Atlantic Intracoastal Waterway Federal Navigation Channel
Cumberland Dividings Maintenance Dredging
Camden County, Georgia
Environmental Assessment and FONSI

Appendix G

Essential Fish Habitat Assessment

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401
January 2023

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Atlantic Intracoastal Waterway Federal Navigation Channel
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Camden County, Georgia
Draft Environmental Assessment and FONSI

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Correspondence

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401
January 2023

From:	Hill, Suzanne CIV USARMY CESAS (USA)
To:	Gregory, Alexander B CIV USARMY CESAS (USA)
Cc:	Garvey, Kimberly L CIV USARMY CESAS (USA)
Subject:	FW: [URL Verdict: Neutral][Non-DoD Source] Re: Draft EA/FONSI Comment Review for Cumberland Dividings Maintenance Dredging- comments due Feb.10 2023
Date:	Tuesday, February 14, 2023 8:58:27 AM

From: Pace Wilber - NOAA Federal <pace.wilber@noaa.gov>
Sent: Monday, February 13, 2023 10:17 PM
To: Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil>
Cc: Cynthia Cooksey - NOAA Federal <cynthia.cooksey@noaa.gov>
Subject: [URL Verdict: Neutral][Non-DoD Source] Re: Draft EA/FONSI Comment Review for Cumberland Dividings Maintenance Dredging- comments due Feb.10 2023

Hi Suzanne.

The NMFS has completed a review of the Cumberland Dividings Environmental Assessment, inclusive of the EFH Assessment, and FONSI, dated January 2023. In addition to the review of these documents, NMFS has also reviewed draft documents and participated in multiple pre-application meetings with the Savannah District and other nature resource agencies. NMFS has appreciated the extensive engagement on this project which has resulted in a preferred alternative that avoids and minimizes adverse impacts to EFH as much as practicable while identifying a beneficial use placement site (BU-E) that will maximize ecological benefits to the project area. Specifically, BU-E is a habitat restoration effort that will involve placement of dredge material into a portion of the AIWW which has experienced extensive erosion. The open water placement at BU-E will initially restore upland bird habitat, but as the site will not be hardened, it is expected to erode over time restoring sediment back into the system benefiting EFH from a regional sediment management perspective. NMFS deems the EFH Assessment comprehensive and complete and offers no conservation recommendations at this time.

Thanks,
Pace and Cindy

On Wed, Jan 11, 2023 at 6:27 PM Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil> wrote:

> Cindy and Pace,
>
> The Corps is pleased to announce that the Draft Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) for the dredging and beneficial use of dredged material for bird island restoration project in the Atlantic Intracoastal Waterway Cumberland Dividings, Camden County, is now available for public comment. Please refer to the attached public notice for project

information. Link to the draft EA and associated appendices is below.

https://www.sas.usace.army.mil/About/Divisions-and-Offices/Planning-Division/Plans-and-Reports/

Additionally, we are requesting your review under the Magnuson-Stevens Fishery Conservation and Management Act. Please find attached the public notice, MSA coordination request letter and Appendix G which contains our essential fish habitat assessment. We are requesting receipt of comments by February 10, 2023.

Please reach out with any questions or comments. We appreciate your coordination on this project.

Thank you,

Suzy

Suzanne Hill
NEPA Team Lead
USACE Savannah District, Planning Branch
Ph. 912.423.2324

--
Pace Wilber, Ph.D.
South Atlantic and Caribbean Branch Chief
Habitat Conservation Division
NOAA Fisheries Service
331 Ft Johnson Road
Charleston, SC 29412

843-592-3024 (NOAA Google Voice)
Pace.Wilber@noaa.gov

Hill, Suzanne CIV USARMY CESAS (USA)

From: Cynthia Cooksey - NOAA Federal <cynthia.cooksey@noaa.gov>
Sent: Friday, December 16, 2022 11:39 AM
To: Hill, Suzanne CIV USARMY CESAS (USA)
Cc: Pace Wilber - NOAA Federal; Armetta, Robin E CIV USARMY CESAS (USA); Wright, Summer G CIV USARMY CESAS (USA); Gregory, Alexander B CIV USARMY CESAS (USA)
Subject: Re: [Non-DoD Source] Re: Draft EFH Assessment Cumberland Dividings Maintenance Dredging- request for review
Attachments: Appendix G EFH_cookseycomments.docx

Hi Suzy,
I have attached the draft with my edits and comments included. Thank you for providing the chance to review the draft EFH Assessment. Overall, the project looks fine but I did have a few questions (see my comments). I will be off most of the next two weeks, but will likely work some so if you have questions please reach out.
Thanks,
Cindy

Cindy Cooksey (she/her/hers)
Fishery Biologist

NOAA
National Marine Fisheries Service
Southeast Regional Office - Habitat Conservation Division
331 Fort Johnson Road
Charleston, SC 29412
Google Voice: (843) 481-0496
E-Mail: cynthia.cooksey@noaa.gov

On Tue, Dec 6, 2022 at 12:24 PM Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil> wrote:

> Appreciate your time and please let us know of any question or need for follow-on meeting.
>
> Suzy
>
> ---
>
> **From:** Pace Wilber - NOAA Federal <pace.wilber@noaa.gov>
> **Sent:** Tuesday, December 6, 2022 11:33 AM
> **To:** Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil>
> **Cc:** Cynthia Cooksey <cynthia.cooksey@noaa.gov>; Armetta, Robin E CIV USARMY CESAS (USA) <Robin.E.Armetta@usace.army.mil>; Wright, Summer G CIV USARMY CESAS (USA) <Summer.G.Wright@usace.army.mil>
> **Subject:** [Non-DoD Source] Re: Draft EFH Assessment Cumberland Dividings Maintenance Dredging- request for review

Thanks Suzy. We will review and get back to you. Pace

On Mon, Dec 5, 2022 at 3:39 PM Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil> wrote:

> Cindy and Pace,
>
> Please find attached a draft of our EFH assessment for the maintenance dredging at Cumberland Dividings that includes beneficial use placement sites. We are currently in the process of completing the draft EA that will be provided for a 30-day public comment period beginning January 9th.
>
> We are providing the draft to facilitate early coordination prior to the Draft EA public comment period. We welcome any comments on the draft EFH assessment and findings, and ask that any preliminary comments be provided by Dec. 19, allowing us time to incorporate any changes prior to the public comment period starting Jan.9th.
>
> In lieu of providing written comments on the draft EFH assessment by Dec.19, we would also welcome a meeting/conference call to discuss any comments.
>
> Finally, we will be asking for formal comments during the 30-day Draft EA public comment period. We intend to indicate in our notification letter requesting comments, that if comments are not received at the end of the Draft EA public comment period, we will assume that NMFS is in concurrence with our findings.
>
> Please let us know if you have any questions, we would be happy to set up a call to discuss the project further.
>
> Thank you,
>
> Suzy
>
> Suzanne Hill
>
> NEPA Team Lead

USACE Savannah District, Planning Branch

Ph. 912.423.2324

From: Hill, Suzanne CIV USARMY CESAS (USA)
Sent: Monday, November 14, 2022 9:49 AM
To: Gregory, Alexander B CIV USARMY CESAS (USA) <Alexander.B.Gregory@usace.army.mil>; Cynthia Cooksey <cynthia.cooksey@noaa.gov>
Cc: Armetta, Robin E CIV USARMY CESAS (USA) <Robin.E.Armetta@usace.army.mil>; Wright, Summer G CIV USARMY CESAS (USA) <Summer.G.Wright@usace.army.mil>; Pace.Wilber@noaa.gov
Subject: RE: EFH Assessment discussion- beneficial use projects

Cindy-

Following up on Alex's email below. We would really like to set up a time soon to discuss EFH assessments for a number of our beneficial use projects. Please let us know what dates/times work for you.

We can do virtual, we are also happy to meet you in Charleston if that would work. We can reserve a conference room at the Corps' office in Charleston.

Suzy

Suzanne Hill

NEPA Team Lead

USACE Savannah District, Planning Branch

Ph. 912.423.2324

From: Gregory, Alexander B CIV USARMY CESAS (USA) <Alexander.B.Gregory@usace.army.mil>
Sent: Monday, October 24, 2022 3:55 PM
To: Cynthia Cooksey <cynthia.cooksey@noaa.gov>
Cc: Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil>; Armetta, Robin E CIV USARMY CESAS (USA) <Robin.E.Armetta@usace.army.mil>; Wright, Summer G CIV USARMY CESAS (USA) <Summer.G.Wright@usace.army.mil>
Subject: RE: EFH Assessment discussion

Good afternoon Cindy,

I just wanted to follow up and see if you had any good dates or times this week or next to meet with a few of us from Savannah District?

Thanks,

Alexander Gregory

Biologist, Public Involvement Specialist

Planning Branch

US Army Corps of Engineers

Savannah District

912-515-5148

From: Gregory, Alexander B CIV USARMY CESAS (USA)
Sent: Tuesday, October 18, 2022 2:25 PM
To: Cynthia Cooksey <cynthia.cooksey@noaa.gov>
Cc: Hill, Suzanne CIV USARMY CESAS (USA) <Suzanne.Hill@usace.army.mil>; Armetta, Robin E CIV USARMY CESAS (USA) <Robin.E.Armetta@usace.army.mil>; Wright, Summer G CIV USARMY CESAS (USA) <Summer.G.Wright@usace.army.mil>
Subject: EFH Assessment discussion

Good afternoon,

The Savannah District has a few projects in the pipeline that will require EFH Assessments and consultation. We thought it would be a good idea to get together in person next week and go over these proposed actions and placement areas so we can have some discussion and exchange some ideas. Would you be willing to meet with us in Charleston? If possible we could meet at your NMFS office, or if not, we can coordinate with USACE Charleston District to get a space there for us to meet. Let me know if there is a good date and time for you next week and we can start working on securing a space.

Thank you,

Alexander Gregory

Biologist, Public Involvement Specialist

Planning Branch

US Army Corps of Engineers

Savannah District

912-515-5148

--

Pace Wilber, Ph.D.

South Atlantic and Caribbean Branch Chief

Habitat Conservation Division

NOAA Fisheries Service

331 Ft Johnson Road

Charleston, SC 29412

843-592-3024 (NOAA Google Voice)

Pace.Wilber@noaa.gov

Atlantic Intracoastal Waterway Federal Navigation Channel
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G.2

EFH Assessment

U.S. ARMY CORPS OF ENGINEERS
SAVANNAH DISTRICT
100 WEST OGLETHORPE AVENUE
SAVANNAH, GEORGIA 31401
January 2023

1. **Introduction**

The U.S. Army Corps of Engineers, Savannah District (Corps) maintains the Atlantic Intracoastal Waterway (AIWW) through navigational dredging. The AIWW is a 739-mile inland waterway system between Norfolk, Virginia, and St. John's River, Florida. The AIWW is authorized to 12 feet deep with widths of 90 feet through land cuts and 150 feet in open water areas and is a vital marine highway along the Atlantic coast, providing safe navigation for commercial and recreational vessels. The 161-mile section of the AIWW within Savannah District is comprised of a 24-mile section in the State of South Carolina with the remaining 137 miles located within Georgia down to the Florida border. Savannah District's portion of the waterway constitutes approximately 22 percent of the AIWW.

The Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) requires that the National Oceanic and Atmospheric Administration National Marine Fisheries Service (NMFS) identify essential fish habitat (EFH) for federally managed fisheries. This includes all the habitats that are used by a species for its entire life cycle. The Corps pursuant to section 305(b)(2) has prepared this assessment to support consultation with NMFS regarding actions that may adversely affect EFH.

Pursuant to the National Environmental Policy Act, USACE is in the process of preparing a draft Environmental Assessment (EA) for the proposed dredging action. The Corps is initiating consultation through providing this assessment prior to release of the Draft EA for public comment, and is requesting comment at the close of the public comment period of the Draft EA.

The Corps has prepared this EFH Assessment for the proposed project. This EFH Assessment includes a brief description of the proposed Federal action, an inventory of the habitats and managed fishery resources that are present within the project action area, and assessment of potential effects of the proposed Federal action on the resources.

2. Project Description

The proposed action involves dredging located in the Cumberland Dividings within the Atlantic Intracoastal Waterway, AIWW river mile 704.5-709.5, in Camden County, Georgia (Figure 1). This section of the AIWW has not been dredged since 2001, and based on a June 2022 bathymetric survey, approximately 316,000 cy of material has accumulated within the channel's authorized depth of -12 ft (with 2 ft overdepth allowance). Within this reach there are three sections being dredged: AIWW miles 704.5-706.5, 707.25-708, and 709.25-709.5. Hydraulic cutterhead dredges have historically performed the dredging work on the Atlantic Intracoastal Waterway (AIWW) and the Savannah District would continue to use this method of dredging for the proposed action. This dredge type is most efficient for placing material in upland, saltmarsh, or open water placement sites. Typically, material is pumped through a 16-inch pipeline to the placement site. There is no constraint on time of year to perform the work.

Agencies and stakeholders were involved in the identification of the potential beneficial use sites for dredged material. The proposed locations were chosen with considerations toward cultural, environmental, economic, and recreational resources. The Corps initially identified six BU placement (BU-A through BU-F) and three upland sites Crab Island, Drum Point, and unconfined placement on Cumberland Island to provide material for road maintenance. Based on best available data, the Corps has screened placement sites BU-A through BU-D, as well as the upland placement sites as they are not feasible or other constraints prohibit placement at these sites. The full array of evaluated placement sites is shown in Figure 1.

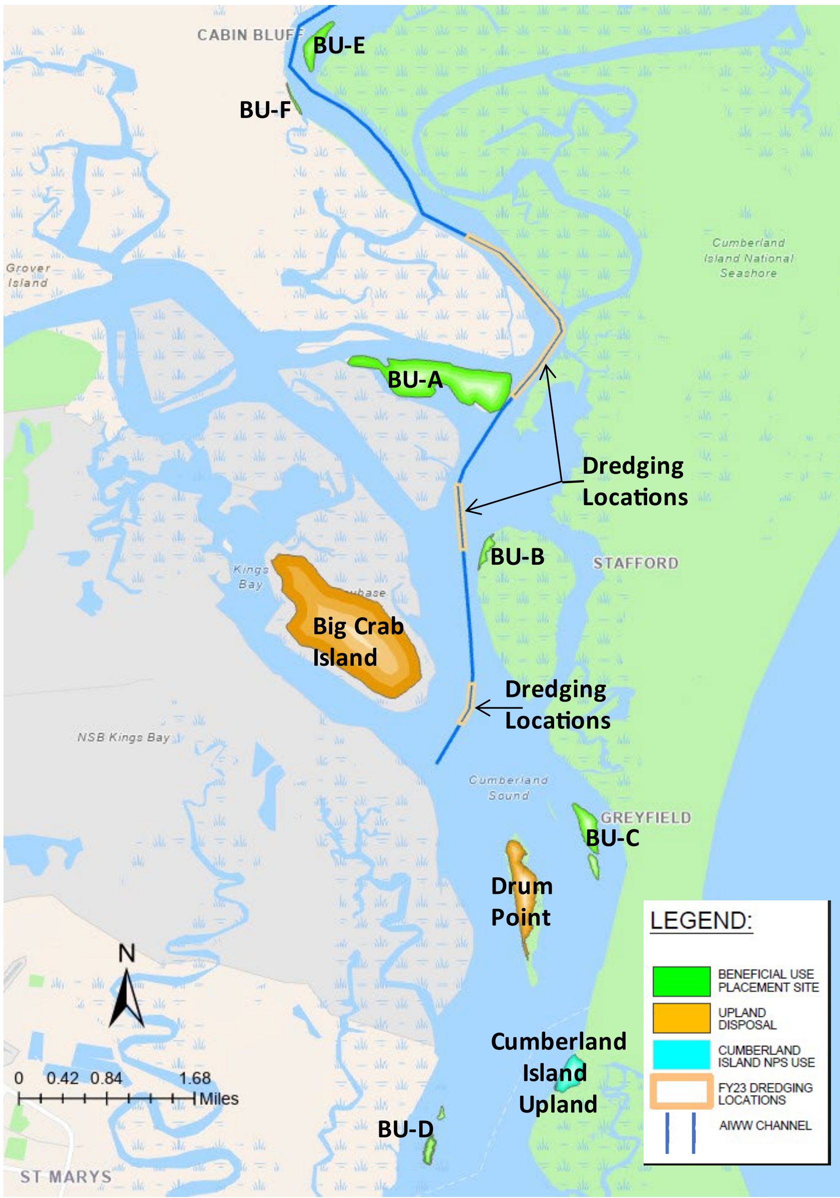

Figure 1. Cumberland Dividings O&M High Shoal Locations and Placement Alternatives.

Placement at BU-E is carried forward as the Preferred Alternative as it meets the navigation mission and need for dredging. BU-E is the least cost, environmentally acceptable alternative. In consideration of applicable factors listed in 33 CFR section 320.4, the Corps has determined this proposed plan is not contrary to public interest and is therefore, carried forward as the Preferred Alternative (Figure 2).

BU-E: Direct Placement for Habitat Restoration

The purpose of direct placement is to restore areas that have lost sediment from coastal storm events, tidal extremes, wave energy, and sea level rise. Returning sediment to eroded zones will restore the historic footprint of intertidal and upland areas to provide more bird nesting/foraging habitat while also supporting regional sediment management goals. Placement material will be pumped from a cutterhead dredge. The pipe will be moved around the placement area to initially spread material and then material will be pushed to final elevations with heavy equipment. The dredged material will be placed in shallow estuarine areas that previously existed as intertidal and upland habitats, but lost elevation due to erosion or have experienced sea level rise and lost upland acreage.

Placement of dredged materials at the proposed BUDM site will temporarily elevate the topography of the area. The additional substrate will provide growth opportunity for marsh and upland vegetation. The placed material will be subject to tidal influence and will maintain sediment within the estuarine habitat, likely providing a net overall benefit to the ecosystem. Additionally, there will be a long-term beneficial effect to the topography and soils of the proposed areas for bird habitat restoration due to the placed material providing higher elevation and restoring foraging and roosting habitat for birds. To achieve these benefits the elevation range would be 9.9 – 12 ft MLLW.

Bathymetric surveys will be conducted for the purpose of monitoring sediment migration and elevation. This will be conducted immediately following, six months, and one year post construction.

Table 1. Summary of BU-E placement site

Name	Location (lat/long)	Dimensions/Size (acres)	Capacity for placement (acres)	Placement Method
BU-E	**Island in Northern Area of the Cumberland Dividings:** 30°53’07.13” N 81°30’45.94” W	~30 AC	~30 AC	unconfined open water placement, habitat restoration

Figure 2. BU-E Placement Site

3. Existing Conditions

Cumberland Dividings is the network of channels between Cumberland Island and the eastern coast of Georgia. The project area occurs in the East River portion of the Dividings between AIWW mile 704.3 to 709.6. This section of the East River is unconsolidated bottom with salt marsh on either side and many tidal creeks and inlets converging into the mainstem. This channel is regularly traversed by recreational boat traffic and occasionally for commercial traffic.

Sediment sampling and analysis were conducted by GHD in July 2021 using vibracore processes to characterize the dredged material and placement area sediment. Samples were collected at three locations within the project area. The sediment consists largely of coarse sandy material with very little fines and organics (Table 2).

Table 2. Grain Size Distribution

Sample Number	Gravel (%)	Sand (%)	Silt (%)	Clay (%)
32	**0.00**	**99.80**	**0.20**	**0.00**
33	**0.00**	**78.30**	**17.10**	**4.60**
34	**0.00**	**99.80**	**0.20**	**0.00**

The sediment samples did not require further chemical analysis and the sediment has been determined suitable for beneficial use (i.e., habitat enhancement/restoration, etc..).

4. Essential Fish Habitat in Project Area

The Magnuson-Stevens Act's final rule, mandating the management of fishery resources and their habitats, was released on 17 January 2002. NMFS and the South Atlantic Fishery Management Council (SAFMC), oversee managed species and their respective EFHs found in the project area. The EFH for a given species can include multiple habitats to support reproduction, juvenile and adult development, feeding, protection, and shelter during species' various life stages. This EFH assessment describes the habitat(s) and managed fishery resource(s) that would potentially be present within the potential project footprint. If any activities could potentially affect EFHs, then applicable federal permitting agencies must consult with the NMFS to ensure the potential action considers the effects on managed species/habitats and supports the management of sustainable marine fisheries.

Essential fish habitat in estuarine areas that are managed by the SAFMC and likely reside within the project area are listed in Table 3. Essential Fish Habitat (EFH) was identified within the dredging project area using NOAA Fisheries Essential Fish Habitat Mapper (https://coast.noaa.gov/digitalcoast/tools/efhmapper.html)

Table 3. Essential fish habitat categories in project area

Essential Fish Habitats	Potential Presence	Potential Effects
	Within Project Area	On-site Dredging or Placement
Intertidal Flats	☑	
Estuarine Water Column	☑	☑
Open waters/Unconsolidated Bottom	☑	☑

4.1 Intertidal Flats

The distribution and individual characteristics of intertidal flats are dynamic features of an estuarine system. An intertidal flat's shape and size varies by changing erosion and depositional rates influenced by tide ranges, coastal geology, freshwater inflow, weather patterns, and anthropogenic factors. Intertidal flat locations with minor tide variations are primarily influenced by wind and waves unless located near a tidal inlet or river mouth discharge. Tidal flats within systems of larger tidal fluctuations are principally formed and fashioned by the area's tidal action. Sediment size interacting with wind, wave, and tidal forces shape and manage intertidal flat development and movement. As the distance from an inlet increases, the intertidal flats' substrates become finer and more susceptible to wind fetch influences (SAFMC 2009).

Intertidal flats serve various functions for many species' life stages, as described in Table 4. Estuarine flats serve as a feeding ground, refuge, and nursery area 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 tidally influenced, constantly changing EFH provides feeding grounds for predators, refuge and feeding grounds for juvenile and forage fish species, as well as nursery grounds for estuarine-dependent benthic species (SAFMC 2009).

Table 4. Common fish and shellfish species utilizing intertidal flats

Common Name	**Scientific Name**	**Function**	**Life Stage Use(s)**
Atlantic menhaden	*Brevoortia tyrannus*	Refuge	Juvenile
Bay anchovy	*Anchoa mitchilli*	Refuge	Juvenile, Adult
Inshore lizardfish	*Synodus foetens*	Forage	Juvenile, Adult
Atlantic silverside	*Menidia menidia*	Refuge	Juvenile, Adult
Black sea bass	*Centropristis striata*	Refuge	Juvenile
Pinfish	*Lagodon rhomboides*	Refuge, Forage	Juvenile, Adult
Summer flounder	*Paralichthys dentatus*	Refuge, Forage	Post-larval, Juvenile, Adult
Blue crab	*Callinectes sapidus*	Refuge, Forage	Juvenile, Adult
Brown shrimp	*Farfantepenaeus aztecus*	Refuge, Forage	Post-larval, Juvenile, Adult
Hard clam	*Mercenaria mercenaria*	Forage	Post-larval, Juvenile, Adult

Species that move from a pelagic larval to a benthic juvenile existence make use of flats during development. These flats can provide a comparatively low energy area with tidal phases that allow species the use of shallow water habitat as well as relatively deeper water within small spatial areas. Species such as summer flounder, red drum, spotted seatrout, striped mullet (*Mugil cephalus*), gray snapper, blue crab (*Callinectes sapidus*), and shrimp use this EFH as a nursery. These flats also serve as refuge areas for species avoiding predators, which use the tidal cycles to gain access to estuarine feeding grounds. Table 3 describes examples of common estuarine fish and shellfish species and their function/life stage uses of intertidal flats (SAFMC 2009). In addition, these habitats are important for both migration routes and foraging for managed species such as red drum. Frequently, nursery areas can include unvegetated soft bottom areas surrounded by salt/brackish emergent marsh (Street et al. 2005). This intertidal flat EFH is found within the AIWW project area.

4.2 Estuarine Water Column

The transient boundaries of the estuarine water column are variable due to wind- and tide-driven inlet sea water mixing with upland freshwater sources and land surface runoff. With these mixing attributes, salinity levels vary within this estuarine EFH. Typically, the salinity groups include four ranges: oligohaline [< 8 parts per thousand (ppt)], mesohaline (8 to 18 ppt), polyhaline (18 to 30 ppt), and euryhaline (>30 ppt). The salt water tidal action and freshwater inflows are primary factors in estuarine circulation and nutrient/waste removal. Strong wind events and freshwater tributaries can increase turbidity, reducing light penetration, and adversely effecting submerged vegetation and phytoplankton photosynthesis. Freshwater rivers and stream inflows provide this EFH organic matter, nutrients, and finer grained sediments; whereas, ocean-driven tides provide coarser sediments and a transport mechanism for estuarine-dependent species. The ocean waters within this EFH act as a temperature stabilizer offsetting seasonal temperature extremes that would reduce productivity and diversity in the shallow upstream waters. Salinity, temperature, dissolved organic matter, dissolved inorganic nitrogen, and oxygen are components normally used to characterize the estuarine water column. Other descriptors, such as adjacent structures (shoals, channels, and marshes), water depth, available fetch, and turbidity are used to further describe this EFH. The estuarine water column provides both migrating and residential species of varying life stages the opportunity to survive in a productive, active, unpredictable, and at times strenuous environment. As the transport medium for nutrients and organisms between the ocean and the upstream rivers and inland freshwater systems, the estuarine water column is as essential a habitat as any marsh, seagrass bed, or reef (SAFMC 2009).

5. Habitats Areas of Particular Concern (HAPC)

Habitat Areas of Particular Concern (HAPC) are EFHs that are considered atypical, 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. HAPCs can include intertidal and estuarine habitats. The Magnuson-Stevens Act does not provide any additional regulatory protection to HAPCs. However, if HAPCs are potentially adversely affected, additional inquiries and conservation guidance may result during the NMFS EFH consultation (NMFS 2008).

The SAFMC has designated coastal inlets and state-designated overwintering areas of Georgia and South Carolina as HAPCs for white, brown and pink shrimp. The Atlantic States Marine Fisheries Commission considers Georgia and South Carolina's coastal inlets HAPCs for red drum. Also, oyster/shell bottom and coastal inlets of Georgia and South Carolina are considered HAPCs for the species of the snapper-grouper complex. The proposed placement site (BU-E) was assessed on 6 January 2023 and it was determined that there was no active oyster activity within the placement template. Finally, HAPCs for the migratory pelagic species of king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*S. maculatus*), and cobia (*Rachycentron canadum*) include any Atlantic coast estuary with high numbers of these species (SAFMC 2009, NMFS 2008). State-designated areas of Importance of Managed Species including Primary Nursery Areas (PNA) are also considered HAPCs. Categories of EFH and associated habitats, and the potential impacts are provided in Table 5.

Table 5: Categories of Essential Fish Habitat in the project vicinity and potential impacts.

	Potential Presence		**Potential Impacts**	
Essential Fish Habitat Category	**In/Near Project Vicinity**	**Project Impact Area**	**Dredge Operation**	**Sediment Placement Activities**
Intertidal Flats	Yes	No	No	Yes
Estuarine Water Column	Yes	Yes	Minor and Temporary	Minor and Temporary
Open waters/Unconsolidated Bottom	Yes	Yes	Yes	Yes

6. Managed Species and Essential Fish Habitat Use

6.1 Penaeid Shrimp and Relevant EFH

White, brown and pink shrimp (penaeids) are managed by the SAFMC via South Atlantic Fisheries Management Plan (SAFMP) (SAFMC 2004). The more common South Carolina/Georgia species is white shrimp; which are regionally referred to as green shrimp, green-tailed shrimp, or southern shrimp. Brown shrimp are referred to as green lake shrimp, red-tail shrimp, and also summer shrimp. Pink shrimp are sometimes referred to as northern shrimp or deepwater prawn. These and other managed species that may be found in the project area are listed in Table 6.

Environmental conditions are believed to primarily control shrimp population sizes even though fishing reduces the populations over the season. Shrimping is not thought to affect successive year totals, unless the reproduction stock is affected by environmental circumstances. Each species, due to their migratory nature and reproductive capability, are able to recover from a low population from one year to the next. The loss or degradation of salt marsh nursery habitat for juvenile white and brown shrimp is one of the most serious threats (NCDENR, 2006) to southeastern United States stocks. All coastal inlets and respective nursery habitats are of particular importance to shrimp.

The brown and white shrimp species' lifecycles are similar in that adults reproduce offshore and eggs are hatched into free-swimming larvae. Both species undergo 11 larval stages to produce post-larvae. Within the estuary, post-larval shrimp grow rapidly; however, the rate is salinity- and temperature-dependent (SAFMC 2004). These shrimp species utilize related habitats with minor differences in substrate and salinity partiality. Once reaching a sub-adult size of three to five inches, the shrimp migrate seaward. Juvenile and adult shrimp are omnivores, feeding mostly at night on benthic organisms, algae, and detritus. Daytime feeding may occur in turbid waters rich in mysids, amphipods, polychaetes, and various types of organic debris (SAFMC 2004, NCDENR 2006). As with brown shrimp, pink shrimp eggs are also demersal. Records suggest a larval period of 15 to 25 days. The mechanism by which postlarvae are brought from spawning areas to inside the estuaries is not well-known. Postlarvae move into estuaries during late spring and early summer. In the South Atlantic, the nursery areas utilized within the estuaries are primarily dominated by the marsh grass *Spartina alterniflora*

Shrimp have separate sexes (dioecious); females grow larger and are able to reproduce in less than 12 months and can expel between 500,000 and 1,000,000 eggs in a single event. Adult brown shrimp spawn in deep ocean waters over the continental shelf, while white shrimp remain nearshore. Larvae and post-larvae depend on ocean currents for transportation through inlets into estuarine nursery grounds. River mouths and inlet entrances are particularly important to estuarine shrimp recruitment. The majority of estuarine shrimp are found in close proximity to shallow wetland systems. White shrimp may use freshwater submerged vegetation to some degree. However, brown shrimp primarily utilize estuarine submerged vegetation because of salinity inclinations. The use of oyster beds by white and brown shrimp occurs, and is considered crucial in the absence of submerged vegetation (NCDENR 2006). In North Carolina sounds/estuaries, juveniles and adult phases of pink shrimp appear in June and July; whereas, in the southern portion of their range this occurs in April and May. Pink shrimp leave Florida estuaries within two to six months after having arrived as postlarvae. Smaller pink shrimp may remain in the estuary during winter. Pink shrimp that survive the winter grow rapidly during late winter and early spring before migrating to the ocean.

White Shrimp

White shrimp are found along the Atlantic coast from New York to Florida. Spawning along the south Atlantic coast occurs from March to November, while May and June are reported as peak months. Spawning takes place in water ≥ 30 feet deep and within five miles of shore where they prefer salinities of ≥ 27 ppt (Muncy 1984). The increase in bottom water temperature in the spring is thought to trigger spawning. After the demersal eggs hatch, the planktonic post-larvae live offshore for approximately 15 to 20 days. During the second post-larval stage, they move inshore on tidal currents and enter estuaries two to three weeks after hatching. Shallow muddy bottoms in low to moderate salinities are the optimum nursery areas for these benthic juvenile white shrimp. During this stage, the diet consists of zooplankton and phytoplankton. By June or July, the juveniles move to deeper creeks, rivers, and sounds. It has been documented that juvenile white shrimp tend to migrate further upstream than do juvenile brown shrimp; as far as 130 miles in nearby northeast Florida (Pérez-Fartante 1969). Juveniles prefer to inhabit shallow estuarine areas with a muddy, loose peat, and sandy mud substrate with moderate salinities. Juvenile white shrimp are benthic omnivores (e.g. fecal pellets, detritus, chitin, bryozoans, sponges, corals, algae, and annelids) and feed primarily at night. White shrimp usually become sexually mature at age one during the calendar year after they hatch. The emigration of sexually mature adults to offshore waters is influenced primarily by body size, age, and environmental conditions. Studies have shown that a decrease in water temperature in estuaries triggers emigration in the south Atlantic (Muncy 1984). During fall and early winter, the south-migrating white shrimp provide a valuable fishery in southern North Carolina, South Carolina, and Georgia. White shrimp are omnivores preferring soft muddy bottoms in areas of expansive brackish marshes (SAFMC 2004). The life span of white shrimp usually does not extend beyond one year.

Brown Shrimp

Brown shrimp occur from Massachusetts to the Florida Keys and west into the Gulf of Mexico. They support an important commercial fishery along the south Atlantic coast, primarily in North and South Carolina. This species spawns in deep ocean waters during late winter or early spring. Larvae migrate from offshore to inshore areas as post-larvae (peak migration from February through April), frequently at night on incoming tides. Carried by currents and tides into estuaries, the larvae develop into post-larvae within 10 to 17 days. Once in the estuaries, post-larvae seek out the soft silty/muddy substrate common to vegetated and non-vegetated, shallow, estuarine environments. This environment yields an abundance of detritus, algae, and microorganisms that comprise their diet at this developmental stage. Post-larvae have been collected in salinities ranging from zero to 69 ppt with maximum growth reported between 18 degrees centigrade (°C) and 25°C, peaking at 32°C. Maximum growth, survival, and efficiency of food utilization have been reported at 26°C (Lassuy 1983). Juveniles develop in four to six weeks, continuing into rapid sub-adult development depending on salinities and temperatures. The density of post-larvae and juveniles is highest among emergent marsh and submerged aquatic vegetation (Howe et al. 1999, Howe and Wallace 2000), followed by tidal creeks, inner marsh, shallow non-vegetated water, and oyster reefs. The diet of juveniles consists primarily of detritus, algae, polychaetes, amphipods, nematodes, ostracods, chironomid larvae, and mysids (Lassuy 1983). Emigration of sub-adults from the shallow estuarine areas to deeper, open water takes place between May through August, with June and July reported as peak months. The stimulus behind emigration appears to be a combination of increased tidal height and water velocities associated with new and full moons. As individuals increase in size, they move to deeper and saltier waters of the inlets until exiting to the ocean in late fall. After exiting the estuaries, adults seek out deeper (60-

foot) offshore waters. Brown shrimp are omnivores and prefer muddy and peat bottoms, but can be found on sand, silt, or clay mixed shell hash bottoms (SAFMC 2004, NCDENR 2006). Adults reach maturity in offshore waters within the first year of life at 5.5 to 5.7 inches long. They have a maximum life span of 18 months (NOAA 2009b).

Pink Shrimp

Pink shrimp occur on the Atlantic Coast from Chesapeake Bay south to the Florida Keys and are most abundant in water depths of 11-37 m. Pink shrimp reach sexual maturity at about 85 mm total length. Spawning occurs during the early part of the summer at depths of 3.7 to 15.8 m. During the larval stages, development is dependent on food availability, water temperature and quality of habitat. Depending on the environmental conditions, the larval period can last from 15-25 days. Post-larval movement from the spawning areas to estuaries are not well known, although some literature suggests that wind conditions and current movements assist in transport from the estuaries to offshore habitats. Migration offshore occurs during May/June off the Georgia coast (SAFMC 2009).

Penaeid Shrimp EFH in the Project Area

Of the shrimp EFH listed (NMFS 2008), those that exist within the project area include the estuarine emergent wetlands; intertidal flats/unvegetated bottoms; estuarine water column; and the marine water column. These EFHs provide transport, refuge, and feeding/developmental areas for post- larval, juvenile, and sub-adult penaeid shrimp. Tidal inlets and state-designated nursery areas are considered HAPCs for white, pink and brown shrimp species.

Potential shrimp EFHs within the project footprint would include the AIWW salt marsh, intertidal mud flats, estuarine water column, and the marine water column.

6.2 Snapper/Grouper Species Complex and Relevant EFH

Snapper/Grouper

The project area is designated as EFH for two species of snapper in the Lutjanidae family. EFH for lane and gray snappers ranges from shallow estuarine areas (e.g., vegetated sand bottom, mangroves, jetties, pilings, bays, channels, and mud bottom) to offshore areas (e.g., hard and live bottom, coral reefs, and rocky bottom) as deep as 1,300 feet (Allen, 1985; Bortone and Williams, 1986). Like most snappers, these species participate in group spawning, which indicates either an offshore migration or a tendency for larger, mature individuals to take residency in deeper, offshore waters. Both the eggs and larvae of these snappers are pelagic (Richards et al. 1994). After an unspecified period of time in the water column, the planktivorous larvae move inshore and become demersal juveniles. The diet of these newly settled juveniles consists of benthic crustaceans and fish. Juveniles inhabit a variety of shallow, estuarine areas including vegetated sand bottom, bays, mangroves, finger coral, and seagrass beds. As adults, most are common to deeper offshore areas such as live and hardbottoms, coral reefs, and rock rubble. However, adult gray and lane snapper also inhabit vegetated sand bottoms with gray snapper less frequently occurring in estuaries and mangroves (Bortone and Williams 1986). Data suggests that adults tend to remain in one area. The diet of adult snappers includes a variety of fish, shrimp, crabs, gastropods, cephalopods, worms, and plankton. All species are of commercial and/or recreational importance (Bortone and Williams 1986).

Snapper/Grouper Complex EFH in Project Area

EFH for the grouper/snapper complex species discussed above include the estuarine water column, intertidal flats, and estuarine marsh. These habitats provide migration, refuge, and feeding/developmental areas for post-larval, juvenile, and/or adults of these species. Furthermore, Georgia and South Carolina tidal inlets, state-designated nursery areas, and oyster/shell bottoms are considered HAPCs for the grouper-snapper complex (NMFS 2008).

6.3 Coastal Migratory Pelagics and Relevant EFH

Spanish Mackerel

The Spanish mackerel is important both commercially and recreationally. The Atlantic States Marine Fisheries Commission (ASFMC) and the SAFMC cooperatively manage Spanish mackerel, a member of the Scombridae family. Spanish mackerel management has resulted in a steady stock abundance increase since 1995; and based on 2002/2003 data, the population is not over-fished. Spanish mackerel are found within the coastal waters of the eastern United States and the Gulf of Mexico. NOAA's Estuarine Living Marine Resource Program, a cooperative effort of the National Ocean Service and NMFS, compiles regional information on estuarine habitat by select marine fish and invertebrates. The accumulated data emphasize the essential nature and extreme importance that estuarine habitats have on Spanish mackerel life stages (NOAA 2009).

Smaller than its congener the king mackerel (but have been reported to reach three feet in length), the Spanish mackerel's average adult weight is two to three pounds. Spanish mackerel are a fast- growing species, and both sexes are capable of reproduction by the second or third year (Mercer et.al. 1990). They have a life span of five to eight years (ASMFC 2009). Spanish mackerel form immense, fast-moving, and surface- feeding schools of comparable-sized individuals. The diet of scombrids consists primarily of fish and, to a lesser extent, penaeid shrimp and cephalopods. The fish that make up the bulk of their diet are small schooling clupeids [e.g., Atlantic menhaden, alewives (*Alosa pseudoharengus*), Atlantic thread herring (*Opisthonema oglinum*), anchovies], atherinids, and to a lesser extent jack mackerels (*Trachurus symmetricus*), snappers, grunts (H*aemulidae* sp.), and half beaks (*Hemiramphidae* sp.) (Collette and Nauen, 1983). Shrimp and jellyfish have also been reported in stomach contents (Mercer et.al., 1990).

As ocean temperatures warm, Spanish mackerel seasonally migrate along the western Atlantic coast. With increasing water temperatures, Spanish mackerel move northward from Florida to Rhode Island between late February and July and return in the fall (Collette and Nauen, 1983). Spanish mackerel spawn in groups over the inner continental shelf, and spawning takes place May through September with peaks in July and August. Batch spawning takes place, frequently inshore. Females grow faster and larger than males; and by age two, females may release up to 1.5 million eggs (Mercer et al., 1990). The eggs are pelagic and hatch into planktonic larvae. Larvae grow quickly and may be found inshore at shallow depths less than 30 feet. There are indications of vertical larval migration during night-time hours (Mercer et al. 1990). Juveniles use estuaries as nursery areas but most remain in nearshore ocean waters. The continental shelf, tidal estuaries, and coastal waters are all habitats for adult Spanish mackerel. However, adults spend most of their life in the open ocean; but can be found over deep reefs, grass beds, and estuarine shallows (ASMFC 2009). Their distribution is considered primarily dependant on water salinity and temperature (ASMFC, 2009; Mercer et al.1990).

Cobia

Cobia are fished both commercially and recreationally; however, the commercial harvest is mostly incidental in both the hook and line, and net fisheries. The recreational harvest is primarily through charter boats, party boats, and fishers fishing from piers and jetties. Cobia, a member of the Rachycentridae family is managed by the SAFMC (SAFMC 2009, NMFS 2008). Cobia, sometimes referred to as "crabeater," is found worldwide in a circum-tropical distribution (SAFMC 2009) in tropical, subtropical, and warm temperate waters where they inhabit estuarine and shelf waters depending on their life stage.

Cobia are prominent in warm, seasonal waters from Chesapeake Bay south through the Gulf of Mexico; and migrate from tropical waters in the winter to warm temperate waters in the spring, summer, and fall. Tagging studies have documented a north-south, spring-fall migration along the southeast United States and an inshore-offshore, spring-fall migration off South Carolina (Ditty and Shaw 1992). As a migratory pelagic fish, cobia are found around offshore reefs and over the continental shelf, preferring structures, platforms, and flotsam. Cobia also inhabit inshore inlets and bays near piers, piles, and inshore structure (University of Florida, 2009). Mills (2000) indicated their association with pilings, wrecks, and other forms of vertical relief (e.g. oil and gas platforms) and their preference for shade from these structures.

Males and females reach sexual maturity at ages two and three, respectively (SAFMC 2009, University of Florida 2009); though females grow faster than males. Sexual maturity is attained by males at an approximate 21-inch length during the second year and at an approximate 28-inch length for females during their third year (Shaffer and Nakamura 1989). Based on past collections of gravid females, spawning takes place from mid May extending through the end of August off South Carolina (Shaffer and Nakamura 1989). Eggs and sperm are released into offshore open waters where external fertilization takes place in large spawning aggregations. However, cobia have also been documented to spawn in estuaries and bays. Cobia spawn once every nine to twelve days; spawning 15 to 20 times during the season. Eggs have been collected in the lower Chesapeake Bay inlets, North Carolina estuaries, in coastal waters 66 to 161 feet deep, and near the edge of the Florida Current, and the Gulf Stream (Ditty and Shaw 1992). Ditty and Shaw (1992) suggested that cobia spawn during the day since all the embryos they examined were at similar stages of development. After 24 to 36 hours following fertilization, larvae emerge and move inshore to lower salinities.

Eyes and mouths develop approximately five days after hatching, allowing active feeding. By day 30, the juveniles take on an adult appearance. Cobia are voracious predators that forage primarily near the bottom, but on occasion do take some prey near the surface. As carnivores, they feed on small fish such as striped mullet, pinfish, Atlantic croakers (*Micropogonias undulatus*), and Atlantic herring (*Clupea harengus*); as well as on crustaceans, benthic invertebrates, and cephalopods. Known as a ravenous feeder, cobia often fully engulf their prey using villiform teeth (bands of small slender teeth located on their jaws, tongue, and roof of mouth). Young cobia seem to require a substantial crustacean diet and appear to do poorly feeding on primarily fish. Cobia will move in schools of 3 to 100 fish hunting shoreline shallows for migratory prey. They will follow or track sharks, turtles, and rays scavenging orts (SAFMC 2009, University of Florida 2009). No predator studies have been conducted, but dolphin (*Coryphaena* sp.) have been known to feed on small cobia.

Cobia exhibit rapid growth, may attain a length of six feet, and are known to live ten years or so (Shaffer and Nakamura 1989). Some cobia documented off North Carolina had maximum ages of 14 years for males and 13 years for females. Adults are large, streamlined, slim- bodied fish with a wide, flattened head, and protruding lower jaw. They are powerful fish averaging 20 to 40 pounds, but can reach up to 130 pounds.

6.4 Coastal Pelagic Species EFH in the Project Area

Coastal migratory pelagic species depend on estuarine systems for various life stages. Spanish mackerel juveniles depend on estuarine habitats, as do larvae, post-larvae, juvenile, and adult cobia. Estuarine EFHs provide transport, refuge, and feeding grounds, as well as developmental areas. Many important prey species for coastal pelagics are associated with estuarine areas. As the transport medium for nutrients and organisms between the ocean and inland freshwater systems, the estuarine water column is a very important essential habitat, and emergent salt marshes provide important refuge and foraging grounds. Though coastal migratory pelagic species are dependent on estuarine systems for larvae, post-larval, juvenile, and adult developmental success; there is no HAPC for either cobia or Spanish mackerel in the project area.

6.5 Highly Migratory Species

Highly migratory species include billfishes, tunas, and sharks. Of these groups, sharks are the most likely to use EFHs in the project area. The Florida Museum of Natural History (FLMNH) provided the following information from biological profiles for managed shark species (FLMNH 2009). Most of the sharks listed in Table 6 use inshore/estuarine habitats occasionally for foraging, particularly when inlet water temperatures are warmer than those offshore. As implied by their managed species classification, these species are highly migratory, moving north and south along the Atlantic coast during spring and fall, respectively. Schooling behavior is fairly common, sometimes even according to gender. Several of the managed shark species in the project area engage in complex courtship behavior prior to mating. Depending on species, gestation for young takes 8 to 15 months. Young may emerge from either viviparous (live birth) or ovoviviparous (initial emergence from egg in the mother) processes. Some species use inlets and estuaries as nursery grounds. However, the shark's life history stage that is most associated with estuarine EFHs is the juvenile stage. The feeding habits of most shark species possibly using the project area are generalist and opportunist. However, some forage more in the mid and upper water column, while others prefer to forage benthic areas.

6.6 Highly Migratory Species EFH in the Project Area

Potential EFH locations for highly migratory species discussed above include inlets, shorelines, coastal waters, and estuary habitats. Sharks may utilize any of the EFHs in the project area, especially for foraging. Their use of tidal areas may be limited based on size of individuals and high tide water depths. Flounder, Scup and Black Sea Bass Fishery Management Plan directed by the MAFMC (NMFS 2008). The summer flounder's range includes shallow estuarine and outer continental shelf waters from Nova Scotia to Florida and the northern Gulf of Mexico (NEFSC 1999). Summer flounder display intense seasonal inshore/offshore migration patterns. From late spring through early fall, summer flounder are concentrated in estuaries and sounds until migrating to the offshore outer continental shelf wintering grounds (NEFSC 1999, ASMFC 2009). During fall and early winter, offshore spawning occurs and the larvae are carried by wind currents into coastal areas. ost larvae and juvenile development occurs principally within the estuaries and sounds. Most individuals are sexually mature at age two. Growth rates and maximum ages vary substantially between sexes; adult females routinely grow larger and older than males (NEFSC 2009).

Summer flounder will begin spawning at age two or three. Summer flounder eggs are pelagic, buoyant, and most plentiful between Cape Cod and Cape Hatteras. The eggs are spherical with a transparent rigid shell, and the yolk occupies approximately 95 percent of the egg volume (ASMFC 2009). Larval free feeding is initiated once the yolk- sac material is consumed, which is a function of the incubation temperature (NEFSC, 1999).

The left-eyed flatfish begin with eyes on both sides of its body; the right eye migrating to the left side in 20 to 32 days post-emergence. Larvae migrate to inshore coastal areas from October to May where they burrow into the sediment and develop into juveniles. Late larval and juvenile summer flounder are active predators, preying on crustaceans, copepods, and polychaetes. Research indicates that appendages of benthic fauna are an important food source for post-larval summer flounders (NEFSC, 1999). Burrowing behavior is influenced by predator and prey abundance, salinity, water temperature, tides, and time of day. Juveniles inhabit marsh creeks, mud flats, and seagrass beds; but prefer primarily sandy shell substrates. Juveniles often remain inshore for 18 to 20 months. Males reach maturity at approximately ten inches; while females reach maturity at approximately 11 inches (NEFSC, 1999; ASMFC, 2009).

Adults primarily inhabit sandy substrates, but have been documented in seagrass beds, marsh creeks, and sand flats. Summer flounders are quick, opportunistic predators that ambush their prey, making use of a well developed dentition. Their camouflage and bottom positioning allow for efficient predation on small fish and squid; crustaceans make up a large percentage of their diet (ASMFC, 2009; NEFSC, 1999). Adults are active during daylight hours and normally inhabit shallow, warm, coastal estuarine waters before wintering offshore on the outer continental shelf. Some research suggests that some older individuals may remain offshore year- round (NEFSC, 1999).

Table 6: Potential managed species within the project area.

Common Name [1]	Scientific Name	Management Plan Agency [2]	Fishery Management Plan (FMP) [4]	Life Stage in EFH [3]	Marine Water Column
Brown shrimp	*Farfantepenaeus aztecus*	SAFMC	Shrimp	P,J,A	L, A
White shrimp	*Lytopenaeus setiferus*	SAFMC	Shrimp	P,J,S	L, A
Pink shrimp	*Farfantepenaeus duorarum*	SAFMC	Shrimp	P, J, S	L, A
(HAPC FOR SHRIMPS: Tidal inlets, state-designated nursery and overwintering habitats) [5]					
Gray snapper	*Lutjanus griseus*	SAFMC	Snapper Grouper	P,J,A	
Lane snapper	*Lutjanus synagris*	SAFMC	Snapper Grouper	J	
Gag grouper	*Mycteroperca microlepis*	SAFMC	Snapper Grouper	P,J,A	
(HAPC FOR SNAPPER/GROUPERS: Oyster/shell habitat, state-designated nursery areas, coastal inlets) [5]					
Cobia	*Rachycentron canadum*	SAFMC	CMP	L,P,J,A	A
Spanish mackerel	*Scomberomorus maculatus*	SAFMC	CMP	J	A
Bluefish	*Pomatomus saltatrix*	MAFMC	Bluefish	J,A	
Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	NMFS	HMS	J	A
Blacknose shark	*Carcharhinus acronotus*	NMFS	HMS	J	A
Bonnethead shark	*Sphyma tiburo*	NMFS	HMS	J	A
Bull shark	*Carcharhinus leucas*	NMFS	HMS	J	A
Dusky shark	*Carcharinus obscures*	NMFS	HMS	J	A
Finetooth shark	*Carcharhinus isodon*	NMFS	HMS	J,A	A
Lemon shark	*Negaprion brevirostris*	NMFS	HMS	J,A	A
Sandbar shark	*Carcharhinus plumbeus*	NMFS	HMS	J	A
Sand tiger shark	*Odontaspis Taurus*	NMFS	HMS	N	A
Scalloped hammerhead	*Sphyrma lewini*	NMFS	HMS	J	A
Spinner shark	*Charcharhinus brevipinna*	NMFS	HMS	J,A	A

Notes:

[1]. These EFH species were based on species lists from SAFMC 2008.
[2]. Fishery Management Plan (FMP) Agencies: SAFMC = South Atlantic Management Council; MAFMC = Mid- Atlantic Fishery Management Council; NMFS = National Marine Fisheries Service.
[3]. Life stages include: E = Eggs, L = Larvae, N = Neonate, P = Post-Larvae, J = Juveniles, S = Sub-Adults, A = Adults
[4] Fishery Management Plans: CMP = Coastal Migratory Pelagics; HMS = Highly Migratory Species.
5. HAPC = Habitat Areas of Particular Concern; if not listed for certain fishery management plans, appropriate HAPC for respective species is not found in the project area or vicinity.

7. Assessment of Impacts

In this section, potential impacts to EFH as well as to managed species within the action area are evaluated.

7.1 Potential Effects to EFH

Dredging:

The Corps evaluation of impacts from dredging within the three identified reaches within the AIWW are summarized below. Overall, the Corps finds that there will be short-term minor impacts to open waters/unconsolidated bottom and estuarine water column EFH.

Unconsolidated Bottom The proposed dredging activities with the three identified reaches within the AIWW (704.5-706.5, 707.25-708, and 709.25-709.5) would require removal of material within open water habitat/unconsolidated EFH. Given the abundance of nearby habitats for organisms to recruit from, the newly dredged areas will likely recover quickly (NMFS, 2020). Any loss of habitat would be short-term, and through primary and secondary succession, would not adversely affect the reestablishment of the existing benthic communities or alter the capacity of EFH to support healthy populations of managed species over the long-term. Early successional benthic organisms will likely rapidly colonize the dredged footprint (Van Dolah et al., 1984).

Estuarine Water Column

Dredging within the three identified reaches within the AIWW will also cause short-term and minor impacts to turbidity with the estuarine water column. Turbidity plumes associated with dredging are only limited to a few hundred feet and most of the turbidity will likely settle out quickly once the dredging is completed (NMFS, 2020). Additionally, the project area because of the dynamic nature of tidally influenced systems is naturally turbid and species that inhabit these systems are acclimated to a turbid environment.

Direct placement of Dredged Material for Habitat Restoration (BU-E):

The Corps evaluation of impacts from direct placement of dredged material for habitat restoration associated with BU-E are summarized below. Overall, the Corps finds that restoring subtidal and intertidal habitat to uplands is a minor long-term impact to estuarine water column EFH. However, using the material for habitat restoration and regional sediment management, the Corps is minimizing adverse impacts.

Unconsolidated Bottom

Open water placement of material to create bird island habitat encompass a portion of an approximate area of approximately 30 acres of unconsolidated bottom with the placement of sandy material. The exact size and design of the proposed bird island will be finalized during the detailed design phase and will be coordinated with Federal and State resource agencies.

The proposed footprint for the bird island restoration island (BU-E) is located in a very dynamic system within the AIWW. Between the years of 2005 and 2017, as shown in Figure 1, the proposed placement site for restoration has seen years of accretion as well as years of erosion of sedimentation resulting from the dynamic nature of the river flows. Current trends, as seen in Google Earth. have shown a pattern of erosion and loss of habitat over time. The proposed placement activities associated with BU-E and BU-F are designed to provide additional sediment to the system to enhance/restore that lost habitat.

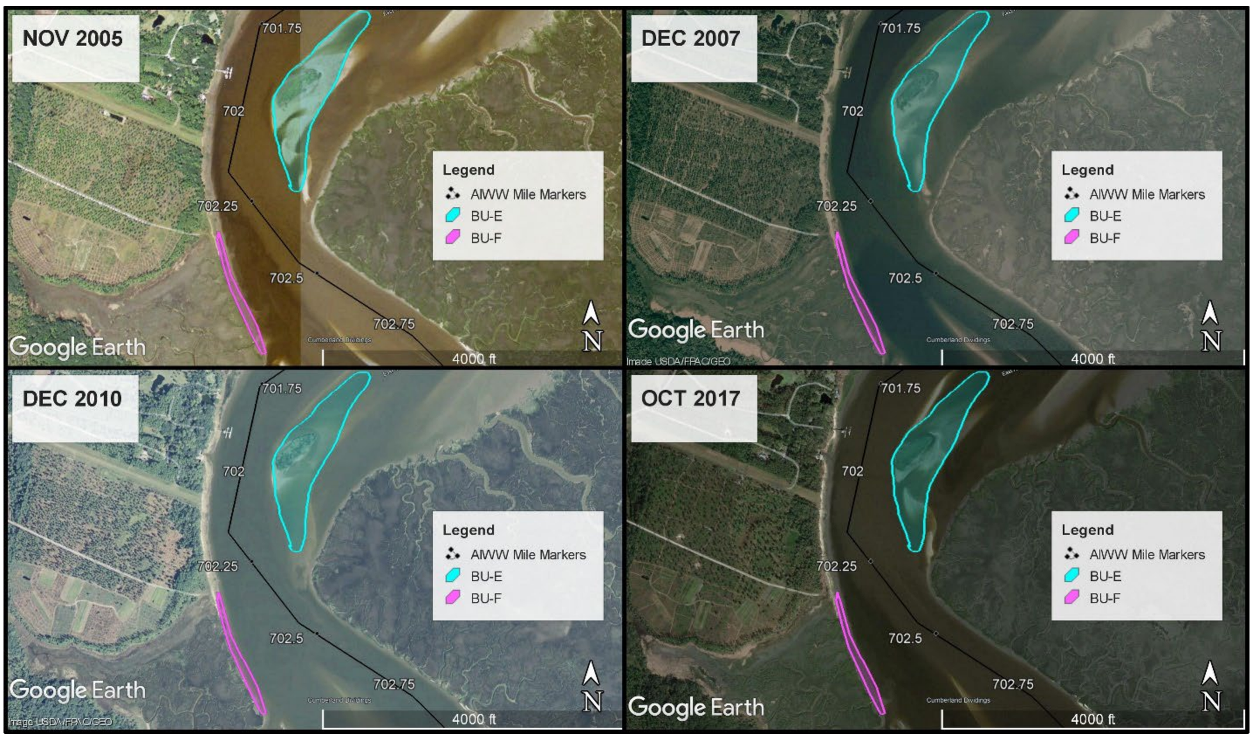

Figure 4: Historical Imagery of Proposed Placement Sites BU-E

The amount of unconsolidated bottom that would be impacted by the proposed placement activities would be temporary, approximately two weeks, and because no hardening measures will be in place the sediment will be allowed to move within the river system during normal tidal cycles. Early successional benthic organisms would rapidly colonize the placement footprint. Through primary and secondary succession, the reestablishment of the existing benthic communities or capacity of EFH will occur slowly over years as the placed material continues to erode.

The amount of unconsolidated bottom that will be temporarily impacted by the restoration of the bird island habitat will account for much smaller percentage of the total area supporting this EFH type within the AIWW study area. The abundance of habitat adjacent to the proposed placement area will be available for species to use, therefore, the predicted temporary impacts from placement will not have minor long-term impacts to this EFH or dependent species. Furthermore, placement of dredged material would enhance the long-term diversity of macroinfauna at the site providing valuable foraging habitat for a variety of managed species.

Estuarine Water Column

Placement of sediment for habitat restoration will cause short-term and minor impacts to turbidity within the estuarine water column. Turbidity plumes associated with placement would be limited to a few hundred feet and most of the turbidity will settle out quickly once placement is completed. There would be only short-term and minimal effects from turbidity because sediment being proposed for placement activities is 80% sand or greater. Due to the sediment being coarse-grained material, it will settle out quickly and not result in long lasting turbidity plumes.

Short-term increases in turbidity will not have a measurable effect on the water temperature or dissolved oxygen concentrations. Turbidity plumes would occur during placement of sediment and would quickly dissipate. No permanent or temporary impacts or changes in temperature dissolved oxygen levels, salinity or pH would occur within the AIWW once placement activities are complete.

Intertidal/Non-Vegetated Flats

Placement activities associated with the direct placement of dredged material for bird island restoration will not have direct impacts to existing intertidal/non-vegetated flats. However, there may be indirect negligible impacts as the intent of the placement activity is to naturally feed the adjacent shoreline to restore and stabilize it against future erosional forces. This process would occur naturally, guided by tidal ebb and flow, and would not alter the benthic community along the shoreline.

7.2 Potential Effects to Managed Species

Effects to Shrimp Species

EFH-HAPCs for brown, pink and white shrimp include coastal inlets (SAFMC, 2009). Over-wintering areas and nursery habitats inside inlets are also important. The project area includes productive estuarine habitats that may be used by brown and white shrimp; such as emergent marsh, unvegetated bottom, and oysterbeds. Localized temporary turbidity would occur during dredging and placement activities. This could potentially have adverse effects on shrimp physiology and behavior. However, the locations being proposed for dredging and placement activities are in already naturally turbid environments and due to the high sand content of the material being proposed for placement activities, turbidity levels will return quickly back to background levels after construction efforts are completed. Many individual shrimp of all life-history stages would likely be directly removed from the project area as a result of entrainment in the dredging equipment and dredged material placement. In addition, the food-base of shrimp within the potential project footprint would likely be affected by changes in water quality and hydraulics during dredging activities. However, the food-base would recover rapidly as water quality rebounds quickly following construction and dredging. Individuals would likely forage in adjacent areas that have not been physically affected.

Effects to Grouper-Snapper Complex Species

The project area includes estuarine resources that may be used by snapper species and their prey. Adult, juvenile, and post-larval snapper may be directly taken through dredging and filling effects. Productive estuarine marshes and benthic habitat, particularly useful for snapper foraging and refuge for young, would be indirectly impacted. The project would potentially cause localized turbidity during dredging, from suspended materials, which would be minor and temporary. More developed and mobile life stages would migrate to other suitable area habitats avoiding localized construction, but adjacent habitats to dredging and placement locations may still be temporarily affected by changes in turbidity. These factors and any changes in prey fish populations would potentially cause temporary affects to the health and condition of juvenile and adult snapper in the area; however, because these fish have the ability to migrate away from the dredging and placement activities, the effects of any turbidity plumes, which are transient and temporary, would be minimal. Overall impacts associated with the proposed dredging and placement activities to the grouper-snapper complex would occur only during construction activities and would be temporary and minor in nature.

Effects to Coastal Migratory Pelagic Complex Species

Larval, post-larval, juvenile, and adult individuals of the coastal migratory pelagic species complex utilize estuarine habitats in the project area. Estuarine marshes and other inlet habitats are particularly important for feeding and refuge/development. Developmental areas and dredging effected prey species would be indirectly affected by the project. Individuals (particularly larvae and juveniles) would likely be incidentally taken during dredging and placement of materials. More developed and mobile life stages would migrate to other suitable area habitats avoiding localized construction, but adjacent habitats to dredging and placement locations may still be temporarily affected by changes in turbidity and circulation patterns. These factors and any changes in prey fish populations would potentially cause temporary affects to the health and condition of juvenile and adult cobia and mackerel in the area. However, because these fish have the ability to migrate away from the dredging and placement activities, the effects of any turbidity plumes, which are transient and temporary, would be minimal. Overall impacts associated with the proposed dredging and placement activities to the coastal migratory pelagic complex would occur during construction activities and would be temporary and minor in nature.

Effects to Highly Migratory Species

Highly migratory species potentially using the project area include sharks, most of which use inshore/inlet areas as juveniles. It is highly unlikely that any individuals of these species would be taken by dredge equipment due to their high motility and the use of cutterhead dredging which is not known to result in take of mobile species, but foraging and other behaviors may be altered as a result of dredging activities. Indirect effects on these species may result if prey habitat is removed or prey populations decline in the project area. However, these migratory species are likely to move to another area where suitable prey would be found. In addition, because these fish have the ability to migrate away from the dredging activities, the effects of any turbidity plumes, which are transient and temporary, would be minimal. Therefore, overall impacts associated with the proposed dredging and placement activities to the highly migratory species within the action area would only occur during construction activities and would be temporary and minor in nature.

Effects to Other Managed Species

Bluefish and summer flounder are not likely to be affected as dredging and placement will not directly impact tidal and intertidal marshes. Sediment will naturally migrate into these habitats, providing resilience to storm surge and SLR, but migration will be gradual and turbidity plumes would only occur during construction activities and would be temporary and minor in nature.

8. Summary of Effects and Determination

The proposed project would have potential direct and indirect effects on EFH, managed species, and habitat associated with managed species. During dredging and placement construction activities, there will be some direct and indirect effects to intertidal flats, estuarine water column, and intertidal/non-vegetated flats EFH.

Species and habitats associated with EFH are typically affected only short-term when dredging activities occur. These species recover within a month or so and would be short-term and minor in nature. The use of cutterhead dredging is not known to result in large number of takes of highly migratory and mobile species. Indirect dredging impacts such as reduced water quality due to temporary increases in turbidity levels for activities such as feeding or spawning may also occur however these impacts would be short-term and minor in nature as the AIWW is a naturally turbid area due to tidal influences. Once dredging and placement activities are completed, any turbidity will quickly dissipate given the riverine/tidal currents. Short-term increases in turbidity will not have a measurable effect on the water temperature or dissolved oxygen concentrations.

Placement of dredged material as part of the restoration activities may adversely affect infaunal and bottom-dwelling organisms at the site by smothering immobile organisms, (*e.g.,* invertebrate prey species) or forcing mobile animals (*e.g.,* benthic oriented fish species) to migrate from the area. This direct impact would be minor and long-term; however, these effects are balanced with the benefits that BU provides to species and the overall system.

Based on the analysis above, the Corps has determined that the proposed action would not cause significant adverse impacts to EFH and managed species located within the action area. Impacts to EFH and managed species that use this habitat would be temporary and minor in nature and do not reduce either the quality or quantity of EFH in the project area. The Corps has used the best scientific and commercial data available to complete this analysis and looks forward to further discussion on this project and its potential impacts.

9. References

Allen, G.R. 1985. An annotated and illustrated catalogue of lutjanid species known to date. FAO species catalogue, snappers of the world. No. 125, 6:208.

ASMFC (Atlantic States Marine Fisheries Commission). 2009. Managed Species, Species Profile. Washington, D.C. http://www.asmfc.org/ Accessed November 2022

Bortone, S.A. and J.L. Williams. 1986. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida) -- gray, lane, mutton, and yellowtail snappers. U.S. Fish and Wildlife Service Biological Report 82(11.52). U.S. Army Corps of Engineers, TR EL-82-4. 18 pp.

Collette, B.B. and C.E. Nauen. 1983. FAO species catalogue. Vol. 2. Scombrids of the world. An annotated and illustrated catalogue of tunas, mackerels, bonitos and related species known to date. FAO Fish. Synop., (125)Vol. 2: 137 pp.

Ditty, J.G. and R.F. Shaw. 1992. Larval development, distribution, and ecology of cobia (*Rachycentron canadum*) (Family: Rachycentridae) in the northern Gulf of Mexico. Fishery Bulletin 90:668-677.

Dolah, Robert F. van, Dale R. Calder, and David M. Knott. 1984. "Effects of Dredging and Open-Water Disposal on Benthic Macroinvertebrates in a South Carolina Estuary." Estuaries 7(1):28–37.

Florida Museum of Natural History (FLMNH). 2009. Biological Profiles. Florida Museum of Natural History Division of Ichthyology. Gainesville,Florida. http://www.flmnh.ufl.edu/fish/ Education/bioprofile.htm Accessed November 2022.

GHD. 2021. Atlantic Intracoastal Waterway Sediment Sampling & Analysis. Final Report. USACE - Savannah District

Lassuy, D.R. 1983. Species profiles: life histories and environmental requirements (Gulf of Mexico) -- brown shrimp. U.S. Fish and Wildlife Service, Division of Biological Services. FWS/OBS-82/11.1. U.S. Army Corps of Engineers, TR EL-82-4. 15 pp.

Mercer, L. P., L.R. Phalen, and J.R. Maiolo. 1990. Fishery Management Plan For Spanish Mackerel, Fisheries Management Report No. 18 of the Atlantic States Marine Fisheries Commission Washington, DC. North Carolina Department of Environment, Health, and Natural Resources Morehead City, NC and East

Carolina University Department of Sociology and Anthropology Greenville, NC. November 1990. Accessed March 2009. Available online at http://www.asmfc.org/.

Mills, S. 2000. A cobia by any other name. Virginia Marine Resource Bulletin 32(1):2-10.

Muncy,R.J. 1984. Species profile: life histories and environmental requirements of coastal fishes and invertebrates (South Atlantic) - white shrimp. U.S. Fish and Wildlife Service. FWS/OBS-82/11.27. U.S. Army Corps of Engineers, TR EL-82-4. 19 pp.

NCDENR (North Carolina Department of Environment and Natural Resources). 2006. North Carolina Fishery Management Plan for Shrimp (NCFMPS). 2006. NCDENR Division of Marine Fisheries. April 2006. Morehead City, NC. http://www.ncfisheries.net/download/shrimpfmp2004finial.pdf Accessed October 2022.

NEFSC (Northeast Fisheries Science Center). 1999. Essential Fish Habitat Source Document: Summer Flounder, (*Paralichthys dentatus*), Life History and Habitat Characteristics. Woods Hole, Massachusetts. September 1999. http://www.nefsc.noaa.gov/nefsc/publications/ tm/tm151/tm151.pdf. Accessed November 2022.

NEFSC. 2009. Status of Fishery Resources off the Northeastern U.S., Resource Evaluation and Assessment Division. Woods Hole, Massachusetts. Modified March 2009. http://www.nefsc.noaa.gov/sos/ spsyn/op/bluefish/. Accessed November 2022.

NMFS (National Marine Fisheries Service). 2008. Essential Fish Habitat: A Marine Fish Habitat Conservation Mandate for Federal Agencies. St. Petersburg, Florida. 21 pp. http://sero.nmfs.noaa.gov/hcd/pdfs/efhdocs/sa_guide_2008.pdf. Accessed October 2022.

NMFS. 2022. Inland Essential Fish Habitat mapper. Available from: https://efhtools.github.io/InlandEFH/Mapper.html. Accessed July 2022.

NMFS. 2020. South Atlantic Regional Biological Opinion for Dredging and Material Placement Activities in the Southeast United States (SARBO)

Pérez-Farfante, I. 1969. Western Atlantic shrimps of the genus *Penaeus*. Fishery Bulletin 67(3):461-591.

Richards, W.J., K.C. Lindeman, J.L. Shultz, J.M. Leis, A. Ropke, M.E. Clarke, and B.H. Comyns. 1994. Preliminary guide to the identification of the early life history stages of lutjanid fishes of the western central Atlantic. NOAA Technical Memorandum NMFS-SEFSC-345, 49 pp

Serrano, X., M. Grosell, J. E. Serafy. 2010. Salinity selection and preference of the grey snapper Lutjanus griseus: field and laboratory observations. Journal of Fish Biology 76(7):1592–1608.

Shaffer, R.V. and E.L. Nakamura. 1989. Synopsis of biological data on the cobia (*Rachycentron canadum*) (Family: Rachycentridae). NOAA Technical Report NMFS Circular 82, 21 pp.

SAFMC. 2004. Final Amendment 6 To The Fishery Management Plan For The Shrimp Fishery Of The South Atlantic Region Including A Final Supplemental Environmental Impact Statement, Initial Regulatory Flexibility Analysis, Regulatory Impact Review, Social Impact Assessment/Fishery Impact Statement And Biological Assessment. December 2004. SAFMC. Charleston, South Carolina. http://www.safmc.net/Portals/6/Library/FMP/Shrimp/Shrimp Amend6.pdf. Accessed October 2022.

South Atlantic Fishery Management Council. 2009. Final Ecosystem Plan of the South Atlantic region. https://safmc.net/fishery-management-plans/habitat/ Accessed November 2022.

South Atlantic Fisheries Management Council and NOAA. 2020. Users Guide to Essential Fish Habitat Designations by the South Atlantic Fishery Management Council. Revised November 2020. Available online at https://safmc.net/download/SAFMCEFHUsersGuideNov20.pdf.

Street, M.W., A.S. Deaton, W.S. Chappell, and P.D. Mooreside. 2005. North Carolina Coastal Habitat Protection Plan. North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries, Morehead City, NC. http://www.ncfisheries.net/habitat/chppdocs /F_Wetlands.pdf. Accessed October 2022.

University of Florida. 2009. Gainesville Florida Museum of Natural History; Ichthyology. Biological Profiles; Cobia. Gainesville, Florida. http://www.flmnh.ufl.edu/fish/gallery/Descript/Cobia/Cobia.html. Accessed November 2022