinct water column habitats for a broad array of species and life-stages. The water column serves as habitat for many marine fish and shellfish. Most marine fish and shellfish broadcast spawn pelagic eggs and thus, most species utilize the water column during some portion of their early life history (e.g., egg, larvae, and juvenile stages). White and brown shrimp, for example, spawn offshore, and shrimp larvae remain in coastal waters until they immigrate into low salinity tidal creeks using tidal currents. The marine water column is also

home to a variety of adult fishes, specifically from the snapper-grouper complex, highly migratory species, and coastal migratory pelagics. These fishes utilize the marine water column for a majority of their adult lives. Many snapper and grouper species form spawning aggregations (i.e., gag grouper) along live/hard bottom areas and within the marine water column. The larvae of many snapper-grouper species remain in the water column for up to 60 days before they are transported into inshore nursery areas via tidal and wind driven currents.

3.2.8 Offshore Marine Habitats: Spawning Grounds

Essential fish habitat is identified as necessary to fish for spawning, feeding, or growth to maturity, hence their importance in ensuring viability of fish populations. These habitats can be characterized by the physical, chemical, and biological properties of their waters and substrata. Penaeid shrimp and snapper-grouper fishes produce large numbers of small-sized pelagic eggs, which also become pelagic planktonic larvae. The distribution of spawning adults, i.e., mature adults with ripe gonads, provides a direct indication of spawning grounds. The distribution of fish/shrimp eggs and larvae in the water column can be a powerful indicator of offshore spawning grounds. Penaeid shrimp, specifically brown and white shrimp, spawn in offshore coastal waters over muddy bottom; eggs typically hatch within 24 to 48 hours, and larvae go through their initial larvae stages at these spawning grounds. Once they reach their post-larvae stage, approximately 15 to 20 days after hatching, the young shrimp will immigrate inshore to estuarine nursery habitats. The value of offshore marine spawning grounds is measured by the high density of eggs and post-larvae produced in these habitats, which will contribute to the recruitment of the adult population. Similarly, adult snapper-grouper species also spawn offshore along the outer continental shelf, typically along reefs and hard-bottom. Some snapper-grouper species, such as gag grouper, form spawning aggregations in deep water over rocky bottom, wrecks, and structured habitats; the fertilized eggs typically hatch at or around these spawning locations in less than 72 hours. The larvae stages of most Council- and NMFS-managed snapper-grouper fishes remain pelagic over these offshore reefs or offshore spawning grounds, and are eventually transported by the Gulf Stream as well as tidal and wind driven currents to salt marsh nursery locations where they will grow to maturity and eventually emigrate back offshore to mature and spawn.

3.2.9 Habitat Areas of Particular Concern (HAPC)

Habitat Areas of Particular Concern (HAPC) are a subset of EFH considered rare (rarity), particularly ecologically important, susceptible to anthropogenic degradation, or located in environmentally challenged or stressed areas. HAPCs may include areas used for migration, reproduction, and development, which can include intertidal, estuarine, and marine habitats. The MSA does not provide any additional regulatory protection to HAPCs; however, if HAPCs are potentially adversely affected, additional inquiries and conservation guidance may be provided (NMFS 2008).

a. Coastal Inlets

Coastal inlets include the throat of the inlet as well as shoal complexes associated with the inlets. Shoals formed by waters moving landward through the inlet are referred to as flood tidal shoals, and shoals formed by waters moving water ward through the inlet are referred to as ebb tidal

shoals. Coastal inlets meet the criteria for HAPC for penaeid shrimp, species in the snapper-grouper management unit, coastal migratory pelagics, as well as highly migratory species.

b. Oyster Reefs/Shell Bars

Oyster reefs and shell banks provide extremely unique benthic habitats with both intertidal and subtidal populations in the tidal creeks and estuaries of the South Atlantic (SAFMC Habitat Plan 1998). Not only does the larger reef or bank structure provide habitat for fish and invertebrates, but the interstitial spaces among the shell also provide microhabitats for smaller species. Oyster reefs and shell bars provide refuge, benthic-pelagic coupling, and erosion reduction. This ecosystem service largely results from the increase in structural complexity in shellfish habitat compared to surrounding areas (particularly soft sediments); areas typically associated with high structural complexity are characterized as "nursery areas", which refer to places where both juvenile invertebrate and fishes are protected from predators. These areas are critically important for juvenile Penaeid shrimp and juvenile snapper-grouper fishes in the South Atlantic region. Shell bottom protects oyster spat and other juvenile bivalves, finfish and crustaceans from predators, as well as wave action, tide swings, and storm surges.

The three major types of shellfish habitat (reefs, aggregations, and accumulations) differ in their combinations of habitat characteristics. However, all shellfish habitats have three major features in common that are the basis for their ecological value for managed species and as a critical fisheries habitat: hard substrate (for settlement/refuge/prey), complex vertical structure (for settlement/refuge/prey), and food (feeding sites for larger predators). While oyster reefs are the most recognized shell bottom habitat, shell hash concentrations on tidal creek bottoms provide important nursery habitat for young fish. For example, the preferred habitat of juvenile drum species in South Carolina is high marsh areas with shell hash and mud bottoms. Perhaps the most fundamental characteristic of shellfish habitat is hard substrate. The shells provide attachment surfaces for algae and sessile invertebrates, such as polychaetes (e.g., sabellids, serpulids), hydroids, bryozoans, and sponges, which in turn provide substrate for other organisms. All three types of shellfish habitats (i.e., reefs, aggregations, and accumulations) provide suitable substrate for other shellfish and many other species that require hard substrate on which to grow.

4. Adverse Impacts to Essential Fish Habitat Due to Navigation Activities

This section addresses potential adverse impacts to EFH and federally managed species occurring in the project area resulting from Charleston District navigation project activities, focusing on hydraulic cutter head suction and hopper dredges, which are the main dredge operations associated with the proposed actions covered by this Programmatic EFH Consultation (see Section 2). The physical impact of dredging is partly dependent on the method of dredging, the amount and grade of deposits, and overspill from the hopper. The dominant impacts of dredging are habitat loss and alteration, along with the physical removal of substratum and the organisms that utilize that substrate. This section will also focus on the environmental implications, stressors, and responses exhibited by fishes due to navigation actions.

4.1 Purpose and Overview

Navigation projects rely heavily on dredging, typically aimed at maintaining or increasing the depth of navigation channels, anchorages, or berthing areas to ensure smooth and safe passage of vessels. Descriptions of dredging and fill related activities and proposed actions covered under this Programmatic EFH Consultation are provided in Section 2.

4.2 Adverse Impacts to EFH and Federally Managed Species

Charleston District navigation activities that may adversely impact EFH include the excavation and maintenance of channels, the transportation of dredged material to disposal facilities, and the placement of dredged material. Potentially harmful activities associated with dredging vessel operations include, but are not limited to: discharge or spillage of fuel, oil, grease, paints, solvents, trash, and dredged material; grounding/sinking/prop scaring in ecologically and environmentally sensitive locations; exacerbation of shoreline erosion due to wakes.

Stressors caused by dredging and material placement include:	**The stressors associated with dredging vessel operations include:**
1. Suspended Sediments and Turbidity	1. Discharge of pollutants
2. Sedimentation	2. Grounding, Sinking, or Prop Scaring
3. Dissolved Oxygen Reduction	3. Shoreline Erosion
4. Decreased Water Quality / Contaminants	
5. Impingement and Entrainment	
6. Channel Blockage	
7. Noise Pollution	
8. Changes in Salinity	
9. Habitat Removal and Degradation	
10. Habitat Conversion	

4.3 Adverse Impacts

The following sections describe environmental impacts commonly associated with dredge activities, as well as general impacts to federally managed species, their prey, and EFH.

4.3.1 Suspended Sediments and Turbidity

Suspended sediments occur when settled bottom sediments become suspended and mixed into the water column after a disturbance or motion of the water. Suspended matter can include sediments (clay and silt) and organic matter (plankton and other microscopic organisms). Suspended matter consequently interferes with the passage of light through the water and increases turbidity, the degree to which water loses its transparency. Suspended sediments occur naturally in muddy-bottom areas by storms, freshets, or tidal flows (Wilber and Clarke 2001); however, dredging-related activities usually result in prolonged exposure to suspended sediments over a large area.

Typically, elevated particles and turbid water tend to be localized in the immediate vicinity of the cutter head and decrease with increasing distance from the dredge site. The cutter head dredge produces the least amount of suspended sediments, which usually occur along the bottom portion of the water column, while hopper dredges (without overflow) produce more suspended particles near surface waters. Studies have indicated elevated sediment levels up to 1,100 feet from a

dredge excavation site (Blair et al. 1990), but concentrations immediately decreased to 10 parts per million within one hour (Neff 1985). Suspended sediments have also been associated with decreased dissolved oxygen levels and impacts to water quality which also put fish at greater risk for being adversely impacted (see Sections 4.3.3 and 4.3.4).

Many coastal and estuarine-dependent species produce pelagic, free-floating eggs, while some anadromous fishes produce demersal eggs. Demersal eggs are more likely to come into contact with suspended sediments within the water column, where they can become subject to burial by accumulated deposited sediments and/or entrainment by suction dredges. Cairns (1968) documented direct effects to fish larvae and eggs by suspended sediments, which include: the abrasion of egg and larval surficial membranes (gills or the epidermis); reduced light availability; resuspension and absorption of contaminants reintroduced into the water column; interference with feeding; and delayed larvae development. As South Carolina estuaries serve as nursery grounds for larval and juvenile stages of fishes, dredging activities occurring during documented spawning times and during periods of ingress or egress would be more likely to cause adverse impacts. Suspended sediments have been documented to affect the hatch successfulness of eggs, percent survival of larvae post-exposure, and increase the time between fertilization and hatching. The eggs and larvae of non-salmonid estuarine fishes exhibit some of the most sensitive responses to suspended sediment exposures of all the taxa and life history stages (Wilber and Clarke 2001). Suspended sediments, especially when fine-grained, decrease the quality and quantity of incident light levels, resulting in a decline in photosynthetic productivity. The increased turbidity reduces visual acuity in fishes, which leads to an array of behavioral, physiological, reproductive, and feeding changes (Wenger et al. 2016). Foraging patterns and success are commonly studied behavioral responses of estuarine fishes to suspended sediments and turbidity; if persistent, decreased feeding success in juveniles may hinder survival, recruitment, year-class strength, and overall physical condition. For adult fishes, the most commonly observed behaviors to elevated levels of suspended sediments are avoidance, changes in foraging patterns, and success rate (Wenger et al. 2016).

4.3.2 Sedimentation

The physical removal of substratum and associated biota, resuspension into the water column, and animal burial due to the subsequent deposition (i.e., sedimentation) of material are the most direct effects of dredging projects. Recent studies suggest the initial sedimentation of material released during the outwash stage of dredging does not actually disperse; rather, it behaves more like a density current where the sediment particles are held together during the initial phase of sedimentation. This in turn effects the immediate area a few hundred meters around the dredge operation rather than dispersing and settling further distances from the dredge site (Newell et al. 1998). Sedimentation can pose major impacts to areas with sedentary species, such as oysters, where small amounts of silt may be enough to cause high rates of mortality. Heavy sedimentation on oyster reefs can cause direct oyster mortality, loss of foraging habitat, loss of shelter functions for other reef fishes and crustaceans when sediments fill the interstitial spaces between oyster shells (Wilber and Clarke 2001). Some documented examples of lethal and sublethal effects of sedimentation on fishes and associated EFH include: decreased feeding

ability; decreased growth rates; avoidance and displacement; prolonged egg development and survival;, as well as decreased primary and secondary productivity (Kjelland et al. 2015).

Sedimentation has also been shown to inhibit foraging ability in benthic-feeding fishes (Bellwood and Fulton 2008). Lowe et al. (2015) investigated the impacts of increased sedimentation and subsequent turbidity on juvenile snapper in a shallow estuary, and demonstrated that foraging success had a significant decline following short-term turbidity pulses. Chronic exposure (30 days) to levels resembling that of storm conditions can cause acute effects on fish growth and health, including significant weight loss, increased mortality, presence of gill lesions, and hypoxic behaviors (gulping at surface, lethargy, and increased ventilation). Lowe et al. (2015) found a higher occurrence of gill lesions and fish mortality in estuaries characterized by increasing sedimentation, lower water clarities, frequent levels of disturbance, and increasing urbanization. The most visible turbidity plumes observed by Goodwin and Michaelis (1984) were produced by the discharge of material with high sand content into unconfined placement areas during times of strong tidal currents. The least visible turbidity plumes were produced by the discharge of material with high silt and clay content into areas enclosed by floating turbidity barriers during times of weak tidal currents. Beach nourishment from hopper dredge unloading operations also produced plumes of low visibility (Goodwin and Michaelis 1984). Primary plumes were observed to be directly produced by dredging and placement operations, while secondary plumes were produced indirectly by resuspension of previously deposited material; but if the fill material is compatible with native material, nearshore communities should not be adversely affected by raised turbidity levels. Because the ecological impacts of sedimentation and turbidity on oyster reefs and benthic-feeding fishes and snappers can be severe in South Carolina estuaries, dredging-induced sedimentation and turbidity should be minimized, as practicable.

4.3.3 Dissolved Oxygen Reduction

Dredging induced reductions of the concentration of dissolved oxygen (DO), or hypoxia, is a direct consequence of the suspension of anoxic sediments around a dredge site, resulting in the creation of both chemical and biological oxygen demands. DO is a function of the: (1) sediments suspended into the water column (Lunz and LaSalle 1986); (2) the oxygen demand of the sediment; and (3) the duration of the resuspension (Wilber and Clarke 2001). Sediments found along South Carolina estuaries and the AIWW are dominated by silts and clays, which are anoxic below the upper few centimeters (Stickney and Perlmutter 1975). DO in the AIWW is lowest typically during the summer months. Resuspension of anoxic sediments into the water column should be minimized, especially during the summer months.

4.3.4 Decreased Water Quality/Contaminants

The release of naturally occurring particles such as nutrients, sulfides, and iron, as well as industrial related particles (i.e., metals, organohalogens, and pesticides) by the suspension of sediments during a dredge event does occur. Contaminants entering aquatic systems from agricultural, industrial, and municipal activities typically accumulate in bottom sediments (Winger et al. 2000). Most metals and other compounds are generally not readily available in a soluble form within the water column, but can be associated with organic matter and clays

(Windom 1972, 1976). Contaminants entering aquatic systems bind to the suspended particulate matter and these become incorporated into the sediments (Winger et al. 2000). Contaminated sediments containing harmful metals or other compounds have a greater impact on fish health than suspended sediments alone, since the disturbance of these sediments through dredging has the potential to increase bioavailability. These contaminants also pose a risk to wildlife inhabiting disposal areas upon transferring the sediments, and have the ability to enter multiple levels within the food chain (top-level consumers, primary consumers, producers, and decomposers).

Assessing the level of contamination in sediments is a key step in determining its suitability for beneficial uses. In general, the more contaminated the material, the greater the constraints on reuse. Highly contaminated material is not suitable for reuse unless its potential risk for biomagnification is low. Proper assessment of sediment contamination for dredging activities is critical to minimizing potential adverse impacts. A full characterization of sediment contamination should be conducted to assess any potential exposure and impacts to fishes and habitats.

4.3.5 Impingement and Entrainment

Hydraulic entrainment is the direct uptake/removal of aquatic organisms by the suction field generated at the drag head or cutter head (Reine et al. 1998). Both demersal and pelagic fish eggs, larvae, and small juveniles are highly susceptible to entrainment by suction dredges due to their inability to escape the suction area around the intake pipe (McNair and Banks 1986). They may be picked up directly with the sediment being drawn in or in the vicinity of the surrounding water column near the suction field. Depending on species and time of year, free-floating eggs and young juveniles migrate in and out of inshore waters at various depths within the water column, becoming more or less prone to entrainment. If dredge operations occur during migration periods and/or work is confined to narrow-channel habitats, the potential for entrainment may increase, especially for bottom dwelling fishes, larval oysters, and post-larval white and brown shrimp (Van Dolah et al. 1984). Several studies have indicated that eggs are more vulnerable to entrainment than adults, experiencing damage and mortality more than double that of adults (Wenger et al. 2016). Even though the volume of water entrained by dredges is small in comparison to other sources, if a dredge is in close vicinity to spawning or nursery locations, entrainment rates of eggs and larval fish could be detrimental. The entrainment rates of eggs and larval due to dredging represent a small proportion of the total larval production, but when eggs and larvae are sucked up by hydraulic dredges, they experience a high mortality rate in comparison to other life stages (Harvey and Lisle 1998).

4.3.6 Channel Blockage

This refers to the physical presence of the dredging equipment and sediment disposal pipelines. Channel blockage is suspected to have a minimal effect on the distribution and movement of juvenile and adult organisms. While placement of equipment has little effect on smaller, coastal fishes, it is particularly important to anadromous fishes. The time of year, i.e., environmental windows, should be considered for these animals with regards to channel blockage, as practicable.

4.3.7 Noise Pollution

Dredging projects do not produce intense sounds compared to that of pile-driving or other in-water construction, but rather lower levels of continuous sound at frequencies generally below one kHz. When dredging involves the demolition of rock, the sound generated is louder compared to the soft sediment dredging typically done. Based on the existing literature, underwater noise can affect fish in a number of ways, including behavioral responses, masking, physiological stress, hearing loss or damage, impairment of lateral line functions, and particle motion-based effects on eggs and larvae (Popper et al. 2014; Wenger et al. 2016). Evidence suggests fish possessing a swim bladder may be more affected by dredge noises than fish without a swim bladder (Popper et al. 2014). Fishes that have a swim bladder used for hearing are more likely affected by the continuous noise produced by dredge operations, compared to those without a swim bladder. Fish possessing a swim bladder do show some temporary hearing loss and behavioral effects such as avoidance and site aversion (Popper et al. 2014). Although dredging may not produce sound levels that can be lethal to fish, dredging noises may mask natural sounds used by fish to locate prey or suitable habitat, thus effecting foraging ability, spawning aggregations, or optimal habitat utilization.

4.3.8 Changes in Salinity

When a channel is dredged, the increased depth can result in higher salinity farther upriver, a type of habitat conversion (see section 4.3.10). The intrusion of salt water further into the estuary or in the river system could impact fish assemblages. Higher salinities tend to occur once a channel is dredged, and thus become less desirable or suitable for species that have a lower salinity tolerance or preference. This can lead to shifts in fish communities, abundance in a small area, increased competition, and could result in negative shifts within food-web dynamics (Güt and Curran 2017). However, given the scope of the activities considered herein, change in salinity is not considered a major threat for the activities covered by the Programmatic EFH Consultation.

4.3.9 Habitat Removal and Degradation

In the AIWW, the frequency of maintenance dredging is not expected to be significantly different than what has occurred in past maintenance events. Stickney and Perlmutter (1975) documented rapid community recovery of benthic organisms post dredging, as well as no to very little change in sediment composition between dredging events in the AIWW. The existing navigation channel side-slopes are not expected to change with any maintenance dredging event and, therefore, shellfish harvest areas adjacent to the channel should not be impacted. These shellfish areas are important essential fish habitats and nursery areas, especially for juvenile gray snapper and gag grouper. Maintenance dredging along the AIWW has been shown to completely displace infauna communities, but both species diversity and composition returned to their pre-dredging levels within a month of post-dredge operations (Stickney and Perlmutter 1974). Given the highly variable nature of most estuarine and marine benthic assemblages on the southeastern coast of the U.S., disturbances by maintenance dredging and placement activities usually represent relatively minor and short-lived impacts, consistent with the ecological disturbance theory.

4.3.10 Habitat Conversion

Habitat conversion is a form of habitat destruction, characterized by the conversion of one naturally functioning aquatic system at the expense of creating another. Habitat conversion typically occurs with the conversion of: shallow subtidal to deeper subtidal habitats; intertidal to subtidal or upland habitats; and salt marsh or oyster beds to mud flats. These habitat conversions can cause a ripple of changes to estuarine circulation, salinity, sediments, and can directly influence the distribution of estuarine and nearshore marine biota. New dredging work poses the risk of converting intertidal habitats to subtidal habitats, while maintenance dredging poses the risk of converting shallow subtidal habitats to deeper subtidal habitats (SAFMC Habitat Plan 1998). Additionally, beach placement and similar beneficial reuse projects pose the risk of converting historical subtidal beach into intertidal beach if too much sand is deposited along the beach at once or in a manner that disrupts the beach slope. The ecological characteristics of the beach fauna and flora are very much determined by morphodynamic beach characteristics such as grain size and beach slope; very similar to the construction of hard structures to manage beach erosion (i.e., rock jetties), beach placement puts a severe pressure on the biota living on, in, and around these sandy beaches (Eede 2013). Past the initial disturbance of beach placement, benthic and infaunal communities can be further disrupted and altered if the beach face is converted into intertidal or even subtidal habitats.

Upland placement methods have the potential to convert salt marsh or oyster bottom to mud flats if sediments are not disposed of in a confined manner. Intertidal conversions pose the risk of impacting plant and animal assemblages unique to tidal regimes, substrate, light, and exposure (i.e., air and water exposure). The loss of intertidal habitat, which provides essential refugia and nursery functions for most managed fishes, represents potential reductions in coastal habitat carrying-capacity and connectivity (Peterson et al. 2003). The deepening of shallow sub-tidal habitat can cause multiple losses to habitat integrity including: reduction in photosynthetic ability within the water column; reductions in primary and secondary productivity; increase the likelihood of benthic hypoxia; and alterations to localized benthic-pelagic coupling which effects

both federally and state managed species. Particular care should be given to the design and implementation of beneficial reuse projects to ensure that habitat conversions are avoided in order to minimize adverse impacts.

4.3.11 Discharge of Pollutants

Every year, diesel, petrol, oil, and other toxic chemicals are accidentally discharged into marine waters during vessel operations. Major oil spills can occur when vessels collide, run aground, or occur when oil cargoes are transferred. Oils discharged into the marine area can have serious implications on: megafauna; fishes; micro-organisms that break down these oils; estuarine dwelling organisms; as well as the contamination of shellfish beds. The accidental release of oil into seawater introduces PAHs, which are typically sequestered in bottom sediments. Once bottom sediments are disturbed, the petroleum components (usually PAHs) are reintroduced into the water column, becoming available for consumption or come into contact with a variety of organisms. The discharge of these and other pollutants has been linked with dysfunctions in reproductive success, endocrine disruption, post larval growth, and embryonic development of fish (Collier et al. 2013).

4.3.12 Grounding, Sinking, or Prop Scaring

Ship grounding is the impact of a ship on the seabed, usually a result of accidental "running aground," where the depth of the ship passage is not sufficient to completely submerge the ship's hull. Grounding can also result from vision impairment, current and tide swings, waves, wind, and speed of the vessel. Other forms of vessel to seabed interaction including boat sinking and prop scaring. Sinking occurs when the majority of a ship's hull is submerged or the vessel capsizes. Prop scaring is the result of vessels traveling in areas too shallow for the vessel operation, and the propellers leave permanent scars on the seabed floor. In areas where habitats are susceptible to disturbances, ship to substrate interaction can lead to a reduction in habitat productivity, reduction in the number of organisms in that locality, habitat destruction, and direct organism mortality (IMO 2018).

4.3.13 Shoreline Erosion

Vessels moving at fast speeds through coastal passages can create a large wake, which in turn can impact the estuarine environment. Shoreline erosion is particularly associated with large vessels or fast ferries, which are much faster than conventional vessels (e.g., dredging vessels). Faster speeds produce a longer-period wake, which disturbs the seabed at greater depths than conventional shipping. Ship wakes can become the major source of energy in coastal systems where the level of background energy is low and pose a greater risk to shoreline erosion. This is the case for enclosed basins such as estuaries, coastal lagoons, embayments, and intracoastal waterways. This can result in changes to the coastline habitat and the composition of the communities that live there by altering the shape of the shoreline, resulting in accelerated coastal erosion. Coastal erosion can lead to a range of detrimental effects including economic impacts due to property destruction, habitat destruction and degradation, and ecological impacts resulting from loss in biodiversity (associated with habitat removal and degradation 4.3.9 and habitat conversion 4.3.10).

5. Programmatic EFH Consultation Conservation Recommendations for Navigation Activities

This Programmatic EFH Consultation is for the Charleston District's navigation projects and minor new work associated with navigation projects and activities. During the formulation of the programmatic consultation process, the Charleston District coordinated the activity categories with NMFS. In addition, the Charleston District requested NMFS to provide conservation recommendations that would help conserve EFH by avoiding and minimizing adverse effects to EFH. The Charleston District has generally accepted these conservation recommendations described here in Section 5 of this Programmatic EFH Consultation, but will still undertake project-specific review in accordance with Appendix B. To comply with this Programmatic EFH Consultation, the Charleston District will implement all applicable conservation recommendations described within the category that contains that activity, unless otherwise documented in accordance with Appendix B. In addition to these conservation recommendations, the Charleston District may propose additional measures that would result in reduced adverse effects to EFH, but may not substitute new measures for the conservation recommendations linked to each activity as described in this Programmatic EFH Consultation unless otherwise documented in accordance with Appendix B. If NMFS notifies the Charleston District (in accordance with Appendix B) that NMFS' Southeast Regional Office, Habitat Conservation Division (SERO HCD) does not concur with the Charleston District's determination that the project is consistent with the Programmatic EFH Consultation, the Charleston District will conduct additional coordination with SERO HCD and a separate individual EFH consultation may be required.

Conservation recommendations, such as Best Management Practices (BMPs), will address all reasonably foreseeable adverse impacts on EFH by similar individual actions occurring within a given geographic area. Therefore, this section lists BMPs focusing on avoidance and minimization strategies to avoid adverse impacts to EFH most applicable to navigation activities and does not include BMPs that would be applicable only to new dredging projects. The BMPs provided below are commonly recommended for navigation activities and can be traced back to Non-Fishing Impacts to EFH and Recommended Conservation Measures Guide (NOAA Fisheries 2003), the National Park Service Beach Nourishment Guidance (Dalles et. al 2012), and the SAFMC beach dredging and renourishment policy (2015; can be found at http://safmc.net/).

5.1. Time of Year Recommendations

Time of Year (TOY) restrictions are recommendations providing the optimal time periods for federal projects to perform dredge and disposal activities. These TOY recommendations are a type of environmental time window routinely recommended by resource agencies to further protect sensitive biological resources, habitats, and organisms from potentially detrimental effects of dredging and disposal operations. Annually, around 80 percent of all USACE civil works navigation projects implement environmental windows, including the Charleston District (Reine et al. 1998). TOY recommendations can be categorized on the likelihood of effects to fish and other species based on entrainment, turbidity, sedimentation, physical disturbance, dissolved oxygen, and migration patterns, as well as effects to: oysters, shellfish, crab, lobster, shrimp, and submerged aquatic vegetation, Potential detrimental impacts to federally managed species and

anadromous fishes are the common reasons for a District to consider TOY recommendations. TOY recommendations for South Carolina are provided in Table 2 using current literature and available fisheries independent data from SCDNR and GADNR, as well as additional information provided by the National Centers for Coastal Ocean Science (NCCOS) (Wickliffe et al. 2019). The TOY recommendations were designed to reflect major ingress and egress times, as well as vulnerable life stages of managed species present in EFH. Seasonal conservation measures for fisheries during coastal development activities in the Carolinas and surrounding areas are available through NCCOS (Wickliffe et al. 2019).

All Charleston District navigation activities should be timed and located in ways that avoid and minimize potential adverse impacts to NOAA-trust resources, as practicable (Table 2). The TOY recommendations for discouraging navigation dredging of coastal inlets and AIWW and sediment transport is from March through October, and encouraging navigation actions to occur during November through February. Due to the large amount of ingressing larval stages in March through May, the NMFS recommends avoiding dredging and related navigation actions in coastal inlets and the AIWW, as practicable, especially in areas with marine emergent wetlands (i.e., intertidal marshes) to avoid larval entrainment. Ideally, but only as practicable, navigation actions would be restricted through the summer to allow for the growth of larvae and juvenile life stages until October 15, when the majority of animals reach maturity and egress out of the estuary to offshore waters. To the maximum extent practicable, activities should be conducted when species are not present in the project area, or are present in low densities. For this reason, the NMFS recommends conducting in-water work from October 15 until March 15 as practicable, if located in areas where managed species persist; however, the time between March 15 and April 15 can be used to conduct navigation activities when the TOY cannot be accommodated. Ideally, and as practicable, navigation work should occur before April 15 to allow recovery of the benthos used by susceptible life stages throughout the spring and summer, ahead of the fall egress.

Table 2. Time of Year recommendations for navigation activities. Using the current literature, the NCCOS Tech Memo, and SCDNR and GADNR Fisheries Independent Data, ingress and egress times, as well as fish presence for each of the following managed species present in inlets and estuarine EFH located with navigation activities were estimated by life stage. Neonatal and juvenile Bull shark presence is pulled from Streich and Peterson (2011). Life stages are designated with the following abbreviations in order: E – egg; L – larvae; P –post larvae; N – neonate; J – juvenile; S – sub-adult; A – adult. Young of year (YOY) indicate young juveniles less than a year old.

Species	Month											
	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec
White Shrimp	J	J	L, P	L,P	P	P, J	J	J	J	J	J	J
Brown Shrimp		L,P	L,P	P	P	J	J	J				
Gag Grouper			P	P	P, J	P, J	J	J	J	J		
Gray Snapper									L, P	P, J	P, J	P, J
Black Sea Bass			P	P	P	P, J	P, J	P, J	J	J		
Spanish Mackerel						L, P, A	P, J	P, J	P, J	J, A		
Summer Flounder	L	L, J	J,A	J,A	J,A	J,A	J,A	J,A	J,A	L,J, A	L, J	L, J
Bull shark	A	A	A	A	N,J,S, A	N,J,S, A	N, J, S, A	N,J,S, A	YOY, J,S, A	YOY, J, S	A	A
Sandbar Shark						N, J, A	N, J	N, J	N, J	J		
Scalloped Hammerhead					N, J, A	N, J, A	N, J, A	YOY, J	YOY, J	YOY, J	YO Y, J	
Lemon Shark					N, J, S, A	N, J, S, A	YO Y, J, S, A	YOY, J, S, A	YOY, J, S, A	YOY, J, S, A		
Location												
Coastal Ocean/Inlets*												
AIWW												

*-timed to allow recovery of benthos ahead of fall egress

Legend			
Species Occurrence		Time of Year Recommendations	
Ingress		Preferred Time for In-Water Work	
Present		Consider avoiding In-Water when practicable	
Egress		Avoid In-Water Work when practicable	

5.2. Dredging

5.2.1. Potential Adverse Impacts

The environmental effects of dredging in or adjacent to designated EFH areas can include: (1) direct removal and burial of organisms; (2) turbidity and siltation effects, including light attenuation; (3) contaminant release and uptake including nutrients, metals, and organics; (4) suspended sediments; (5) sedimentation; (6) alteration to hydrodynamic regimes and physical habitat; and (7) habitat degradation and/or conversion.

5.2.2. Recommended Best Management Practices

1. Avoid new dredging to the maximum extent practicable.
2. If minor new work is deemed necessary as part of navigation activities, then dredging area and volume should be reduced to the maximum extent practicable that will still accomplish the stated project purpose; areas that are within the project area, but are deeper than the target dredge depth should be avoided.
3. Incorporate adequate control measures to minimize turbidity plumes. Hydraulic dredging techniques should be the preferred method in areas with fine sediments to reduce turbidity plumes.
4. Equipment to avoid and minimize impacts to species should be used during dredging activities. These include, but are not limited to, sea turtle deflector dragheads and floating pipelines. Inflow screening baskets should be installed to monitor the intake and overflow of the dredge.
5. Avoid placing dredging pipelines and accessory equipment close to oyster aggregations, estuarine/salt marshes, and other high value habitat areas.
6. Implement time-of-year recommendation (i.e., environmental windows), as practicable, to further avoid impacts to habitat during species critical life history stages. Perform dredging during the time frame when impacts due to entrainment of federally managed species or their prey are least likely to be entrained, as practicable. Dredging should be avoided in areas with oyster aggregations.
7. For maintenance dredging, sources of erosion in tidally influenced areas should be identified that may be contributing to excessive siltation and sedimentation and the need for maintenance dredging. Techniques or programs should be implemented that reduce erosion and sedimentation.

For unavoidable adverse impacts to EFH, the Charleston District will consider measures to minimize, mitigate, or offset such effects of the activity on EFH, as appropriate.

5.3. Placement of Dredged Material

5.3.1. Potential Adverse Impacts

The placement of dredged material can adversely affect EFH by: (1) impacting or destroying benthic communities; (2) habitat removal and degradation; (3) creating turbidity plumes; (4) introducing contaminants and/or nutrients; and (5) burial of organisms.

5.3.2. Recommended Best Management Practices

1. All available options for placement of dredged materials, including placement sites and methods used should be thoroughly investigated. Placement areas should be properly sited, managed, and monitored to avoid adverse impacts associated with dredge material placement.
2. Placement of dredge material in EFH should meet or exceed applicable state and/or federal water quality standards for such placement.
3. Direct and indirect impacts of open-water disposal of dredged material on EFH should be assessed during navigation project reviews. If necessary (e.g., the project occurs outside TOY recommendation), physical and biological monitoring programs to gauge whether actual results of open-water placement are within the predicted ranges should be conducted.
4. The areal extent of any placement site in EFH should be avoided or, if identified as a beneficial use, minimized.
5. Dredge placement sites should be appropriately considered, using the volumes of proposed dredged material prior to dredging so placement sites will adequately contain dredge material.
6. Beneficial uses of uncontaminated sediments should be considered whenever practicable; materials that contribute to habitat restoration and enhancement should be prioritized.
7. When practicable, placement of dredge material should be avoided outside the TOY recommendations (Section 5.1) when direct burial or sedimentation to EFH, federally managed species or their prey are most likely to be impacted.
8. Placement of material into undiked tracts, regardless if Geotubes or similar structures are used, should include Best Management Practices to minimize the likelihood of impacts occurring outside placement areas from the dredged material and from any dike construction.
9. Pipelines between the dredges and placement sites should pass through the least amount of EFH, as practicable, and avoid oyster beds.

For unavoidable adverse impacts to EFH, the Charleston District will consider measures to minimize, mitigate or offset such effects of the activity on EFH, as appropriate.

5.4. Dredging Vessel Operations and Transportation of Dredged Material

5.4.1. Potential Adverse Impacts

The routine operation and maintenance of navigable waterways introduces dredging vessels more frequently to the surrounding environment. The use of large dredge vessels increases the likelihood of encounters with the surrounding habitat and organisms, including dredging vessel groundings, modification of water circulation (breakwaters, channels, and fill), dredging vessel wake generation, pier lighting, anchor and prop scouring, and the discharge of contaminants and

debris. Direct impacts include permanent or temporary loss of productive forage habitat resulting from minor channel realignment and maintenance dredging, turbidity-related impacts due to both dredging and placement of dredged material, and reduced water quality from resuspension of contaminated sediments. Dredging vessel discharges, engine operations, bottom paint sloughing, boat wash-downs, painting and other vessel maintenance activities can deliver debris, nutrients, and contaminants to waterways and may degrade water quality and contaminate sediments if gone unnoticed.

5.4.2. Recommended Best Management Practices

1. For unavoidable adverse impacts to EFH, compensatory mitigation may be required to replace the loss of wetland, stream, and/or other aquatic resource functions and area.
2. Include low-wake vessel technology, appropriate routes, and best management practices for wave attenuation structures as part of the design process. Dredging vessels should be operated at sufficiently low speeds to reduce wake energy, and no-wake zones should be designated near sensitive habitats.
3. The discharge of contaminated bilge water and sewage is illegal and strictly prohibited.
4. Prevent oil contamination of bilge water. Do not drain oil into the bilge. Use containment troughs underneath the engine to capture any drips or spills and oil absorbent pads, socks or pillows to soak up oil and fuel. Keep the bilge area of the dredging vessel as clean and dry as possible fixing all fuel and oil leaks as they occur. Inspect fuel lines and hoses for chaffing, wear, and general deterioration and secure and prevent hoses from chaffing. Clean bilge areas after engine maintenance.

5.5. Beneficial Use - Beach and Nearshore Placement

This section lists BMPs focusing on avoidance and minimization strategies to avoid adverse impacts to EFH most applicable to federal navigation project beach and nearshore placement activities and does not include BMPs that would be applicable only to new beach nourishment projects.

5.5.1. Potential Adverse Impacts

The implementation of restoration/enhancement activities may have localized and temporary adverse impacts on EFH. Possible impacts can include: (1) localized nonpoint source pollution such as influx of sediment or nutrients; (2) interference with spawning and migration periods; (3) temporary or permanent removal of feeding opportunities; and (4) animal burial or smothering.

5.5.2. Recommended Best Management Practices

1. Use material consisting solely of natural sediment and shell material, containing no construction debris, toxic material or other foreign matter.
2. Use material similar in color and grain size distribution (sand grain frequency, mean and median grain size and sorting coefficient) to the native material in the project area. Ideally, sediment used for beach placement should be indistinguishable from native site sediment in terms of color, shape, size, mineralogy, compaction, organic content, and sorting. Sediment for nearshore placement should also be of similar color, shape, size, mineralogy, compaction, organic content, and sorting to any nearby beach sites.
3. Beach placement projects should use fill material with a composite grain size distribution similar to that of the native beach material. Ideally, the median size of the dredged sediment should not be less than the median of the native material and the spread of sizes in the dredge distribution should not exceed that of the native sediment.
4. Avoid beach and nearshore placement in areas containing sensitive marine benthic habitats adjacent to the beach (e.g., spawning and feeding sites, hard bottom, and cobble/gravel substrate).
5. When practicable, conduct beach and nearshore placement following the TOY recommendations (Section 5.1), when productivity for benthic infauna is at a minimum; this may minimize the impacts for some beach sites.
6. Slope of the beach after placement of dredged material should mimic the natural beach profile.
7. The overall volume of fill material to be added to the beach in any fill episode should not exceed 50 percent of the estimated annual net sediment transport for the beach in order to minimize the magnitude of the disturbance to the ecosystem and to prevent large-scale alterations of the local coastal processes.
8. If heavy equipment is used on the beach for placement activities, it should not leave ruts. Storage of heavy equipment and pipe on the beach should be avoided to the extent possible, using staging areas off of the beach wherever available.
9. When practicable, placement episodes should only be conducted after the ecosystem has fully recovered for a duration of at least one year, preferably two or three, in order to avoid permanent perturbations to the system; and disturbances should be episodic and their ecological impacts should not overlap between placement episodes (i.e., a placement episode should not take place before the impacts from the previous fill event have completely abated).
10. A during-construction monitoring plan as deemed necessary for a specific project, designed with appropriate methodology to adequately detect and document both direct and indirect project impacts. Monitoring plans, if deemed necessary, should follow the Before-After-Control-Impact (BACI) sampling framework.
11. A post-construction monitoring plan as deemed necessary for biological, physical and water resources designed with appropriate methodology to adequately detect and document both direct and indirect project impacts. Monitoring plans, if deemed necessary, should follow the BACI sampling framework.

6. Programmatic Consultation Procedures

For a given navigation project, the Charleston District must first determine whether EFH may be present and whether the activity is covered under this programmatic consultation. The Programmatic EFH Consultation will serve as a fundamental tool between NMFS and the Charleston District to review activities that conform to all conditions described. This programmatic consultation will be adaptive, accountable, and credible as a conservation tool. As such, additional categories of activities and/or stressors may be added and/or removed based on best available scientific information. The scope of the Programmatic EFH Consultation remains limited to those activity and project types that will not have a substantial adverse effect both individually and cumulatively on EFH. The review and consultation procedures are further described in the following section.

6.1 Annual Meeting

Following the implementation of this Programmatic EFH Consultation, the Charleston District and SERO HCD will meet annually, in-person or virtually. The Charleston District and SERO HCD may subsequently agree to meet less often if both agencies agree the programmatic consultation is functioning as intended and if less frequent meetings will not undermine the goals of the Programmatic EFH Consultation. At the meeting, the Charleston District and SERO HCD will:

• discuss the annual tracking of covered projects;

• evaluate and discuss the continued effectiveness of the programmatic consultation;

• account for any new information or technology;

• ensure the activities authorized by the programmatic consultation continue to minimize adverse effects to EFH; and/or

• update the procedures, covered actions, or best management practices, if necessary.

6.2 Project Verification Requirements

After implementation of this Programmatic EFH Consultation, the Charleston District will not need to initiate individual EFH consultation for covered navigation projects (Section 2). For each project proposed under this Programmatic EFH Consultation, the Charleston District will provide all of the required project-specific information to SERO HCD. This will serve as a record of the activity to take place and account for cumulative effects of those activities funded or authorized by the Charleston District. The Charleston District will track and analyze the activities on an annual basis, as noted below, and will review the results with SERO HCD.

6.2.1 Initial Screening Process

6.2.1.1. The Charleston District will screen the project for the presence of EFH/EFH-HAPC and/or federally managed species (Section 3).

6.2.1.2. If EFH may be present within the project action area, then the Charleston District will review the Programmatic EFH Consultation to determine whether the project conforms to the activity description and the specified criteria and limitations.

6.2.2 Impact Determination and Consultation Type

Once there is sufficient information on the project design, the Charleston District will make an EFH determination on the project effects using the following standards.

6.2.2.1. If the action does not adversely affect EFH temporally or spatially, the Charleston District will determine that an action covered by this Programmatic EFH Consultation will not adversely affect EFH, and no EFH consultation is required. It is not necessary to notify SERO HCD or seek NMFS' concurrence with the determination if there is no adverse effect to EFH.

6.2.2.2. If the action may adversely affect EFH, then the Charleston District will initiate programmatic consultation with SERO HCD in accordance with Appendix B. An adverse effect may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystems components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from an action occurring within or outside EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

6.2.3 Projects using Programmatic EFH Consultation process

6.2.3.1. The Charleston District will send the verification form (Appendix B) to SERO HCD for each project covered under the Programmatic EFH Consultation, with complete project information.

6.2.3.2. Within 15 calendar days of receipt of the verification form (Appendix B), SERO HCD will notify the Charleston District (via execution of Part III of the verification form) whether SERO HCD concurs with the Charleston District's determination that a given project is consistent with the Programmatic EFH Consultation. If the 15th calendar falls on a weekend, the deadline shall be the next business day. The Charleston District will ensure that any project using the Programmatic EFH Consultation incorporates all applicable EFH best management practices, unless otherwise documented in accordance with Appendix B.

6.3 Annual Report

The Charleston District will provide an annual summary of the activities carried out under this Programmatic EFH Consultation for the purpose of determining the effectiveness of the programmatic consultation and calculating aggregate effects. The Charleston District will provide the compiled information to SERO HCD for the previous calendar year of activities, each year that the Programmatic EFH Consultation is in effect. The reporting period ends December 31each year and the Annual Report will be due 90 days later.

The Annual Reporting Spreadsheet and description of results will be sent electronically to:

National Marine Fisheries Service SERO
Habitat Conservation Division
Attn: Cindy Cooksey
331 Fort Johnson Road
Charleston, South Carolina 29412
Cynthia.Cooksey@noaa.gov and nmfs.ser.hcdconsultations@noaa.gov

6.4 Revisions and Withdrawal

The Charleston District and SERO HCD will discuss the need for revisions at the annual meetings, as noted above. Revisions may be needed to account for new information or technology or to better streamline the coordination process. SERO HCD and the Charleston District may revise this document (e.g., restricting or expanding its scope) at any time by agreement of both agencies. At any time, NMFS or the Charleston District may withdraw from this Programmatic EFH Consultation by providing written 15-day notice. NMFS and the Charleston District are encouraged, but not required, to attempt to address any issues via proposed revisions before withdrawing from the Programmatic EFH Consultation.

6.5 Supplemental Consultation

Pursuant to 50 CFR § 600.920(a)(l), the Charleston District must reinitiate EFH consultation with SERO HCD if the proposed action considered under this Programmatic EFH Consultation is substantially revised in a manner that may adversely affect EFH, or if new information becomes available that affects NMFS trust resources. In addition, if SERO HCD receives new or additional information that fall outside the scope of this Programmatic EFH Consultation, SERO HCD may request an additional consultation.

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Appendix A: Project and Activity Descriptions

1 Atlantic Intracoastal Waterway.

The AIWW project includes 210 miles of federal channel, 12 ft MLLW deep and not less than 90 ft wide, beginning at the North Carolina – South Carolina state line above Little River Inlet and extending to Port Royal Sound near Hilton Head, as well as upland, and in-water placement areas (Table 1). Maintenance Dredging will be performed using a hydraulic cutterhead dredge. Hydraulic dredging utilizes suction to remove sediments from the channel bed. The cutterhead is a rotating tool mounted in front of the suction head that dislodges and excavates the sediments. The material will be transported hydraulically via a pipeline to the placement sites. Figure1 depicts an overview of the AIWW in South Carolina and Figures 2 through 11 depict shoaling and placement areas.

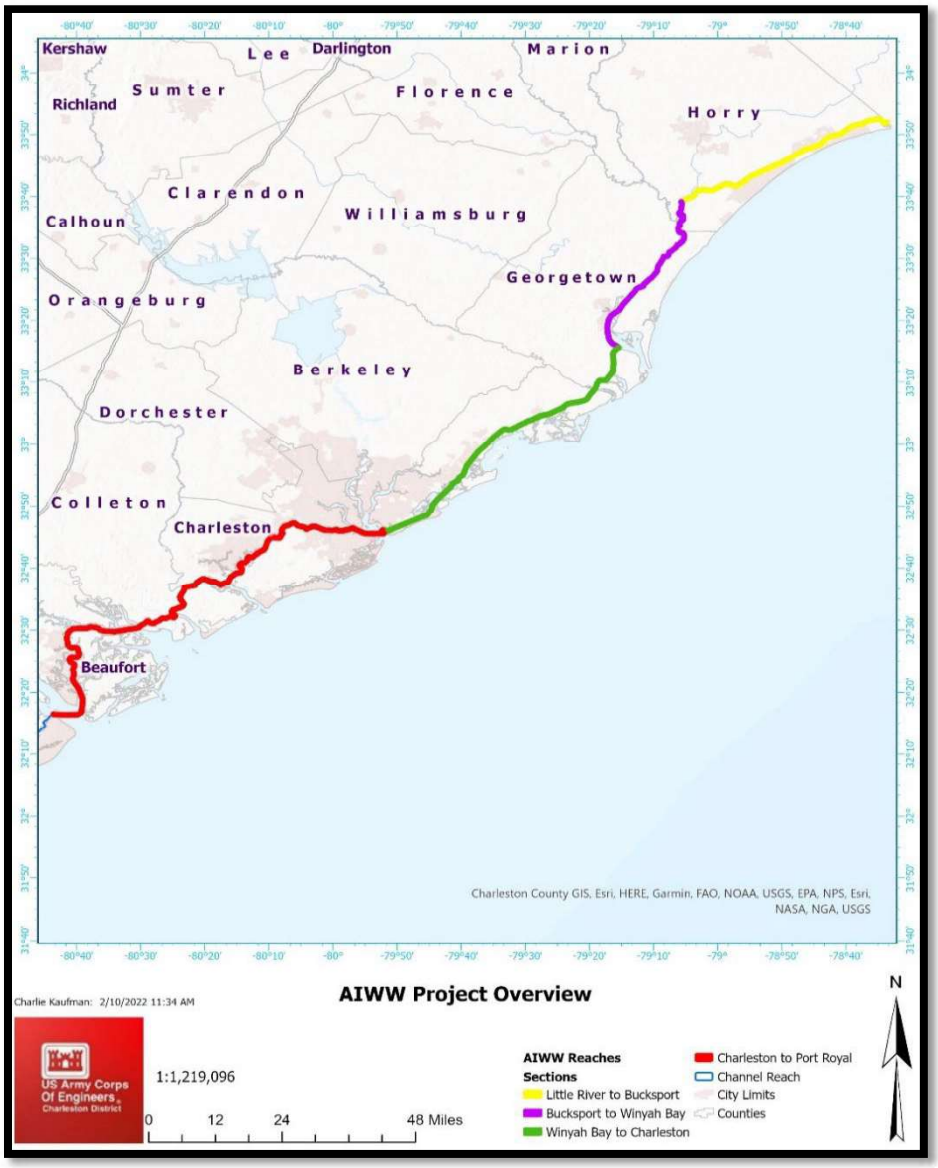

Figure 1. Overview of the Atlantic Intracoastal Waterway in SC

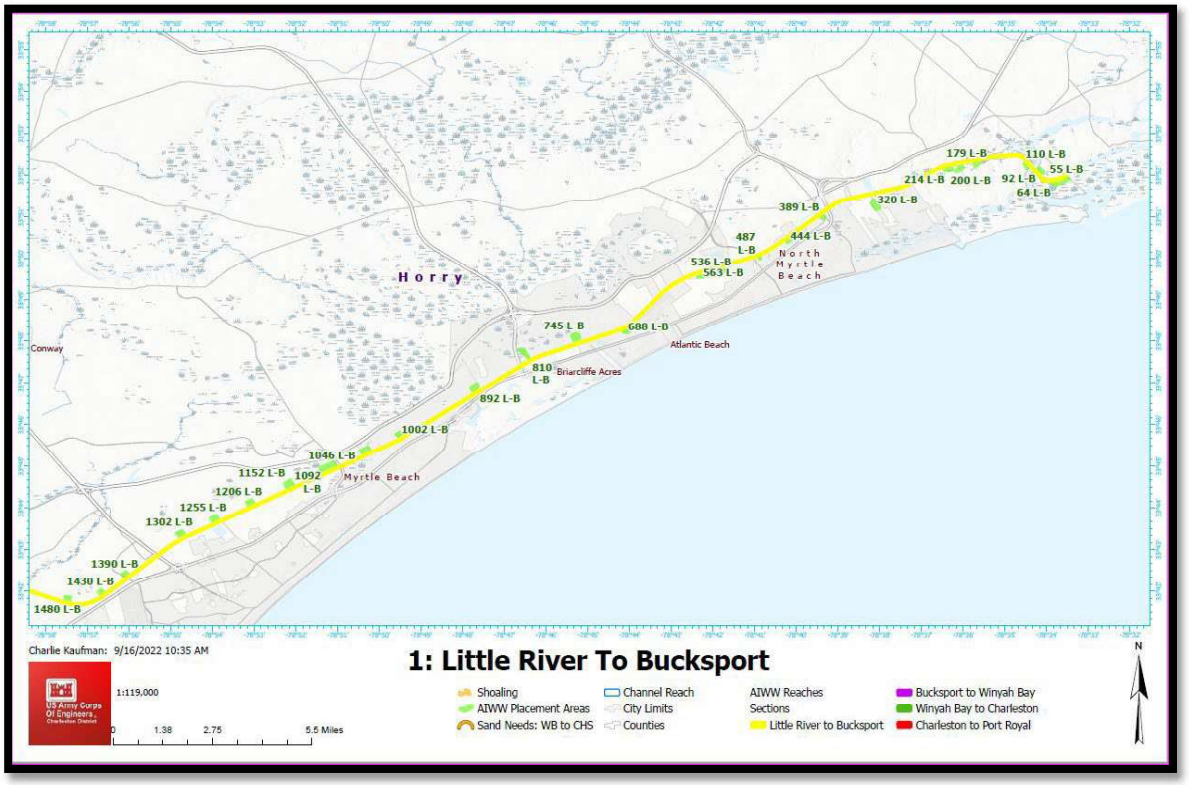

Figure 2. Little River to Bucksport Reach Part 1

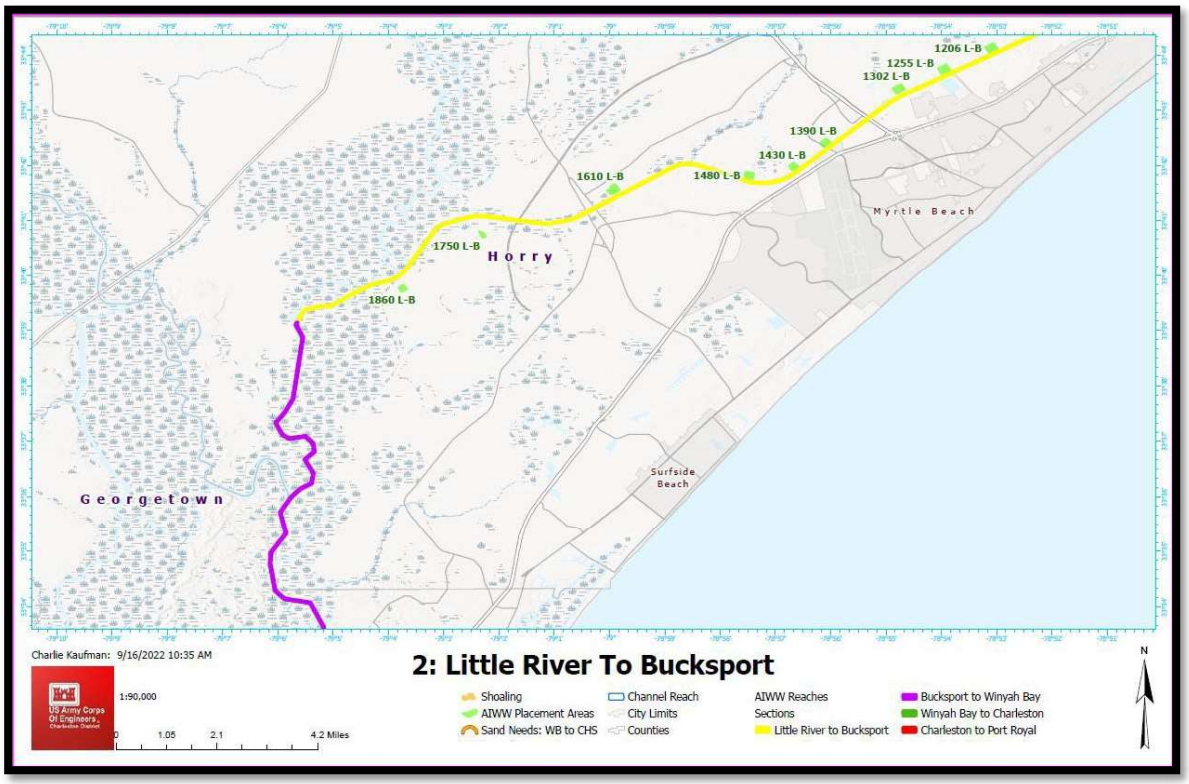

Figure 3. Little River to Bucksport Reach Part 2

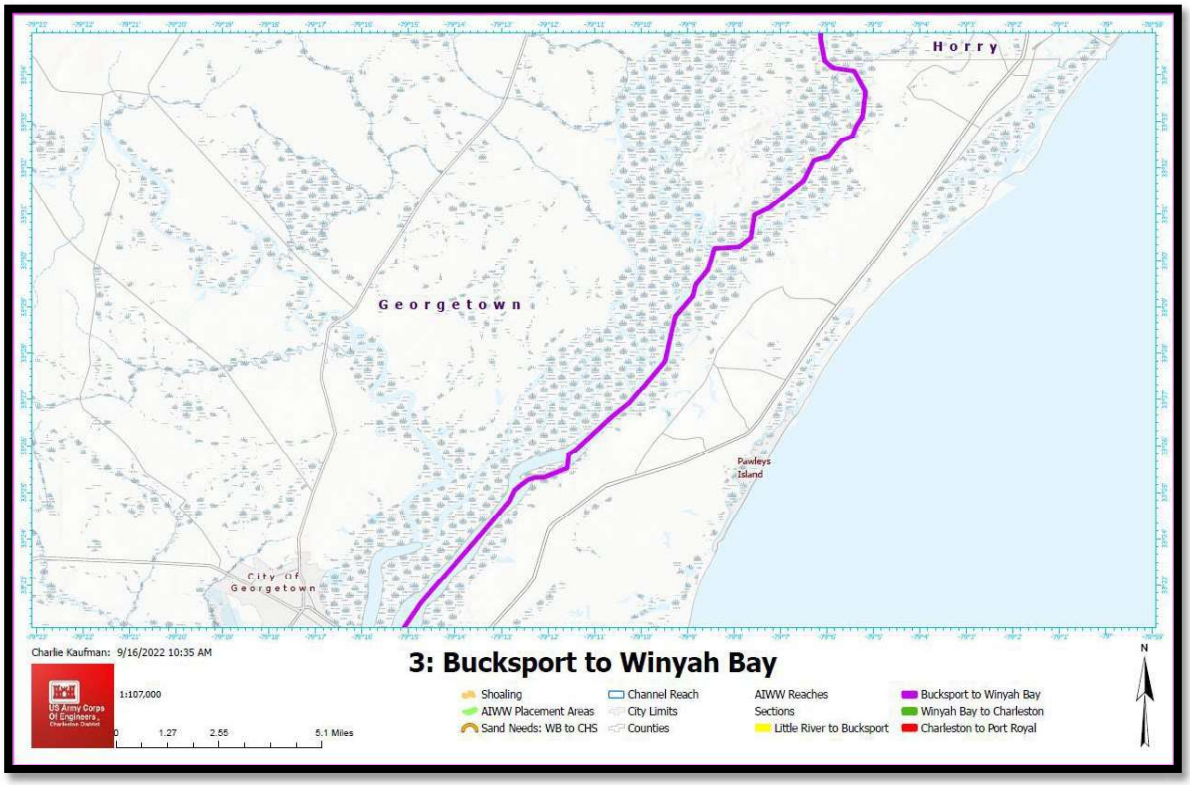

Figure 4. Bucksport to Winyah Bay Part 1

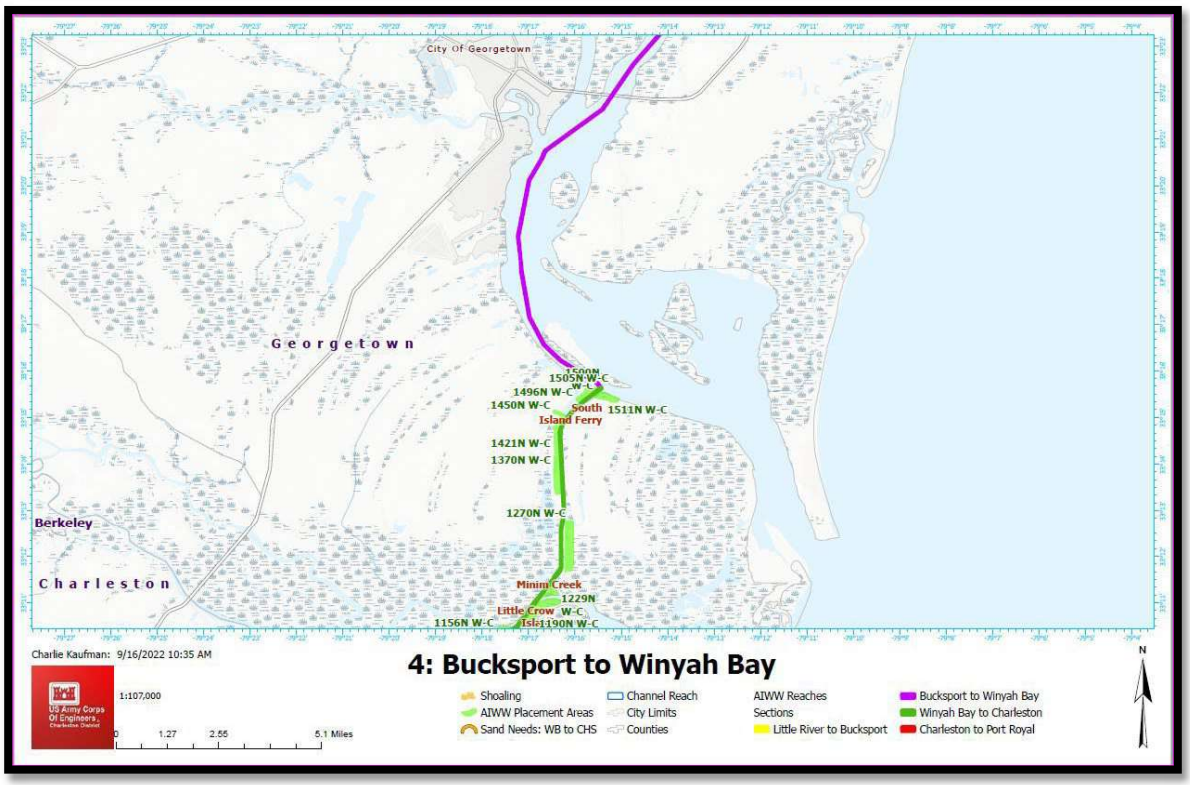

Figure 5. Bucksport to Winyah Bay Part 2

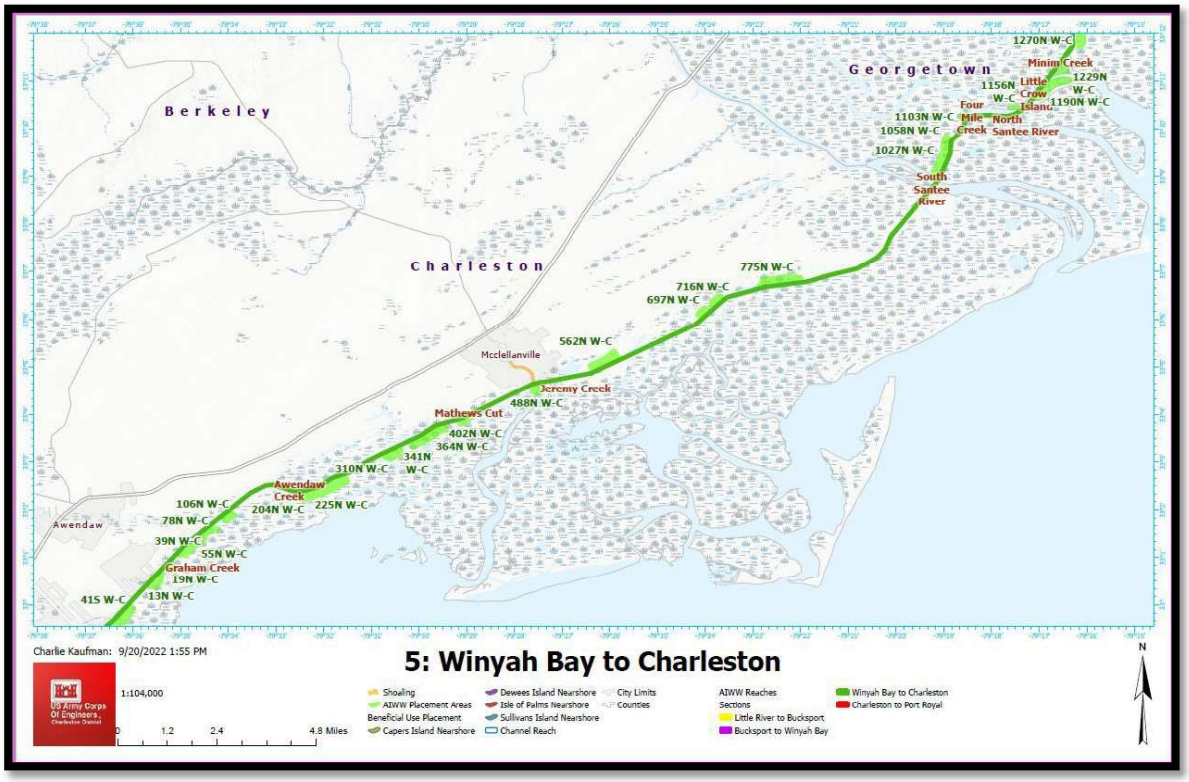

Figure 6. Winyah Bay to Charleston Part 1

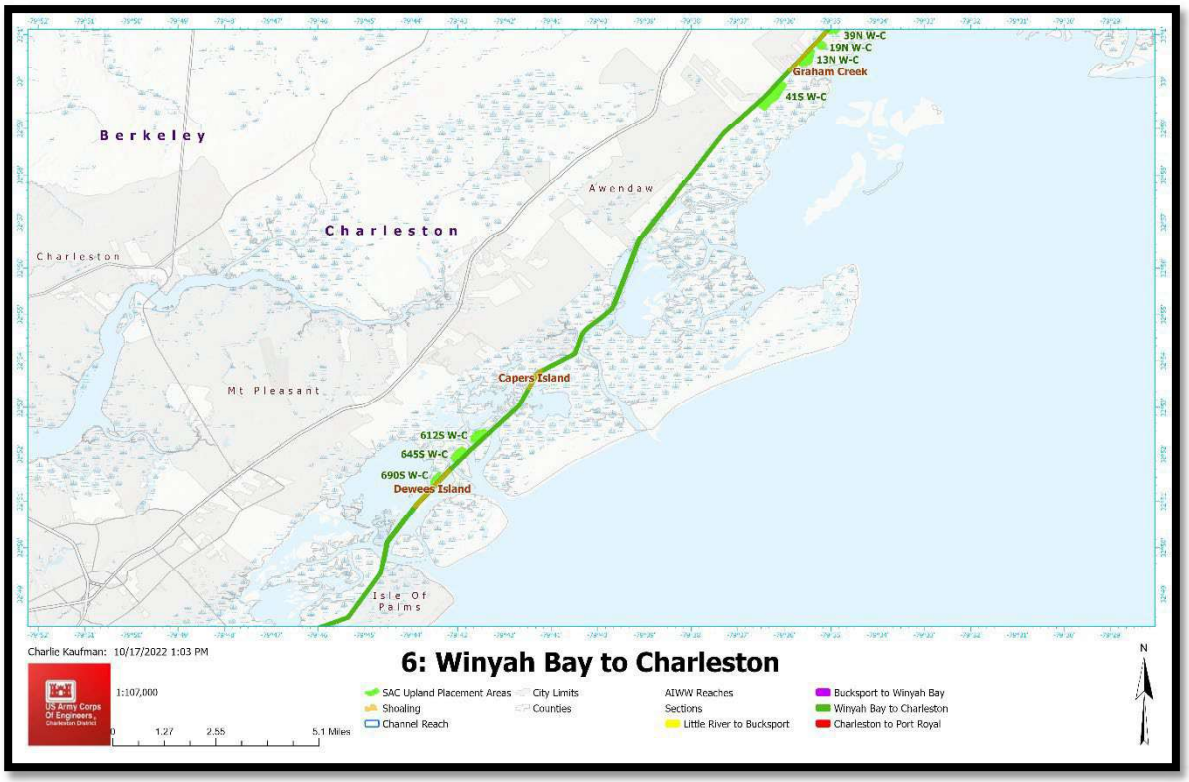

Figure 7. Winyah Bay to Charleston Part 2

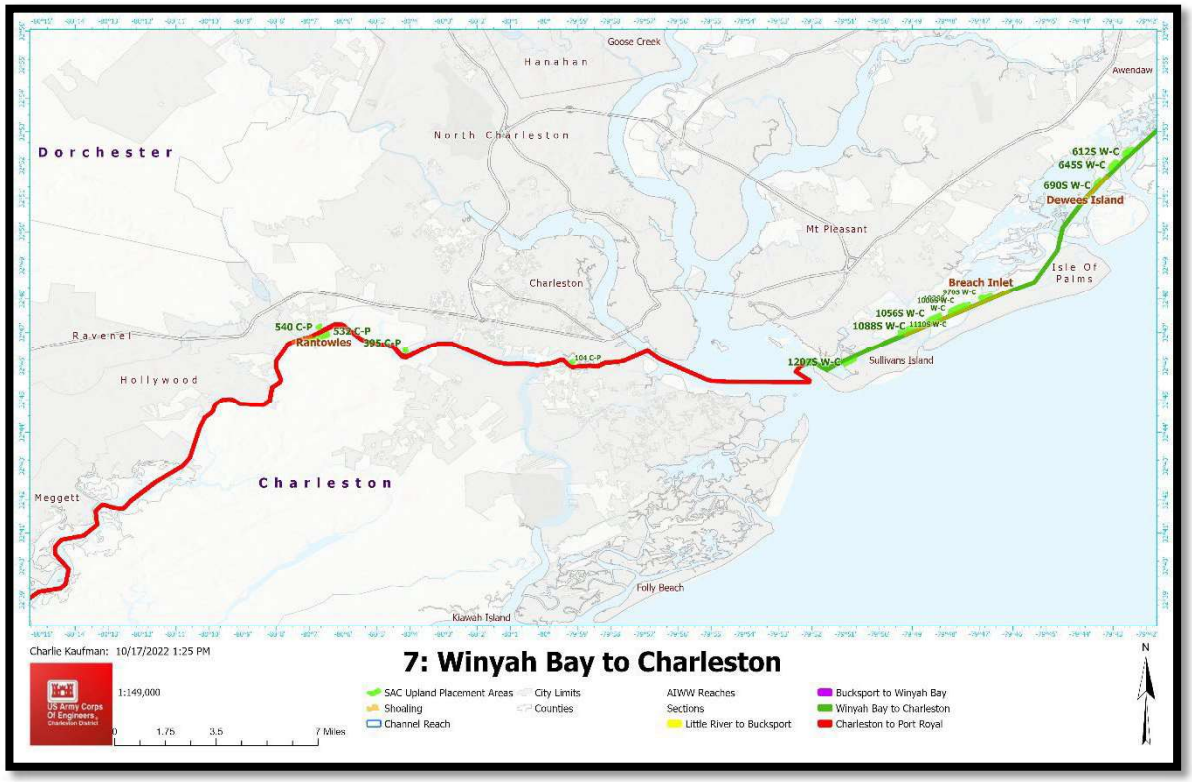

Figure 8. Winyah Bay to Charleston Part 3

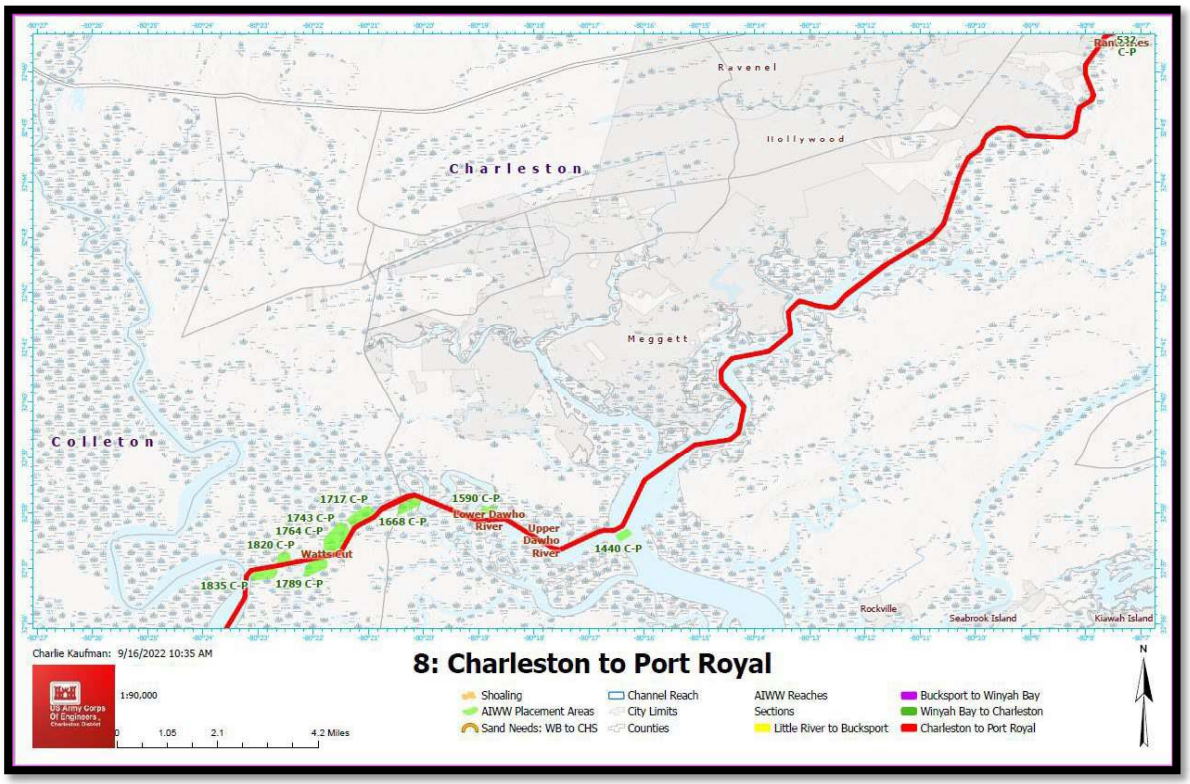

Figure 9. Port Royal to Charleston Part 1

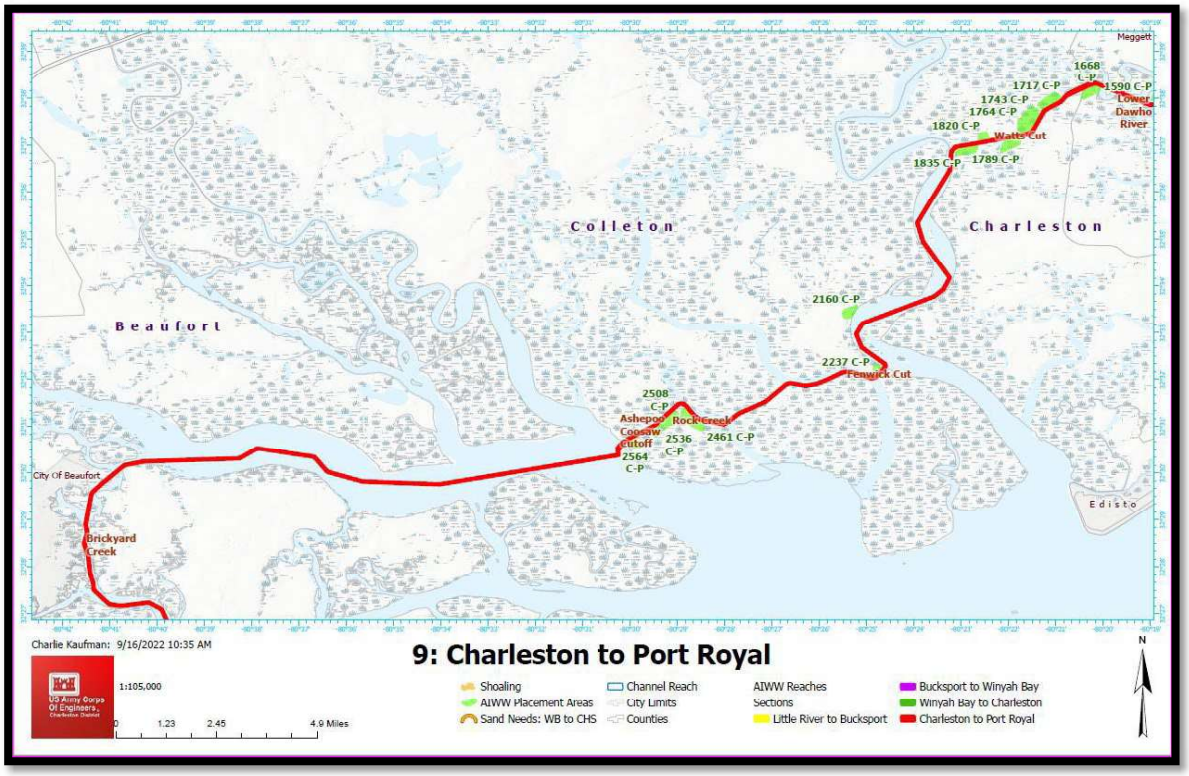

Figure 10. Charleston to Port Royal Part 2

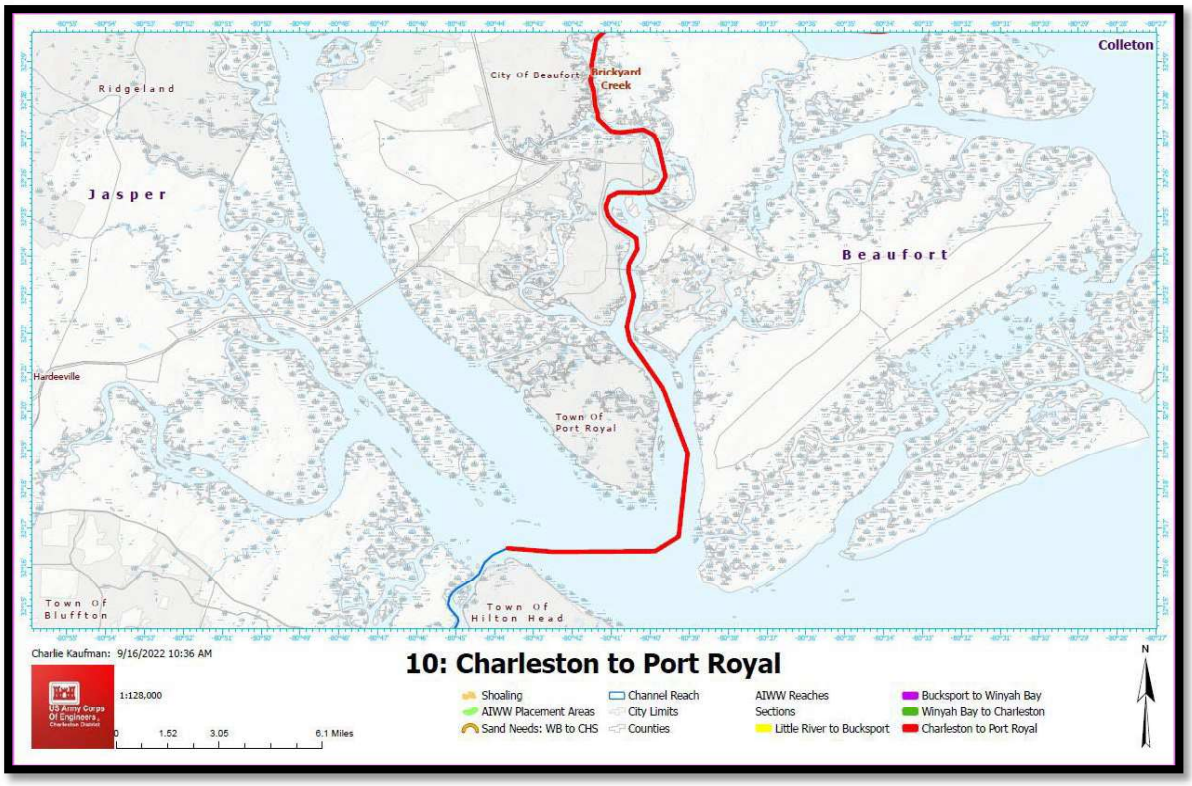

Figure 11. Charleston to Port Royal Part 3

Table 1. AIWW Shoaling and Placement Information

		to	1930+00					
		miles						
	er	Start Station	End Station	Dredge Frequency (months)	Estimated Quantity (cy)	Upland DMMAs	In-water DMMAs	Beneficial Use Options
		1085+00	1100+00	48	10000	1152 L-B	None	Haul Out
Unidentified	N/A	N/A	N/A	As Needed, primarily based on extreme events	As Needed	55, 64, 92, 110, 179, 200, 214, 320, 389, 444, 487, 536, 563, 688, 745, 810, 892, 1002, 1046, 1092, 1152, 1255, 1302, 1390, 1430, 1480, 1610, 1750, 1860 L-B	None	Haul Out
		to	3691+00					
		miles						
	er	Start Station	End Station	Dredge Frequency (months)	Estimated Quantity (cy)	Upland DMMAs	In-water DMMAs	Beneficial Use Options
		N/A	N/A	N/A	N/A	None	None	N/A
		to	6510+00					
		miles						
	er	Start Station	End Station	Dredge Frequency (months)	Estimated Quantity (cy)	Upland DMMAs	In-water DMMAs	Beneficial Use Options
Unidentified	N/A	N/A	N/A	As Needed, primarily based on extreme events	As Needed	775N, 716N, 697N W-C	None	Not pursued at this time
South Island Ferry	N/A	3698+00	3744+00	36	100,000	1511N, 1505N, 1500N, 1496N, 1450N, 1421N, 1370N W-C	None	Not pursued at this time
	Santee	3956+00	3997+35	36	100,000	1270N, 1229N, 1190N W-C	None	Not pursued at this time
	Santee	3997+35	4050+00	36	140,000	1270N, 1229N, 1190N W-C	None	Not pursued at this time
	Santee	4053+00	4066+00	36	25,000	1229N, 1190N, 1156N W-C	None	Not pursued at this time
		4084+00	4109+00	48	50,000	1156N, 1103N, 1058N, 1027N W-C	None	Not pursued at this time
		4195+00	4216+00	48	22,000	1058N, 1027N W-C	None	Not pursued at this time
	g Basin	00+45	42+77.95	24	200,000	562N, 488N W-C	None	Not pursued at this time
Mathews Cut	N/A	4723+18	4926+00	36	730,000	488N, 402N, 364N, 341N, 310N, 225N, 204N W-C	None	Not pursued at this time
		5000+000	5020+00	36	45,000	225N, 204N W-C	None	Not pursued at this time
Graham Creek	N/A	5179+00	5244+00	36	180,000	106N, 78N, 55N, 39N, 19N, 13N, 41S W-C	None	Not pursued at this time
		5730+00	5758+00	48	75,000	612S, 645S W-C	None	Not pursued at this time
		5896+00	5957+00	48	245,000	612S, 645S, 690S W-C	810S W-C (Dewees Inlet)	Not pursued at this time
Breach Inlet	N/A	6163+00	6341+00	24	500,000	970S, 1006S, 1028S, 1056S, 1088S, 1110S, 1207S W-C	810S W-C (Dewees Inlet)	Not pursued at this time
		to	11282+08					
		miles						
	er	Start Station	End Station	Dredge Frequency (months)	Estimated Quantity (cy)	Upland DMMAs	In-water DMMAs	Beneficial Use Options
Unidentified	N/A	N/A	N/A	As Needed, primarily based on extreme events	As Needed	104, 395, 540, 580 C-P	None	Not pursued at this time
		7390+00	7424+00	48	50,000	532 C-P	None	Haul Out
		8274+00	8381+00	Recently realigned	Recently realigned	1590 C-P	1440 C-P (North Edisto River)	Not pursued at this time
		8391+00	8431+00	24	45,000	1590 C-P	1440 C-P (North Edisto River)	Not pursued at this time
Watts Cut	N/A	8511+00	8670+00	24	490,000	1668, 1717, 1743, 1764, 1789, 1820, 1835 C-P	None	Not pursued at this time
		9042+00	9064+00	36	21,000	2160, 2237 C-P	None	Not pursued at this time
		9270+00	9294+00	48	Recently realigned	2461 C-P	None	Not pursued at this time
	Cut	9306+00	9392+00	24	360,000	2461, 2508, 2536, 2564 C-P	None	Not pursued at this time
		10065+00	10083+00	48	Recently realigned	None	None	Not pursued at this time

2 Murrell's Inlet

Murrell's Inlet project (Figure 12) is located on the Atlantic Coast between the south end of Garden City Beach and the north end of Huntington Beach State Park in Georgetown County. The action area includes the federal entrance channel at the inlet located between the south end of Garden City Beach and the north end of Huntington Beach State Park and extending approximately 3000 ft landward from the -12 ft ocean contour, Main Creek extending approximately 3 miles north/northeast from the entrance channel, a 14.9-acre deposition basin located north and adjacent to the entrance channel, an auxiliary channel extending approximately 1000 ft northwest from the entrance channel, and dredge material placement along the shorelines of Huntington Beach State Park and Garden City Beach and along the beach area at the landward terminus of the south jetty. The authorized project dimensions include a 12 ft MLLW deep by 300 ft wide entrance channel and a 10 ft MLLW deep by 90 ft wide inner channel. Maintenance dredging will be performed using a hydraulic cutterhead dredge. The material will be transported hydraulically via a pipeline to the placement sites.

Table 2. Murrells Inlet Project Shoaling and Placement Information

Reaches	Channel Reaches	Shoaling (Cubic yards per event)	Frequency of Dredging (years)	Placement Location	Dredge Type	Sediment Type
Entrance Channel	25+00 to 40+00	300,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand
Auxiliary Channel	00+00 to 10+00	15,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand
Deposition Basin	Entire (14.9 acres)	600,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand
Inner Shoal A	42+00 to 68+00	50,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand
Inner Shoal B	145+00 to 155+00	50,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand
Inner Shoal C	186+00 to 197+00	50,000	5-7 (or as funding permits)	Front Beach, Jetty	Pipeline Dredge	Beach Compatible Sand

Figure 12. Shoaling and Placement Locations for Murrells Inlet.

3 Town Creek

The Town Creek project (Figure 13) is located on the Atlantic Coast between Bulls Bay and Sandy Point near McClellanville, South Carolina. The action area includes an entrance channel approximately 12 ft MLLW deep and 100 ft wide across the ocean bar and approximately 4 miles long from the Atlantic Ocean to the mouth of Five Fathom Creek, and a channel 10 ft MLLW deep and 80 ft wide through Five Fathom Creek and Town Creek to the AIWW, a distance of approximately 6.2 miles. Dredging would be accomplished through sidecast dredge with placement adjacent to the channel or modified hopper dredge for transport and placement along the Lighthouse Island nearshore. Sidecast dredging involves removal of sediments from the channel using drag arms with discharge by pumping the dredged material directly overboard through an elevated discharge boom. A modified (small) hopper dredge is a ship equipped with trailing suction pipes, dredge pumps, and a hopper. The trailing suction pipes are equipped with a drag head that moves over the ocean floor or channel bed to suction sediments and create a slurry. The dredge pumps are used to hydraulically transport the slurry to the hopper for storage and excess water is then allowed to drain from the hopper. Once the hopper is full, the material can be discharged from the bow of the ship using a nozzle, pumped via floating or underwater pipes to a placement area, or deposited through doors located in the bottom of the dredging vessel. Unlike traditional hopper dredge equipment, the modified hopper dredge equipment has small dragheads (2-feet by 2-feet to 2-feet by 3-feet), small openings (5-inch by 5-inch to 5-inch by 8-inch, small suction intake pipe diameters (10-14 inches), and limited draghead suction. Additional activities could include realignment of the entrance channel for the purpose of following deep water and reducing dredging amounts.

Table 3. Town Creek Project Shoaling and Placement Information

Reaches	Channel Reaches	Shoaling (Cubic yards per event)	Frequency of Dredging (years)	Placement Location	Dredge Type	Sediment Type
Entrance Channel (Outer Shoal)	36+00 to 46+00	21,000	5 (or as funding permits)	Nearshore (Lighthouse Island)	Sidecast or modified hopper dredge	Beach Compatible Sand
Entrance Channel (Inner Shoal)	75+94 to 97+14	25,000	5 (or as funding permits)	Nearshore (Lighthouse Island)	Sidecast or modified hopper dredge	Beach Compatible Sand
Entrance Channel Advanced Maintenance	78+00 to 88+00	50,000	5 (or as funding permits)	Nearshore (Lighthouse Island)	Sidecast or modified hopper dredge	Beach Compatible Sand

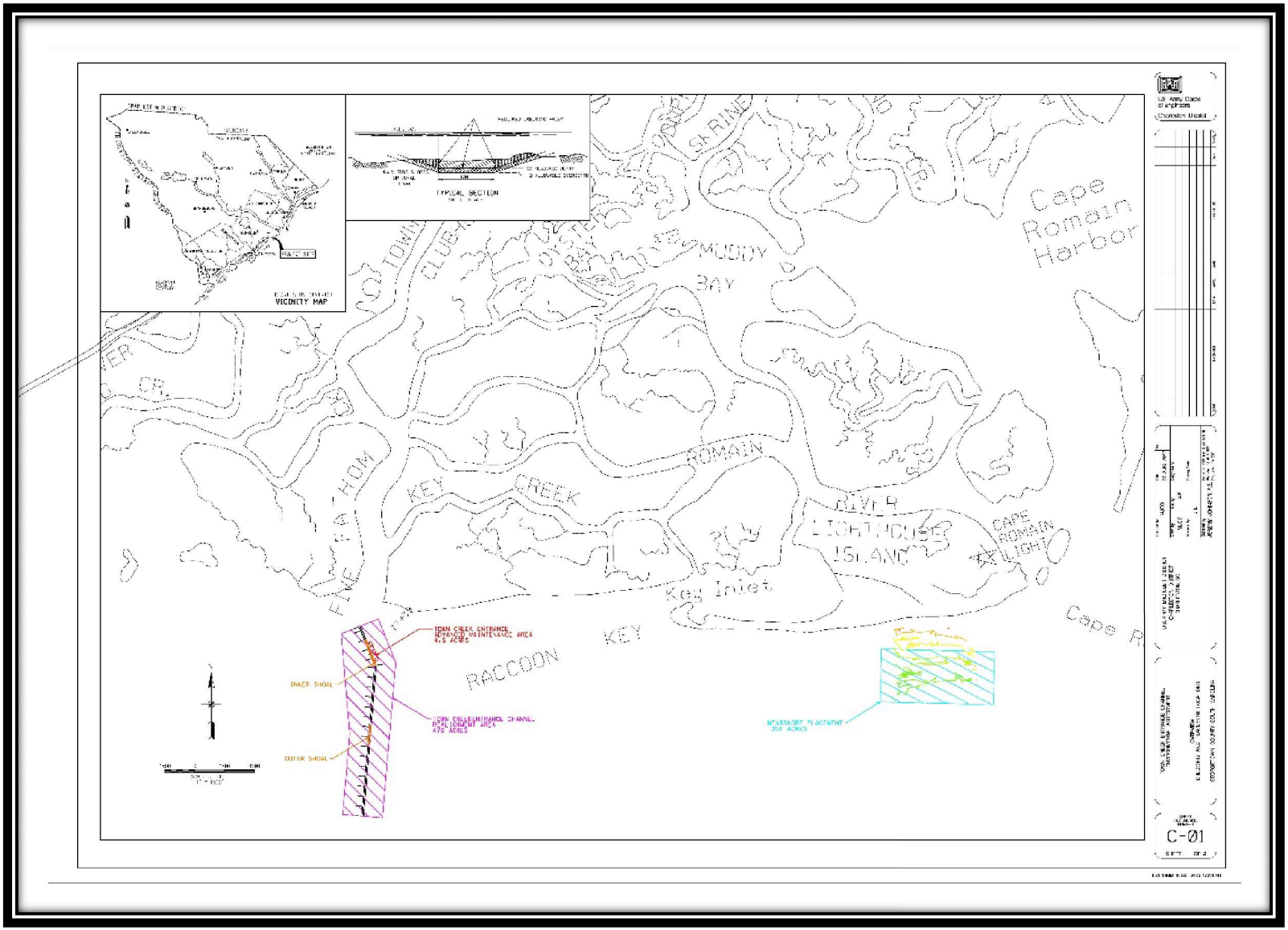

Figure 13. Shoaling and Placement Locations for Town Creek.

4 Folly River

The Folly River project (Figure 14) is located between Kiawah Island and Folly Beach. The action area includes the Stono Inlet entrance channel extending waterward approximately 3 miles from the 11 ft contour, the Folly River channel extending downstream approximately 3 miles from Highway 171 to its confluence with the Stono River, the Folly Creek channel extending downstream approximately 3 miles from Highway 171 to its confluence with the Folly River, as well as placement along the beach and nearshore of Folly Beach, and on Bird Key. The authorized dimensions include the 11 ft MLLW deep by 100 ft wide Stono River entrance channel, and a 9 ft MLLW deep by 80 ft wide Folly River channel and Folly Creek channel.

Dredging equipment used would be dependent on the placement location and equipment availability, and may include hydraulic cutterhead pipeline dredge, sidecaster dredge and/or the modified hopper dredge. The suitability of dredge materials will determine the potential placement locations which include Bird Key Island, Folly Beach, sidecast placement in the Stono channel, or nearshore placement for Folly Beach. Additional activities could include realignment of the entrance channel for the purpose of following deep water and reducing dredging amounts.

Table 4. Folly River Project Shoaling and Placement Information

Reaches	Channel Reaches	Shoaling (Cubic yards per event)	Frequency of Dredging (years)	Placement Location	Dredge Type	Sediment Type
Folly River	103+00 to 303+68	400,000	3	Front Beach, Nearshore, Bird Key	Pipeline Dredge	Beach Compatible Sand
Stono River Entrance South Approach	0+00 to 105+00	300,000	2	Front Beach, Nearshore, Bird Key	Modified Hopper Dredge, Pipeline Dredge, Sidecast	Beach Compatible Sand
Stono River Entrance (East Approach)	0+00 to 58+00	300,000	2	Front Beach, Nearshore, Bird Key	Modified Hopper Dredge, Pipeline Dredge, Sidecast	Beach Compatible Sand

Figure 14. Shoaling and Placement Locations for Folly River.

Appendix B. Programmatic Essential Fish Habitat Consultation for United States Army Corps of Engineers Activities and Projects Regularly Undertaken in South Carolina - Verification Form

Programmatic Essential Fish Habitat Consultation for United States Army Corps of Engineers Activities and Projects Regularly Undertaken in South Carolina - Verification Form

This form will be filled out by the United States Army Corps of Engineers, Charleston District (Charleston District) for activities and projects regularly undertaken in the tidally-influenced waters of South Carolina using the Programmatic Essential Fish Habitat (EFH) Consultation with NOAA's National Marine Fisheries Service, Southeast Regional Office, Habitat Conservation Division (SERO HCD). Upon obtaining sufficient information, the Charleston District will submit the form to SERO HCD for their review and response. After receiving a response from SERO HCD, the Charleston District will keep the completed form(s) for reporting purposes.

In addition to the information required below, the Charleston District must also provide a list of all recommended management practices that will not be adhered to (with justification provided). This list may use the same numbers as the recommended management practices listed in Section 5.

PART I.

Project Activity Type

☐ 1. Dredging
☐ 2. Placement of Dredged Material
☐ 3. Transportation of Dredged Material
☐ 4. Beneficial Use - Beach and Nearshore Placement

USACE Charleston District Project Information

Waterway Name:	
Latitude (e.g., 42.6258):	
Longitude (e.g., -70.6461):	
Work Description:	
Total area of impact to EFH (in acres), broken down by individual types of EFH:	
Programmatic EFH Consultation Appendix A Project Reference Number:	

Part II.

USACE's Determination of Effects to Essential Fish Habitat

The Charleston District will select the appropriate determination:

☐ The activity complies with all elements of the Programmatic EFH Consultation, including all Programmatic EFH Consultation recommended best management practices, and adverse effects to EFH will not be substantial.

☐ The activity does not comply with all of the elements of the Programmatic EFH Consultation, including some Programmatic EFH Consultation recommended best management practices. However, the justification below demonstrates that the adverse effects to EFH are not substantial. This does not apply to Programmatic EFH Consultation recommended best management practices that are not applicable to the project.

Justification for Not Incorporating All EFH conservation measures

If the project does not comply with all of the applicable Programmatic EFH Conservation measures and the Charleston District has still determined that the effects of a project on EFH are not substantial and the project is otherwise consistent with the Programmatic EFH Consultation, provide justification below and identify which conservation measures, provided in the Programmatic EFH Consultation as BMPs, are not included:

_____

_____

_____

_____

_____

_____

_____

USACE, Charleston District preparer:

_____ _____

Name Signature

_____

Date

Part III.

SERO HCD Determination (To be filled out by NMFS SERO HCD)

After receiving the Verification Form, SERO HCD will contact the Charleston District with any concerns.

☐ SERO HCD concurs with the Charleston District's determination that the proposed project is consistent with the Programmatic EFH Consultation (without the need for justification).

☐ SERO HCD concurs with the Charleston District's determination that the proposed project is consistent with the Programmatic EFH Consultation, with justification described above.

☐ SERO HCD does not concur with the Charleston District's determination that the project is consistent with the Programmatic EFH Consultation. The Charleston District must conduct additional coordination with SERO HCD and a separate individual EFH consultation may be required.

SERO HCD reviewer:

_____ _____

Name Signature

_____

Date

Appendix B
USFWS ESA Section 7 Consultation Record
(Placeholder)

Appendix C
NHPA Section 106 Consultation Record

From:	Van Overschelde, Athena
To:	"Johnson, Elizabeth"
Cc:	Spirek, Jim; Farmer, Andrea A CIV (USA)
Subject:	[URL Verdict: Neutral][Non-DoD Source] Folly River Federal Navigation Project (SHPO Project No. 22-RL0141) Review
Date:	Friday, February 17, 2023 8:48:37 AM
Attachments:	Outlook-USC_Linear.png

Good morning,

The MRD has reviewed the management summary titled *Management Summary for the Submerged Cultural Resources Survey and Diver Investigation Folly River Federal Navigation Channel and Folly Beach Nearshore Charleston County, South Carolina* (SHPO Project No. 22-RL0141) from Coastal Environments, Inc. and we concur with the proposed buffer of 150 feet around Target 1. Apart from that, we have no comments or concerns.

As always, if there are any unexpected discoveries, operations should cease and move to a different area, and SHPO and SCIAA should be contacted to assess the find and decide if further archaeological work is needed.

Please let me know if you need anything further from us.

Thank you,
Athena

Athena Van Overschelde, M.P.S.
Underwater Archaeologist
Maritime Research Division
South Carolina Institute of Archaeology and Anthropology
College of Arts and Sciences
University of South Carolina
1321 Pendleton Street
Columbia SC 29208 USA
Phone: (803) 576-6565
Fax: (803) 254-1338
E-mail: athenav@sc.edu
Maritime Research Division Website: http://artsandsciences.sc.edu/sciaa/mrd/
Follow MRD on Facebook: @MaritimeResearchDivision
SCIAA Website: http://www.cas.sc.edu/sciaa/
Follow SCIAA on Facebook: @SCIAAOfficial


USC_Linear

From: Larsen, Robert
To: Farmer, Andrea A CIV (USA)
Subject: [Non-DoD Source] RE: Folly River Federal Navigation Project (SHPO Project No. 22-RL0141) Review
Date: Tuesday, February 21, 2023 10:09:39 AM
Attachments: image001.png

Good Morning Andrea,

Thank you for the update on Camp Croft, I look forward to seeing the results for the methodology we had discussed there.

I apologize for the delay on my end, I have been particularly swamped since the New Year. I concur with SCIAA's MRD determination, that if the 150 feet buffer around Target 1 (a potential historic shipwreck) is implemented as recommended in the *Management Summary for the Submerged Cultural Resources Survey and Diver Investigation Folly River Federal Navigation Channel and Folly Beach Nearshore Charleston County, South Carolina* then the SHPO concurs there will be no adverse effect within the Folly Beach APE based upon the buffer's inclusion as a stipulation for the nearshore placement area. Our office has no further comments or concerns, we look forward to receiving the full results for the Stono Bar Realignment Area survey and nearshore survey upon their completion.

As always, If archaeological materials are encountered during construction, the procedures codified at 36 CFR 800.13(b) will apply. Archaeological materials consist of any items, fifty years old or older, which were made or used by man. These items include, but are not limited to, stone projectile points (arrowheads), ceramic sherds, bricks, worked wood, bone and stone, metal and glass objects, and human skeletal materials. The federal agency or the applicant receiving federal assistance should contact our office immediately.

Sincerely,

Robert P. Larsen III, MSc., RPA
Archaeologist
State Historic Preservation Office (SHPO)
SC Department of Archives & History
8301 Parklane Road
Columbia, SC 29223
803.896.6181
https://scdah.sc.gov/historic-preservation/resources/archaeology

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From: Farmer, Andrea A CIV (USA) <Andrea.A.Farmer@usace.army.mil>
Sent: Friday, February 17, 2023 8:55 AM
To: Larsen, Robert <RLarsen@scdah.sc.gov>
Subject: FW: Folly River Federal Navigation Project (SHPO Project No. 22-RL0141) Review

Good morning Robert,

I received this out-of-office reply from Elizabeth, so I wanted to reach out to you. The response from SCIAA is attached, along with my original email.

Hope you are doing well! I'll follow-up with you soon on Camp Croft. There have been a few project changes, unrelated to cultural resources, that are holding up progress.

Best regards,

Andrea Farmer, RPA
Archaeologist, Savannah District
U.S. Army Corps of Engineers
912.412.3363 (cell)
Andrea.Adams.Farmer@usace.army.mil

From: Johnson, Elizabeth <EJohnson@scdah.sc.gov>
Sent: Friday, February 17, 2023 8:52 AM
To: Farmer, Andrea A CIV (USA) <Andrea.A.Farmer@usace.army.mil>
Subject: [Non-DoD Source] Automatic reply: Folly River Federal Navigation Project (SHPO Project No. 22-RL0141) Review

Thank you for contacting the SC Department of Archives and History. I am currently out of the office on medical leave. Please direct your questions about the following programs to the staff listed below:

- Preservation Conference, Donna Foster at dfoster@scdah.sc.gov
- Projects involving Section 106 and other reviews, John Sylvest at jsylvest@scdah.sc.gov or Rob Larsen at rlarsen@scdah.sc.gov
- Historic Preservation State Grant Fund, email sgf@scdah.sc.gov
- Tax credit projects, Chris Tenny at ctenny@scdah.sc.gov
- Historic property research and the National Register, Virginia Harness at vharness@scdah.sc.gov or Edwin Breeden at ebreeden@scdah.sc.gov
- Historical markers, Edwin Breeden at ebreeden@scdah.sc.gov
- For other questions please contact Brad Sauls at bsauls@scdah.sc.gov

Thank you,

Elizabeth M. Johnson
State Historic Preservation Office
https://scdah.sc.gov

Appendix D
CWA Section 401 WQC (Placeholder) & 404(b)(1) Analysis

FOLLY RIVER NAVIGATION PROJECT
OPERATION & MAINTENANCE DREDGING
CHARLESTON COUNTY, SOUTH CAROLINA

Draft Supplemental Environmental Assessment

DRAFT

U.S. ARMY CORPS OF ENGINEERS
CHARLESTON DISTRICT
CHARLESTON, SOUTH CAROLINA

APPENDIX A

404(B) (1) ANALYSIS

FOLLY RIVER O&M DREDGING

CHARLESTON COUNTY, SOUTH CAROLINA

Preliminary Evaluation of Section 404 (b) (1) Guidelines 40 CFR 230

This evaluation covers the placement of all fill material into waters and wetlands of the United States required for the maintenance of the Folly River O&M Dredging Project, Charleston County, South Carolina. The proposed project involves the placement of beach quality sand extracted from suitable O&M dredging within the Folly River and Stono Entrance Channel for nearshore placement along the shoreline of Folly Beach, direct beach placement on Folly Beach and Bird Key Island.

Section 404 Public Notice No.

1. Review of Compliance (230.10(a)-(d)) **Preliminary 1/** **Final 2/**

A review of the NEPA Document indicates that:

a. The discharge represents the least environmentally damaging practicable alternative and if in a special aquatic site, the activity associated with the discharge must have direct access or proximity to, or be located in the aquatic ecosystem to fulfill its basic purpose (if no, see section 2 and NEPA document);

YES ☒ NO☐ YES ☐ NO☐

b. The activity does not:

1) violate applicable State water quality standards or effluent standards prohibited under Section 307 of the CWA;

2) jeopardize the existence of federally listed endangered or threatened species or their habitat; and

3) violate requirements of any federally designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies);

YES☒ NO☐* YES☐ NO☐

c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values (if no, see section 2);

YES☒ NO☐ YES☐ NO☐

d Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see section 5).

YES☒ NO☐* YES☐ NO☐

2. Technical Evaluation Factors (Subparts C-F)

a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C)

	N/A	Not Significant	Significant
(1) Substrate impacts.		X	
(2) Suspended particulates/turbidity impacts		X	
(3) Water column impacts.		X	
(4) Alteration of current patterns and water circulation.			
(5) Alteration of normal water fluctuations/hydroperiod.		X	
(6) Alteration of salinity gradients.			
		X	
		X	

b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)

(1) Effect on threatened/endangered species and their habitat.			
(2) Effect on the aquatic food web.		X	
(3) Effect on other wildlife (mammals birds, reptiles, and amphibians).		X	
		X	

c Special Aquatic Sites (Subpart E)

(1) Sanctuaries and refuges.		X	
(2) Wetlands.		X	
(3) Mud flats.	NA		
(4) Vegetated shallows.	NA		
(5) Coral reefs.	NA		
(6) Riffle and pool complexes.	NA		

d. Human Use Characteristics (Subpart F)

(1) Effects on municipal and private water supplies.	NA		
(2) Recreational and commercial fisheries impacts		X	
(3) Effects on water-related recreation.		X	
(4) Aesthetic impacts.		X	
(5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves.		X	

3. Evaluation of Dredged or Fill Material (Subpart G) 3/

a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material. (Check only those appropriate.)

(1) Physical characteristics ☒

(2) Hydrography in relation to known or anticipated sources of contaminants ☒

(3) Results from previous testing of the material or similar material in the vicinity of the project ☒

(4) Known, significant sources of persistent pesticides from land runoff or percolation X

(5) Spill records for petroleum products or designated (Section 311 of CWA) hazardous substances X

(6) Other public records of significant introduction of contaminants from industries, municipalities, or other sources ☒

(7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities X

(8) Other sources (specify). X

https://www.epa.gov/superfund/superfund-national-priorities-list-npl

b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredge or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and disposal sites and not likely to result in degradation of the disposal site.**

YES ☒ NO ☐ *

4. Disposal Site Determinations (230.11(f)).

a. The following factors as appropriate, have been considered in evaluating the disposal site.

(1) Depth of water at disposal site. ..... ☒

(2) Current velocity, direction, and variability at disposal site ..... ☒

(3) Degree of turbulence. ..... ☒

(4) Water column stratification ..... ☒

(5) Discharge vessel speed and direction..... ☒

(6) Rate of discharge ..... ☒

(7) Dredged material characteristics (constituents, amount and type of material, settling velocities). ..... ☒

(8) Number of discharges per unit of time. ..... ☒

(9) Other factors affecting rates and patterns of mixing (specify)

List appropriate references.

b. An evaluation of the appropriate factors in 4a above indicates that the disposal site and/or size of mixing zone are acceptable. YES ☒ NO ☐*

5. Actions to Minimize Adverse Effects (Subpart H).

All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77, to ensure minimal adverse effects of the proposed discharge. YES ☒ NO ☐*

Actions taken to ensure minimal adverse effects of the proposed discharge will include all 401 Water Quality Certificate conditions as well as standard Best Management Practices to minimize migration of sediments on and off the placement areas during and after construction

6. Factual Determinations (230.11).

A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:

a. Physical substrate at the disposal site (review sections 2a, 3, 4, and 5). YES ☒ NO ☐*

b. Water circulation, fluctuation, and salinity (review sections 2a, 3, 4, and 5). YES ☒ NO ☐*

c. Suspended particulates/turbidity (review sections 2a, 3, 4, and 5). YES ☒ NO ☐*

d Contaminant availability (review sections 2a, 3, and 4). YES ☒ NO ☐*

e. Aquatic ecosystem structure and function (review sections 2b and c, 3, and 5). YES ☒ NO ☐*

f. Disposal site (review sections 2, 4, and 5). YES ☒ NO ☐*

g. Cumulative impact on the aquatic ecosystem. YES ☒ NO ☐*

h. Secondary impacts on the aquatic ecosystem. YES ☒ NO ☐*

7. Findings.

a. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines. . . . . ☒

b. The proposed disposal site for discharge of dredged or fill material complies with the Section 404(b)(1) guidelines with the inclusion of the following conditions:. . . . . ☐

c. The proposed disposal site for discharge of dredged or fill material does not comply with the Section 404(b)(1) guidelines for the following reasons(s):

(1) There is a less damaging practicable alternative . . . . . ☐
(2) The proposed discharge will result in significant degradation of the aquatic ecosystem . . . . . ☐
(3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem. . . . . ☐

DRAFT

_____ Date: _____

Andrew C. Johannes
Lieutenant Colonel, U.S.
Army District Engineer

*A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

1/ Negative responses to three or more of the compliance criteria at this stage indicate that the proposed projects may not be evaluated using this "short form procedure." Care should be used in assessing pertinent portions of the technical information of items 2 a-d, before completing the final review of compliance.

2/ Negative response to one of the compliance criteria at this stage indicates that the proposed project does not comply with the guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form evaluation process is inappropriate."

3/ If the dredged or fill material cannot be excluded from individual testing, the "short-form" evaluation process is inappropriate.

Appendix E
USFWS CBRA Exception 16 U.S.C. 3505(a)(2) Concurrence

Coastal Barrier Resources Act Consultation Request

January 20, 2023

FROM:
U.S. Army Corps of Engineers,
Charleston District
69A Hagood Ave.
Charleston, SC 29403-5107

TO:
U.S. Fish & Wildlife Service
South Carolina Ecological Services Field Office
176 Croghan Spur Road, Suite 200
Charleston, SC 29407-7558

Consultation Request: The U.S Army Corps of Engineers, Charleston District requests a consultation with the U.S. Fish and Wildlife Service (Service) under the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.) for maintenance dredging of the entrance channel of the Folly River federal navigation project. This maintenance dredging project is funded by the Corps of Engineers annual O&M dredging budget.

Project Location: The dredging project is located in Charleston County, SC, and is mostly within Unit M07 of the Coastal Barrier Resources System (CBRS).

Description of the Proposed Action or Project: The project involves maintenance dredging of the entrance channel of the Folly River federal navigation project and placement of the dredged material in a shallow water placement area offshore of Folly Beach. The area of the entrance channel being dredged is within CBRS Unit M07, while the placement area offshore of Folly Beach is outside of Unit M07. Approximately 60,000 yd^3 of sediment will be removed from Unit M07. See Figure 1 for the boundaries of Unit M07 in relation to the area of the entrance channel being dredged and the location of the placement area.

Applicable Exception(s) under 16 U.S.C. 3505(a)

General Exceptions

☐ 16 U.S.C. 3505(a)(1): Any use or facility necessary for the **exploration, extraction, or transportation of energy resources** which can be carried out only on, in, or adjacent to a coastal water area because the use or facility requires access to the coastal water body.

☒ 16 U.S.C. 3505(a)(2): The **maintenance or construction of improvements of existing federal navigation channels** (including the Intracoastal Waterway) and related structures (such as jetties), including the disposal of dredge materials related to such maintenance or construction. *A federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System Unit or portion of the System Unit was included within the CBRS (16 U.S.C. 3505(b)).*

☐ 16 U.S.C. 3505(a)(3): The maintenance, replacement, reconstruction, or repair, but not the expansion, of **publicly owned or publicly operated roads, structures, or facilities that are essential links** in a larger network or system. *While this exception generally prohibits expansions, there is a special provision in CBRA that allows for the expansion of highways in Michigan under this exception (see 16 U.S.C. 3505(c)).*

☐ 16 U.S.C. 3505(a)(4): **Military activities** essential to national security.

☐ 16 U.S.C. 3505(a)(5): The construction, operation, maintenance, and rehabilitation of **Coast Guard facilities** and access thereto.

Specific Exceptions

The exceptions below may apply only if the project or action is also consistent with the purposes of CBRA, which are:

- *to minimize the loss of human life;*
- *minimize wasteful expenditure of federal revenues; and*
- *minimize damage to fish, wildlife, and other natural resources associated with coastal barriers*

by restricting future federal expenditures and financial assistance which have the effect of encouraging development; and by considering the means and measures by which the long-term conservation of these fish, wildlife, and other natural resources may be achieved.

Therefore, **if selecting any of the exceptions below, it is necessary to describe how the proposed action or project is consistent with these purposes**.

☐ 16 U.S.C. 3505(a)(6)(A): **Projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats**, including acquisition of fish and wildlife habitats, and related lands, stabilization projects for fish and wildlife habitats, and recreational projects.

☐ 16 U.S.C. 3505(a)(6)(B): Establishment, operation, and maintenance of **air and water navigation aids** and devices, and for access thereto.

☐ 16 U.S.C. 3505(a)(6)(C): Projects under chapter 2003 of title 54 and the **Coastal Zone Management Act** of 1972 (16 U.S.C. 1451 et seq.). *Chapter 2003 of title 54 refers to expenditures under the **Land and Water Conservation Fund**. For additional information on the use of this exception for projects under the CZMA, please see this fact sheet.*

☐ 16 U.S.C. 3505(a)(6)(D): **Scientific research**, including aeronautical, atmospheric, space, geologic, marine, fish and wildlife, and other research, development, and applications.

☐ 16 U.S.C. 3505(a)(6)(E): Assistance for **emergency actions essential to the saving of lives and the protection of property and the public health and safety**, if such actions are performed pursuant to sections 5170a, 5170b, and 5192 of title 42 **and are limited to actions that are necessary to alleviate the emergency.**

☐ 16 U.S.C. 3505(a)(6)(F): Maintenance, replacement, reconstruction, or repair, but not the expansion (except with respect to United States route 1 in the Florida Keys), of **publicly owned or publicly operated roads, structures, and facilities.** *Please note that for this exception, FEMA regulations (44 CFR Part 206.347(c)(5)) indicate that "no such facility may be repaired, reconstructed, or replaced unless it is an 'existing facility'" (i.e., one that was constructed prior to its inclusion in the CBRS and has not been substantially improved or expanded since).*

☐ 16 U.S.C. 3505(a)(6)(G): **Nonstructural projects for shoreline stabilization** that are designed to mimic, enhance, or restore a natural stabilization system. *For additional information on the use of this exception, please see this Frequently Asked Questions document.*

Justification for Exception(s): The Folly River project is an existing U.S. Army Corps of Engineers federal navigation project that was authorized by the Chief of Engineers on 23 December 1977 under Section 107 of the River and Harbor Act of 1960, as amended. This predates the establishment of the Coastal Barrier Resources System. Therefore, the planned dredging of the Folly River entrance channel and nearshore placement of dredged materials fully meets exception 16 U.S.C. 3505(a)(2).

Contact Information: Alan Shirey, U.S. Army Corps of Engineers, Charleston District, 69A Hagood Avenue, Charleston, SC; 843-329-8166; *alan.d.shirey@usace.army.mil*.

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Nancy A. Parrish
Chief, Planning and Environmental Branch

1/20/23
Date

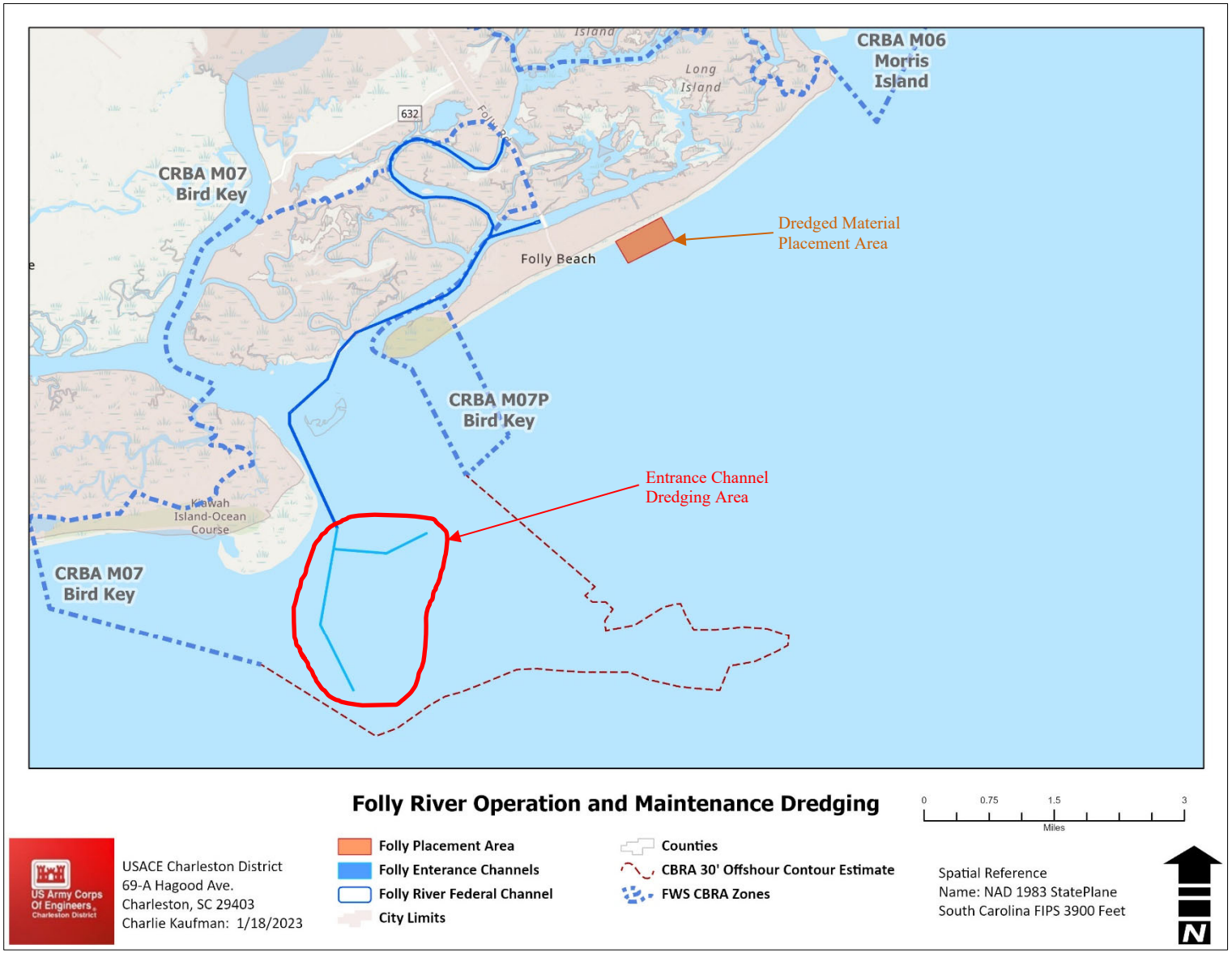

Figure 1 – 2023 Folly River Entrance Channel Maintenance Dredging Project

U.S. Fish and Wildlife Service Response

Below is the Service's response to the U.S. Army Corps of Engineers, Charleston District's (USACE Charleston) request for a consultation under CBRA for maintenance dredging of the entrance channel of the Folly River federal navigation project. This response represents the Service's opinion. **The final decision regarding the expenditure of funds for this action or project rests with the federal action agency.** USACE Charleston has fulfilled its obligation to consult with the Service under CBRA for this particular action or project within the CBRS. Please note that any new commitment of federal funds associated with this action or project, or change in the project design and/or scope, is subject to CBRA's consultation requirement.

The Service has reviewed the information provided by USACE Charleston, and believes the referenced action/project is:

☐ Not located within a System Unit of the CBRS and CBRA does not apply (except with respect to the restrictions on federal flood insurance)

☒ Located within a System Unit of the CBRS and meets the exception(s) to CBRA selected above

☐ Located within a System Unit of the CBRS and meets different exception(s) than the one(s) selected above (see additional information/comments below)

☐ Located within a System Unit of the CBRS and does not meet an exception to CBRA (see additional information/comments below)

Additional Information/Comments

This response does not constitute consultation for any project pursuant to section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 et seq.); nor does it preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 et seq.).

THOMAS MCCOY

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Thomas D. McCoy
Field Supervisor

February 21, 2023
Date

Appendix F
SCDHEC CZMA Compliance Concurrence
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Appendix G
Public Review Comments & Responses
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