Subject: DWH-Early Restoration- Essential Fish Habitat Consultation Initiation-Hancock County Living Shoreline Project-Mississippi
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Date: 2/20/2014 3:23 PM
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Mr. Thompson,
Attached is the Essential Fish Habitat Assessment for the Hancock County Living Shoreline Project in Mississippi. This project is being proposed in the Deepwater Horizon Draft Phase III Early Restoration Plan and Programmatic Environmental Impact Statement. Please consider this our initiation of our Essential Fish Habitat consultation. If you anticipate this consultation requiring more than 30 days (March 24, 2014) please let me know.

If you have any questions or require additional information, please contact me at 409-621-1248 or at jamie.schubert@noaa.gov.
Thanks,

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Jamie Schubert
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4700 Avenue U
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Attachments:

DWH-ER-Final_EFH_Hancock County Living Shoreline Project-1-3-2014.docx 550 KB

Essential Fish Habitat Assessment

for the Hancock County Marsh Living Shoreline Project

1.0 INTRODUCTION

The purpose of this document is to present the findings of the Essential Fish Habitat (EFH) assessment conducted for the proposed Hancock County Marsh Living Shoreline project as required by the Magnuson-Stevens Fishery Conservation and Management Act of 1976, as amended through 1996 (Magnuson-Stevens Act). The objectives of this EFH Assessment are to describe how the actions proposed by Hancock County Marsh Living Shoreline project may affect EFH designated by the National Marine Fisheries Service (NMFS) and Gulf of Mexico Fisheries Management Council (GMFMC), for the area of proposed action. According to the GMFMC, EFH within the Gulf of Mexico (Gulf) includes all estuarine and marine waters and substrates from the shoreline to the seaward limit of the Exclusive Economic Zone (EEZ). The area of proposed action of the Hancock County Marsh Living Shoreline project would be the project footprint. All anticipated maneuvering for construction vessels near the area of proposed action would be within the flotation channels (described in Section 2.0). This assessment will include a description of the proposed action; a summary of EFH within the vicinity of the Hancock County Marsh; a description of each Fishery Management Plan; an analysis of the direct, indirect and cumulative effects on EFH for the managed fish species and their major food sources; our views regarding the effects of the proposed action; and proposed minimization measures selected to minimize expected project negative effects.

2.0 PROJECT DESCRIPTION

The proposed Hancock County Marsh Living Shoreline project is intended to employ living shoreline techniques that utilize natural and artificial breakwater material to stabilize eroding shorelines by dampening wave energy while encouraging reestablishment of habitat that was once present in the region. In areas that have experienced erosion, marsh creation and subtidal oyster reefs would be used in combination with the living shoreline. The project would provide for construction of up to six miles of living shoreline. An additional component includes, approximately 46 acres of marsh would be constructed to protect and enhance the existing shoreline near Heron Bay and 46 acres of sub-tidal oyster reef would be created in Heron Bay to protect the shallow bay and increase oyster production in the area of proposed action. The project would include stabilization of the shoreline, re-establishment of oyster habitat, enhanced fisheries resources and marsh habitat. The estimated cost for this project is $50,000,000.

The shoreline within the Hancock County Marsh Coastal Preserve has been receding for many years mainly due to wave erosion. Schmid (2013) determined that the shoreline regression rate from 1850 to 2001 was an average one-meter per year, although rates varied locally (Figure 1). For example, the area from Three Oaks Bayou to Heron Bay Point receded at a rate higher than one meter per year. This area is important because once it is breached, shoreline erosion will likely increase along Heron Bay. Schmid (2013) also estimated an annual shoreline loss of approximately 6.2 acres. Thus, over the next 25 years,

between 200 and 500 acres in the Hancock County Marsh are at risk. An accelerated rate of sea level rise would result in further losses of marsh habitat. Additionally, shoreline regression may have been exacerbated as a result of marsh injury stemming from the oil spill.

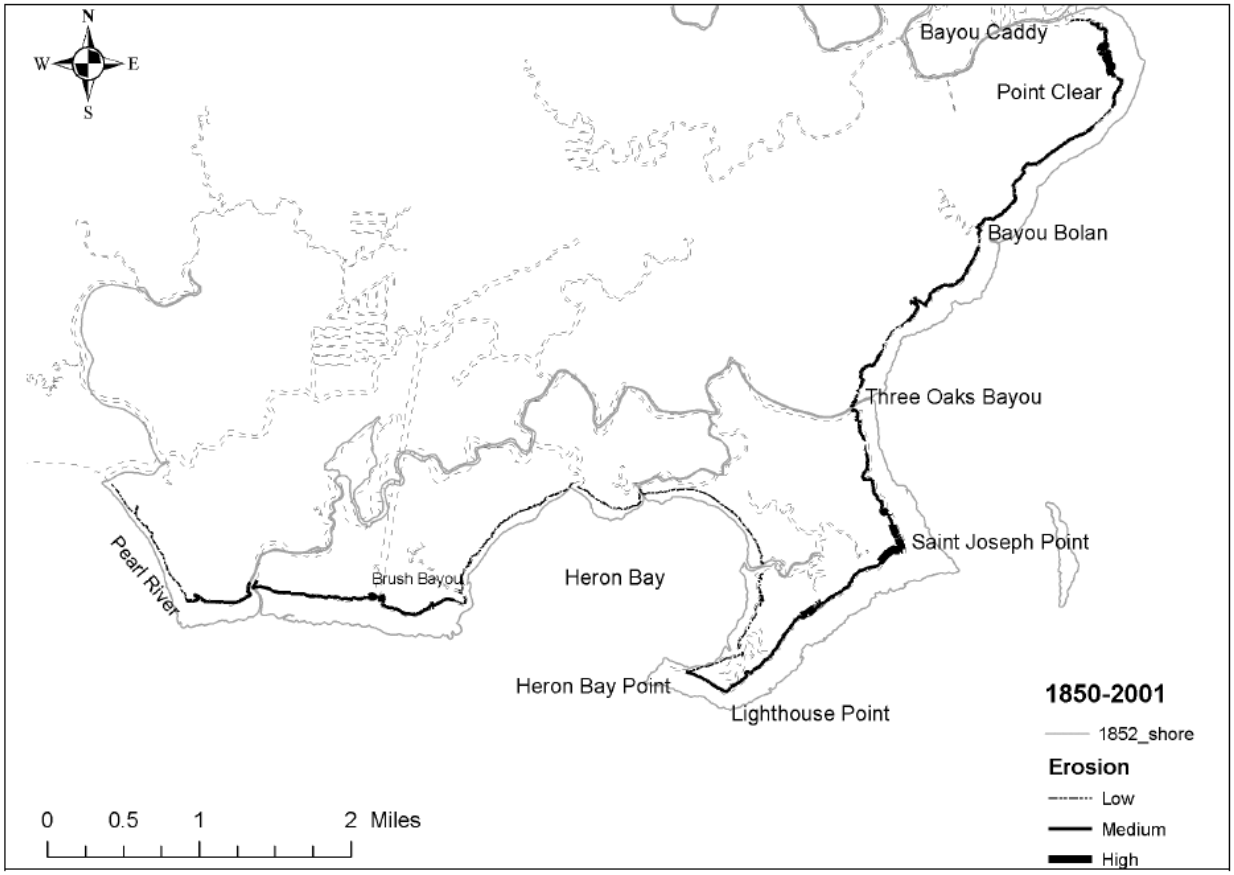


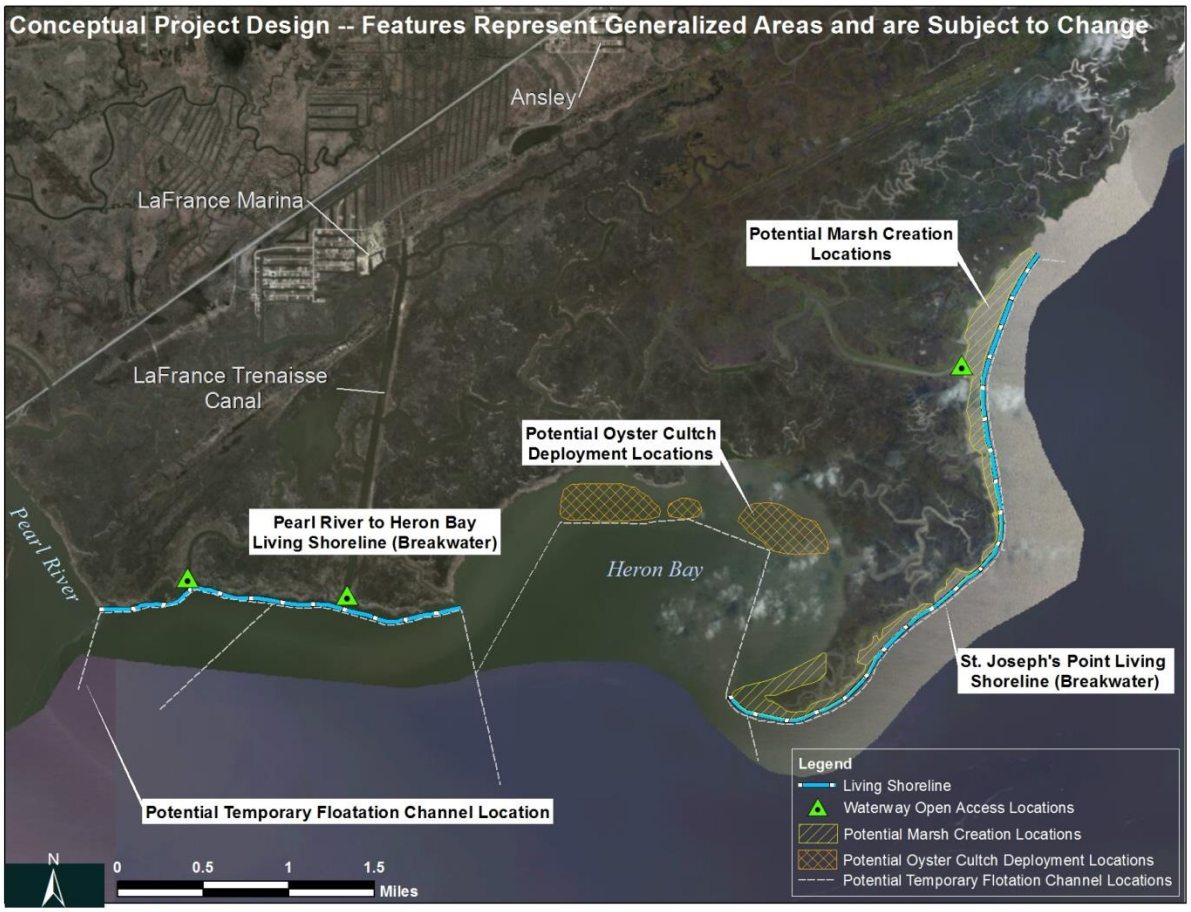
FIGURE 1 – SHORELINE EROSION RATES FROM 1850 TO 2001 (SCHMID 2013)

The project is located in western Hancock County, Mississippi, between Bayou Caddy and the mouth of the East Pearl River (Figure 2). The 13,570 acre Hancock County Marsh complex, one of the largest in Mississippi, is part of the extensive Pearl River estuary and is owned and managed by the Mississippi Department of Marine Resources as part of the Coastal Preserves of the State of Mississippi. Historically, there were extensive, prolific reefs of the American Oyster (*Crassostrea virginica*) in the shore zone and nearshore areas of lower Hancock County that provided natural protection from shoreline erosion. Historical erosion rates, particularly at St. Joseph's Point, make this shoreline a priority for protection and marsh creation. The living shoreline would help protect the Hancock County Marsh complex that includes estuarine and marine deepwater habitats, estuarine and marine wetlands, freshwater emergent wetlands and freshwater forested and scrub shrub wetlands.

Oyster breakwater/living shorelines would be constructed along the marsh shoreline in two locations: from the eastern limit of Heron Bay to approximately 4 miles to the northeast towards Bayou Caddy (eastern reach), and from the western limit of Heron Bay to the mouth of the Pearl River (western reach). Construction activities could include placement of linear structures that may utilize artificial

and/or shell-based materials within the -3 to -5 foot Mean Lower Low Water contour. Approximately 46 acres of marsh would be constructed in the St. Joseph's point area to protect and restore marsh areas that experience the historical rates of erosion. A total of 46 acres of subtidal oyster reef would be created using oyster shell in northeastern Heron Bay to protect the shallow embayment and to increase oyster production in the area.

FIGURE 2: PROPOSED HANCOCK COUNTY MARSH LIVING SHORELINE PROJECT



Construction and Installation

Living Shorelines (Breakwaters)

The specific breakwater elevation and design was selected to maximize shoreline protection and meet individual state regulatory requirements. Construction would include placement of linear structures that would utilize artificial and/or shell-based materials at approximately the -3.5 ft msl contour.

The alignment and limits of the breakwaters would be surveyed in with the outer limits of the breakwaters being marked with poles driven into the bottom and extended approximately 3 feet above the water surface. The height of the breakwaters along the alignment would be constructed based on

bottom elevations and the reef's crest elevation (0.87 foot NAVD88 – Mean Tide Level). Barriers, navigation warning signs (lighted and unlighted), and other safety devices would be installed along the work area to protect boaters.

The breakwaters would be approximately 30 feet wide at the base, 15 feet wide at the crest, to approximately 4 feet thick. The riprap core of the breakwaters would either be constructed using loose boulders or 'marine mattresses', consisting of 2 to 6 inch diameter rocks assembled on land. The core material would be transported to the work area on barges and installed by a crane located on a separate barge. Placement of the riprap core would be monitored to ensure the breakwater dimensions, slopes, and crest elevations are achieved. After installation of the riprap core, it would be covered with bags of shell. The deployment of the breakwaters may extend over a period of ten to twelve months. Total installed volumes would be as follows:

- *St. Joseph's Point Breakwater (Eastern Reach):* The target depth for deployment is approximately -3.5 MLLW. The volume of placed material would be approximately 51,600 cubic yards of riprap and 16,400 cubic yards of shell. The breakwater would cover a footprint of approximately 14.4 acres of fine-grained sediment.

- *Pearl River to Heron Bay Breakwater (Western Reach):* The target depth for deployment is between approximately -3.5 MLLW. The volume of placed material would be approximately 16,900 cubic yards of riprap and 6,300 cubic yards of shell. The breakwater would cover a footprint of approximately 5.5 acres of fine-grained sediment.

The project is designed to use temporary flotation channels to facilitate access for work barges into the work area. A channel will be excavated parallel to the alignments of the two breakwaters. Additional channels will be excavated perpendicular to these channels to provide access from the Mississippi Sound to allow work barges entry and exit for the area of proposed action. The excavated dredged material would be cast on the seaward side of the channels so that they would naturally fill back in after construction. The depth of the channels would be 8 feet below MLLW to accommodate barge draft. The bottom width of the channels would be approximately 80 feet with 3H:1V side slopes. The entry locations for the channels would be determined by analyzing the shortest distance from the breakwaters to the appropriate depth on -8 ft. and excavated using best management practices to minimize environmental impacts. The preliminary flotation channel footprint for the purposes of project planning was calculated based on an estimate of a heavy loaded barge. Proposed flotation channel dimensions are summarized in Table 1.

Table 1 – Preliminary Temporary Flotation Channel Footprint

Component	Dimension
Channel Length	55,008 ft.
Barge Draft	8 ft.
Channel Width	80 ft.
Area Temporarily Impacted	101 acres

After completion of construction, the breakwater structure would be surveyed and permanent navigation signs would be installed in accordance with safety requirements.

Creation of Marsh in the Vicinity of St. Joseph's Point

After the breakwater along St. Joseph's Point has been installed, selected areas landward of the breakwater would be filled with dredged material obtained from the MDMR Beneficial Use of Sediment Program if material is available, or a suitable borrow source. A dike would be constructed at the seaward extent of the marsh. The dike would be constructed by excavating existing material from the landward side of the dike. Once an area of the marsh is diked, the area landward of the dike would be filled with dredged material until final marsh grades are achieved. Sediment would be pumped through a floating pipeline from a hydraulic dredge located where suitable fill material is available. Pumps and sediment controls would remain in place throughout the dredging and filling process, and after initial settling has occurred. Once the entire marsh area(s) is constructed, the area would be monitored for natural re-vegetation.

Placement of Oyster Cultch Reefs in Heron Bay

Oyster cultch would be deployed in Heron Bay in water depths of -3 to -5 feet MLLW in areas that currently support or previously supported oyster production. An oyster presence survey has been completed that identified suitable areas. The cultch would be deployed as a 6 to 9-inch thick layer of oyster shell. Prior to deployment, the limits of the oyster cultch deployment area(s) would be marked with buoys or poles. Oyster shells would be deployed by a barge-mounted crane with a clam shell bucket. A material barge loaded with oyster shells would be moored to the crane barge. As a construction alternative, water jetting of loose shell off of a material barge may be used in case of water depth constraints. Upon completion, the deployment area would be surveyed.

Best Management Practices

Construction timing would be limited to the May to October timeframe to avoid disturbance to Gulf Sturgeon migration patterns in the area. Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (flotation channels, deployment

areas). Spoil from flotation channels will be placed on the seaward side of the channel to facilitate current-driven backfilling of channels.

Anticipated pre- and post-construction monitoring activities

Monitoring activities would be performed prior to construction as well as for up to seven years after construction. Monitoring activities would include:

- Topographic/bathymetric surveys
- Vegetation surveys (species composition and percent cover)
- Oyster and invertebrate monitoring (density and biomass)

The project will incorporate a mix of monitoring efforts to ensure project designs are correctly implemented during construction and in a subsequent period, where corrective action could be taken.

Post-construction performance monitoring will be conducted to observe the performance of the physical breakwater structures (breakwater height, structural integrity, settling rate, etc.), and marsh (elevation, settling rate, etc.) to allow for corrective action, as needed or as defined by the Trustee.

Post-construction performance monitoring would also evaluate the project's performance over time with respect to the agreed-upon restoration goals and objectives. Specifically, this monitoring would evaluate the production and support of organisms on the breakwater (e.g., secondary production) and the performance of the created marsh. Monitoring parameters would include the following: water quality (e.g., salinity, dissolved oxygen); vegetative monitoring; and invertebrate infauna and epifauna composition and biomass.

Anticipated short-term maintenance activities

Within four years following construction, a maintenance activity on the breakwater structure may be necessary to add more riprap or shell material. The breakwater is anticipated to experience the greatest consolidation of the subgrade in the first years following construction. Additional placement of rock and/or shell on the breakwater would be assessed during the regular monitoring. Maintenance construction methods would be similar to the construction methods of the original breakwater structure.

Anticipated long-term maintenance activities

No other operations or maintenance activities are anticipated.

3.0 ESSENTIAL FISH HABITAT

The 1996 amendments to the Magnuson-Stevens Act set forth a mandate for NMFS, regional Fishery Management Councils (FMC), and other Federal agencies to identify and protect EFH of economically important marine and estuarine fisheries. To achieve this goal, suitable fishery habitats need to be

maintained. EFH in the area of proposed action is identified and described for various life stages of 12 managed fish and shellfish (GMFMC 1998). A provision of the Magnuson-Stevens Act requires that FMC's identify and protect EFH for every species managed by a Fishery Management Plan (FMP) (U.S.C. 1853(a)(7)). There are FMP's in the Gulf region for shrimp, red drum, reef fishes, coastal migratory pelagics, and highly migratory species (e.g., sharks). Table 2 presents the EFH within northern Gulf of Mexico, and includes species that may not be present within the area of proposed action.

Table 2. EFH in the Northern Gulf

Management Unit	Lifestage(s) Found at Location	FMP^
Red Drum	ALL	Red Drum
Highly Migratory Species		
Scalloped Hammerhead Shark	Neonate, Juvenile	HMS*
Bonnethead Shark	Adult	HMS*
Blacktip Shark	Neonate, Juvenile	HMS*
Bull Shark	Juvenile, Adult	HMS*
Spinner Shark	Juvenile	HMS*
Atlantic Sharpnose Shark	Neonate	HMS*
Shrimp (4 Species) Brown shrimp (*Farfantepenaeus aztecus*) White shrimp (*Litopenaeus setiferus*) Pink shrimp (*Farfantepenaeus duorarum*) Royal red shrimp (*Pleoticus robustus*)	ALL	Shrimp
Coastal Migratory Pelagics King mackerel (*Scomberomorus cavalla)* Spanish mackerel (*Scomberomorus maculatus*) Cobia (*Rachycentron canadum*) Dolphin (*Coryphaena hippurus*) Little tunny (*Euthynnus alletteratus*) Cero mackerel (*Scomberomorus regalls*) Bluefish (*Pomatomus saltatrix*)	ALL	Coastal Migratory Pelagics
Reef Fish (43 Species) <u>Balistidae - Triggerfishes</u> Gray triggerfish (*Balistes capriscus*) <u>Carangidae - Jacks</u> Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) <u>Labridae - Wrasses</u>	ALL	Reef Fish

Management Unit	Lifestage(s) Found at Location	FMP^
Hogfish (*Lachnolaimus maximus*)		
Lutjanidae - Snappers		
Queen snapper (*Etelis oculatus*)		
Mutton snapper (*Lutjanus analis*)		
Schoolmaster (*Lutjanus apodus*)		
Blackfin snapper (*Lutjanus buccanella*)		
Red snapper (*Lutjanus campechanus*)		
Cubera snapper (*Lutjanus cyanopterus*)		
Gray (mangrove) snapper (*Lutjanus griseus*)		
Dog snapper (*Lutjanus jocu*)		
Mahogany snapper (*Lutjanus mahogoni*)		
Lane snapper (*Lutjanus synagris*)		
Silk snapper (*Lutjanus vivanus*)		
Yellowtail snapper (*Ocyurus chrysurus*)		
Wenchman (*Pristipomoides aquilonaris*)		
Vermilion snapper (*Rhomboplites aurorubens*)		
Malacanthidae – Tilefishes		
Goldface tilefish (*Caulolatilus chrysops*)		
Blackline tilefish (*Caulolatilus cyanops*)		
Anchor tilefish (*Caulolatilus intermedius*)		
Blueline tilefish (*Caulolatilus microps*)		
(Golden) Tilefish (*Lopholatilus chamaeleonticeps*)		
Serranidae – Groupers		
Dwarf sand perch (*Diplectrum bivittatum*)		
Sand perch (*Diplectrum formosum*)		
Rock hind (*Epinephelus adscensionis*)		
Speckled hind (*Epinephelus drummondhayi*)		
Yellowedge grouper (*Epinephelus flavolimbatus*)		
Red hind (*Epinephelus guttatus*)		
Goliath grouper (*Epinephelus itajara*)		
Red grouper (*Epinephelus morio*)		
Misty grouper (*Epinephelus mystacinus*)		
Warsaw grouper (*Epinephelus nigritus*)		
Snowy grouper (*Epinephelus niveatus*)		
Nassau grouper (*Epinephelus striatus*)		

Management Unit	Lifestage(s) Found at Location	FMP^
Marbled grouper (*Epinephelus inermis*)		
Black grouper (*Mycteroperca bonaci*)		
Yellowmouth grouper (*Mycteroperca interstitialis*)		
Gag (*Mycteroperca microlepis*)		
Scamp (*Mycteroperca phenax*)		
Yellowfin grouper (*Mycteroperca venenosa*)		

^FMP-Fisheries Management Plan, *HMS- Highly Migratory Species

4.0 MANAGED FISH SPECIES

The seasonal and year-round locations of designated EFH for the managed fisheries are depicted on the figures available on the NMFS website (http://sero.nmfs.noaa.gov/hcd/efh.htm) and species abundance maps, both inshore and offshore, are available on the National Ocean Service (NOS) website (http://ccma.nos.noaa.gov/products/biogeography/gom-efh/). EFH figures for HMS are found in the 2009 amendments to the Consolidated Atlantic Highly Migratory Species Fisheries Management Plan. EFH for each managed fishery within the project's footprint is described below:

Red Drum FMP – EFH for red drum consists of all Gulf of Mexico estuaries; waters and substrates extending from Vermilion Bay, Louisiana to the eastern edge of Mobile Bay, Alabama out to depths of 25 fathoms; waters and substrates extending from Crystal River, Florida to Naples, Florida between depths of 5 and 10 fathoms; waters and substrates extending from Cape Sable, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council between depths of 5 and 10 fathoms.

Shrimp FMP – EFH for shrimp consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to Fort Walton Beach, Florida from estuarine waters out to depths of 100 fathoms; waters and substrates extending from Grand Isle, Louisiana to Pensacola Bay, Florida between depths of 100 and 325 fathoms; waters and substrates extending from Pensacola Bay, Florida to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council out to depths of 35 fathoms, with the exception of waters extending from Crystal River, Florida to Naples, Florida between depths of 10 and 25 fathoms and in Florida Bay between depths of 5 and 10 fathoms.

Coastal Migratory Pelagics FMP – EFH for coastal migratory pelagics consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms. Managed fish in this fishery include king mackerel, Spanish mackerel, and cobia. Non-managed fish in this fishery include cero mackerel, little tunny, dolphin, and bluefish.

These areas are connected by currents and water patterns that influence the occurrence of HMS at particular times of the year. Due to habitat specific requirements of each species, EFH for each HMS potentially occurring in the vicinity of the Hancock County Marsh Living Shoreline is described below (EFH information from NMFS, 2009):

Scalloped Hammerhead Shark:

•Neonate/YOY (≤60 cm TL): Coastal areas in the Gulf of Mexico from Texas to the southern west coast of Florida. Atlantic east coast from the mid-east coast of Florida to southern North Carolina.

• Juveniles (61 to 179 cm TL): Coastal areas in the Gulf of Mexico from the southern to mid-coast of Texas, eastern Lousainia to the southern west coast of Florida, and the Florida Keys. Offshore from the mid-coast of Texas to eastern Louisiana. Atlantic east coast of Florida through New Jersey.

• Adults (≥180 cm TL): Coastal areas in the Gulf of Mexico along the southern Texas coast, and eastern Lousainia through the Florida Keys. Offshore from southern Texas to eastern Louisiana. Atlantic east coast of Florida to Long Island, NY.

Bonnethead Shark:

• Neonate/YOY (≤55 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys. Atlantic east coast from the midcoast of Florida to South Carolina.

• Juveniles (56 to 81 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys. Atlantic east coast from the midcoast of Florida to South Carolina.

• Adults (≥82 cm TL): Coastal areas in the Gulf of Mexico along Texas, and from eastern Mississippi through the Florida Keys. Atlantic east coast from the mid-coast of Florida to Cape Lookout.

Blacktip Shark:

• Neonate/YOY (≤75 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys. In Atlantic coastal areas from northern Florida through Georgia, and the mid-coast of South Carolina.

• Juvenile (76 to 136 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys. In Atlantic coastal areas localized off of the southeast Florida coast and from West Palm Beach, Florida to Cape Hattaras.

• Adult (≥137 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys. In Atlantic coastal areas southeast Florida to Cape Hattaras.

Bull Shark:

• Neonate/YOY (≤95 cm TL): Gulf of Mexico coastal areas along Texas, and localized areas off of Mississippi, the Florida Panhandle, and west coast of Florida;

as well as the Atlantic mid-east coast of Florida.
• Juveniles (96 to 219 cm TL): Gulf of Mexico coastal areas along the Texas coast, eastern Louisiana to the Florida Panhandle, and the west coast of Florida through the Florida Keys. Atlantic coastal areas localized from the mid-east coast of Florida to South Carolina.
• Adults (≥220 cm TL): Gulf of Mexico along the southern and mid-coast of Texas to western Louisiana, eastern Louisiana to the Florida Keys. East coast of Florida to South Carolina in the Atlantic.

Spinner Shark:
• Neonate/YOY (≤70 cm TL): Localized coastal areas in the Gulf of Mexico along Texas, eastern Louisiana, the Florida Panhandle, Florida west coast, and the Florida Keys; and in the Atlantic along the east coast of Florida to southern North Carolina.
• Juveniles (71 to 179 cm TL): Gulf of Mexico coastal areas from Texas to the Florida Panhandle, and the mid-west coast of Florida to the Florida Keys. Atlantic east coast of Florida through North Carolina.
• Adults (≥180 cm TL): Localized areas in the Gulf of Mexico off of southern Texas, Louisiana through the Florida Panhandle, and from the mid-coast of Florida through the Florida Keys. In the Atlantic along the east coast of Florida, and localized areas from South Carolina to Virginia.

Atlantic Sharpnose Shark
• Neonate/YOY (≤60 cm TL): Gulf of Mexico coastal areas from Texas through the Florida Keys. In the Atlantic from the mid-coast of Florida to Cape Hattaras.
• Juveniles (61 to 71 cm TL): Gulf of Mexico coastal areas from Texas through the Florida Keys. In the Atlantic from the mid-coast of Florida to Cape Hattaras, and a localized area off of Delaware.
• Adults (≥72 cm TL): Gulf of Mexico from Texas through the Florida Keys out to a depth of 200 meters. In the Atlantic from the mid-coast of Florida to Maryland.

Reef Fish FMP – EFH for reef fish consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to the boundary between the areas covered by the Gulf of Mexico Fishery Management Council and the South Atlantic Fishery Management Council from estuarine waters out to depths of 100 fathoms.

4.1 ECOLOGICAL NOTES ON THE EFH FISHERIES AND SPECIES

Habitats in Proposed Project Area

The Hancock County Marsh Living Shoreline area of proposed action is composed largely of estuarine emergent marsh and estuarine shallow water intertwined by a network of tidal creeks. The benthic habitats can be divided into two classes including intertidal and subtidal.

Intertidal zones (typical tidal range of 0.5 ft.) in the area are composed of mud flats, small areas of natural sand beach, and a small number of Native American shell middens. The nearshore subtidal benthic habitat is composed mostly of unconsolidated bottom types including sand, muddy sand, and mud bottom (Wieland 1994). Bathymetry in the area of proposed action ranges from approximately 0-12 ft. below MLLW, although the living shoreline, oyster deployment, and marsh creation areas range roughly from 1-4 ft. below MLLW. A recent survey of SAV and oysters in Heron Bay noted that SAV presence was primarily documented in very shallow waters along the fringe of the marsh edge growing on eroded submerged marsh platform. Sparse amounts of *Ruppia maritima* were found growing in a matrix of mud and relict plant rhizomes. Oyster shell locations were present primarily in the northern and middle sections of Heron bay. Presence was documented in areas that had been delineated as supporting historic oyster reefs by the MDMR. Most of the shell was dead and silted in below the bottom surface. Both habitat classes support an array of neonate, juvenile, and adult fish. Table 4 is a summary of restoration activities by habitat type.

The following section describes the EFH within the area of proposed action. Table 3 lists the EFH species that utilized the area of proposed action.

Table 3: EFH within the Area of Proposed Action

GoM FMP Group	Species	Habitat Type	Eggs	Larvae	Post Larvae	Early Juveniles	Late Juveniles	Adults	Spawning Adults
Red Drum Fishery	Red Drum (*Scianops ocellatus*)	SAV, soft bottom, hard bottom, sand/shell, emergent marsh		growth; feeding	growth; feeding	growth; feeding	growth; feeding	feeding	feeding
Reef Fish Fishery	Mutton Snapper (*Lutjanus analis*)	SAV				growth; feeding	growth; feeding	feeding	
	Cubera Snapper (*Lutjanues cyanopterus*)	SAV, emergent marsh				growth	growth		
	Gray Snapper (*Lutjanus griseus*)	SAV, soft bottom, sand/shell, emergent marsh			growth; feeding	growth; feeding	growth; feeding	feeding	
	Lane Snapper (*Lutjanus synagris*)	SAV, soft bottom, sand/shell			growth	growth; feeding	growth; feeding		
	Yellowtail Snapper (*Ocyurus chrysurus*)	SAV, soft bottom				growth; feeding			
	Goliath Grouper (*Epinephelus itajara*)	SAV, hard bottom				growth; feeding	growth; feeding		
	Red Grouper (*Epinephelus morio*)	SAV, hard bottom				growth; feeding	growth; feeding		
	Black Grouper (*Mycteroperca bonaci*)	SAV				growth; feeding			
Coastal Pelagic Fishery	Spanish Mackerel (*Scomberomorus maculatus*)	pelagic				growth; feeding	growth; feeding	growth; feeding	
Shrimp Fishery	Brown Shrimp (*Farfantepenaeus aztecus*)	SAV, soft bottom, sand/shell, emergent marsh, oyster reef			growth; feeding	growth; feeding	growth; feeding		
	White Shrimp (*Litopenaeus setiferus*	emergent marsh, soft bottom			growth; feeding	growth; feeding	growth; feeding		

4.1.1 Red Drum

In the Gulf, red drum occur in a variety of habitats, ranging from depths of about 130 feet offshore to very shallow estuarine waters. Red drum utilize SAV, soft bottom, sand/shell, and emergent marsh habitat during all life cycle stages (Table 3). They commonly occur in all of the Gulf's estuaries where they are associated with a variety of substrate types including sand, mud, and hardened bottom. Throughout the Gulf, red drum use seagrass meadows as nursery and foraging habitat (GMMFC 2004). Estuaries provide habitat for red drum and species that it preys on. The GMFMC considers all estuaries to be EFH for the red drum. Schools of large red drum are common in the deep Gulf waters with spawning occurring in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands.

In the area of proposed action the red drum fishery is very common. The estuarine zone is used by this species in all life stages. Habitat use is highest for nearshore hard bottoms, nearshore sand/shell, estuarine SAV, and estuarine soft bottoms (GMFMC 2005). Larvae, juveniles, and young adults spend the majority of their time in estuarine habitats and prey on a large array of species including blue crab eggs and numerous juvenile fish.

4.1.2 Reef Fish

The reef fishes FMP in the area of proposed action include snappers and groupers. Reef fish utilize a variety of habitats including SAV, soft bottom, hard bottom, sand/shell, and emergent march during their juvenile and adult life cycle stages (Table 3). They are often found as adults associated with coral reef, limestone, hard bottom, and artificial reef substrates. Occasionally adults occur over sand, away from reefs, but these appear to be foraging individuals. There is some evidence that adults have restricted movement and do not display long migrations. Juveniles of many of the reef fish species are located in shallow, inshore areas associated especially with SAV beds and inshore reefs. There is a general tendency for older and larger fish to occur in deeper water extending to the edge of the continental shelf. Reef fish feed on a variety of invertebrates including shrimp, craps, amphipods, octopus, and squid. Larger reef fish also have a tendency to eat small fish and other larger food items (GMFMC 1981).

Reef fish utilize both pelagic and benthic habitats during their life cycle. A planktonic larval stage lives in the water column and feeds on zooplankton and phytoplankton. Juvenile and adult reef fish are typically demersal and usually associated with bottom topographies on the continental shelf that have high relief: i.e., coral reefs, artificial reefs, rocky hard-bottom substrates, ledges and caves, sloping soft-bottom areas, and limestone outcroppings. More detail on these habitat types is found in the Fishery Management Plan (FMP) for Corals and Coral Reefs (GMFMC and SAFMC 1983). However, several species are found over sand and soft-bottom substrates. Some juvenile snapper and grouper such as mutton, gray, lane, and yellowtail snappers and red grouper have been documented in inshore seagrass beds, mangrove estuaries, lagoons, and larger bay systems (GMFMC 1981).

In the area of proposed action the reef fish fishery includes numerous species that utilize the estuarine zone in certain life stages. Most are transitory species use inshore environments part of the year. Only mutton (*Lutjanus analis*) and gray snapper (*Lutjanus griseus*) use the estuarine zone as adults for feeding. Reef species have the potential to use this zone as early or late juveniles for growth and feeding habitat.

4.1.3 Coastal Migratory Pelagics FMP

The managed coastal migratory pelagics in the area of proposed action include Spanish mackerel. Spanish mackerel is jointly managed by the GMFMC and the South Atlantic Fisheries Management Council. Spanish mackerel migrate south during the winter months and return north in the spring to their spawning grounds (GMFMC & SAFMC, 1983). Mackerel tend to feed on other fishes.

In the area of proposed action, only the Spanish mackerel (*Scomberomorus maculatus*) uses the estuarine zone during the early and late juvenile and adult life stages (Table 3).

4.1.4 Shrimp

Shrimp use a variety of estuarine and marine habitats in the Gulf of Mexico. Brown shrimp are found within the estuaries to offshore depths of 110 meters (m) throughout the Gulf; white shrimp inhabit estuaries and to depths of about 40 m offshore in the coastal area extending from Florida's Big Bend area through Texas. Brown and white shrimp are generally more abundant in the central and western Gulf.

Brown Shrimp

"Brown shrimp range in the Gulf of Mexico from Florida to the northwestern coast of Yucatan. The range is not continuous but is marked by an apparent absence of brown shrimp along Florida's west coast between the Sanibel and the Apalachicola shrimping grounds. In the U.S. Gulf of Mexico, catches are high along the Texas, Louisiana, and Mississippi coasts. Shrimp are typically found as post larvae and juveniles in shallow vegetated habitats (including SAV, soft bottom, sand/shell, emergent marsh, and oyster reef habitat), and occasionally, in silty sand and non-vegetated bottoms (Table 3). Juveniles and sub-adults generally prefer shallow estuaries and marsh edges (plant-water interfaces). Sub-adults migrate from estuaries during outgoing high tides and adult brown shrimp typically inhabit Gulf waters from the Mean Low Water line to the continental shelf" (GMFMC, 2006). Post-larvae, early juvenile, and late-juvenile brown shrimp use estuarine habitat for survival. Emergent marsh and marsh edge are particularly important microhabitats for these species, and they would use the tidal cycle to enter low emergent marsh adjacent to the shoreline (GMFMC 2004).

White Shrimp

White shrimp are offshore and estuarine dwellers, and are pelagic or demersal depending on their life stage. The eggs are demersal and larval stages are planktonic, and both occur in nearshore marine eaters. Post larval white shrimp become benthic upon reaching the nursery areas of estuaries, seeking shallow water with muddy-sand bottoms that are high in organic detritus. Juveniles move from estuarine areas to coastal waters as they mature. Adult white shrimp are demersal and generally inhabit

nearshore Gulf waters in depths less than 100 feet on soft mud or silty bottoms (GMFMC, 2006). Post-larvae, early juvenile, and late-juvenile white shrimp use estuarine habitat (emergent marsh and soft bottom habitat) for survival (Table 3). Emergent marsh and marsh edge are particularly important microhabitats for these species, and they would use the tidal cycle to enter low emergent marsh adjacent to the shoreline (GMFMC 2004).

4.1.5 Highly Migratory Species

Estuarine waters like those found at the Hancock County marsh site provide EFH resources for various life stages of HMS. Sharks enter the shallow estuarine bay waters to forage and feed. The shark species discussed in this assessment generally feed on a variety of small fish (such as menhaden, seatrout, croaker, and perch), shrimp, small sharks, crabs, and seagrass (most likely a result of foraging behavior) (Adams and Paperno, 2007; Barry, 1996; Curtis, No Date; Bethea et. al., 2007).

5.0 ASSESSMENT OF IMPACTS AND MITIGATIVE MEASURES

The Trustee, in consultation with the contractors, will take all practicable precautions to minimize unavoidable negative impacts to EFH. The project will not result in adverse, direct impacts to emergent wetlands, existing oyster reefs, or Submerged Aquatic Vegetation (SAV). Most motile fauna such as crab, shrimp, and finfish will likely avoid the area of proposed action during the construction process. Following construction, there is expected to be increased habitat utilization of the breakwaters and near-shore environment by these species and a beneficial, long-term impact is anticipated. The project may result in minor, adverse short-term impacts to benthic organisms and temporarily affect habitat utilization by individuals considered under EFH fishery management plans. The potential impacts and minimization/mitigative measure are discussed in greater detail below (Section 5.3).

5.1 IMPACTS TO EFH

Minor and temporally limited impacts to EFH components are expected to soft bottom substrates, since the Hancock County marsh project will be constructed in an area that is considered EFH for various lifestages of the species managed under FMPs. Because of SAV's overall significance to nearly all managed fisheries, a brief description of effects is provided here. A recent survey of submerged aquatic vegetation (SAV) and oyster presence in Heron Bay revealed scarce amounts of Widgeon grass (*Ruppia maritima)* in very shallow water along eroded marsh edge platform. None of the construction areas associated with the breakwater or marsh creation development contain SAVs. Therefore these construction activities would have no impact on submerged vegetation. Construction of the breakwater could provide areas conducive to SAV growth. The deployment of the oyster cultch could result in short-term, minor, adverse impacts to SAV. Widgeon grass (*Ruppia maritima)* exists in scarce amounts in very shallow waters along the fringe of the marsh edge in Heron Bay and grows on eroded marsh platforms. Any disturbance would be re-vegetated naturally. Therefore, due to the lack of existing SAV beds or minimal coverage of SAV in the area of proposed action, only very minimal adverse impacts from the proposed activities would be expected.

Impacts for each project components are listed in Table 4 and discussed briefly below:

Living Shoreline (breakwater): Construction 19.9 acres of breakwater structures would eliminate soft bottom sediments and have a short term, minor adverse effect on various life stages of red drum, gray snapper, lane snapper, yellowtail snapper, Spanish mackerel, brown shrimp and white shrimp.

Oyster Reef (46 acres): Deployment of oyster cultch over 46 acres of previously hard structure would result in short term minor impacts to various life stages of red drum, gray snapper, goliath grouper, red grouper and brown shrimp.

Marsh Creation (46 acres) : Creation of 46 acres of marsh would result in short term, minor impacts to various life stages of red drum, gray snapper, lane snapper, yellowtail snapper, Spanish mackerel, brown shrimp and white shrimp.

Flotation Channels (101 acres): Excavation of flotation channels would result in a temporary short term, minor impact to various life stages of gray snapper, lane snapper, yellow tail snapper, Spanish mackerel, brown shrimp and white shrimp.

Table 4: Impact Summary

Species	Habitats Utilized	Life stages within the Area of Proposed Action	Living Shoreline (breakwater) (19.9 acres)	Oyster Reef (46 acres)	Marsh Creation (46 acres)	Flotation Channels (101 acres)
Red Drum (*Scianops ocellatus*)	SAV, soft bottom, hard bottom, sand/shell, emergent marsh	Larvae, post larvae, juvenile, adult, spawning adults	Short term, minor	Short term, minor	Short term, minor	
Mutton Snapper (*Lutjanus analis*)	SAV	Juvenile, adult				
Cubera Snapper (*Lutjanues cyanopterus*)	SAV, emergent marsh	juvenile				
Gray Snapper (*Lutjanus griseus*)	SAV, soft bottom, sand/shell, emergent marsh	Post larvae, juvenile, adult,	Short term, minor	Short term, minor	Short term, minor	Short term, minor
Lane Snapper (*Lutjanus synagris*)	SAV, soft bottom, sand/shell	Post larvae, juvenile	Short term, minor	Short term, minor	Short term, minor	Short term, minor
Yellowtail Snapper (*Ocyurus chrysurus*)	SAV, soft bottom	juvenile	Short term, minor		Short term, minor	Short term, minor
Goliath Grouper (*Epinephelus itajara*)	SAV, hard bottom	juvenile		Short term, minor		
Red Grouper (*Epinephelus morio*)	SAV, hard bottom	juvenile		Short term, minor		
Black Grouper (*Mycteroperca*	SAV	juvenile				

bonaci)						
Spanish Mackerel (*Scomberomorus maculatus*)	pelagic	Juvenile, adult	Short term, minor		Short term, minor	Short term, minor
Brown Shrimp (*Farfantepenaeus aztecus*)	SAV, soft bottom, sand/shell, emergent marsh, oyster reef	Post larvae, juvenile	Short term, minor	Short term, minor	Short term, minor	Short term, minor
White Shrimp (*Litopenaeus setiferus*	emergent marsh, soft bottom	Post larvae, juvenile	Short term, minor		Short term, minor	Short term, minor

Bottom Disturbance and Turbidity

Structural Placement and Access Channels

Placement of the breakwaters, created marsh, and deployment of oyster cultch would result in short-term, minor adverse impacts to water quality as a result of re-suspension of sediment by vessels (barges, tugs, skiffs, etc.) moving in and out of the area of proposed action, excavation of the temporary flotation channels, and filling of the marsh. Dredge material from the temporary flotation channel excavation will be placed on the seaward side of the channeled and allowed to fill in naturally with influence from currents. The suspended sediment may be transported into surrounding wetlands, waterways, and the Mississippi Sound. However, the area is currently exposed to elevated turbidity levels as a result of re-suspension of sediment during frequent storms, tides and other typical events.

Disturbance of the bottom sediment by dredging and placing hardened structure may affect prey availability in the area of proposed action for juvenile and adult fish. The adverse impacts from dredging and placing material will be localized and temporary, affecting individuals and not entire populations. Since potential impacts will be localized and temporary, there are no expected impacts to populations since spawning, feeding, and resting occurs over broad areas. Following construction and stabilization of the access channel areas, if constructed, and breakwater structure, it is expected that the hardened breakwater structure will attract transient fish, blue crabs, shrimp, and other shellfish (Gregalis et. al., 2009).

Best management practices along with other avoidance and mitigation measures required by state and federal regulatory agencies would be employed to minimize potential water quality and sedimentation impacts. U.S. Army Corps of Engineers Section 10/404 and State Water Quality Certifications would be required and permit conditions would be adhered to. Impacts from turbidity would be moderate, but short-term and limited in spatial extent.

Piling Installation

Installation of pilings for navigational signage can be accomplished using different methods including driving or jetting. Driving pilings creates less turbidity than jetting pilings. If pilings are jetted, there may

be a minor adverse impact to the water column due to increased turbidity. Either piling installation technique will result in minor adverse impacts to the benthic community and the use of the area of proposed action by transient fish. These impacts will be temporary and small scale and will not have wide-ranging impacts to EFH beyond the piling installation footprint. This project intends to employ the driving method for piling installation.

Natural Shell Sourcing

Adverse impacts to EFH may result depending on the source from which shell for the reef is obtained. Shells are commonly acquired via two methods. Dredge shell programs obtain buried shells by dredging areas, which can cause short-term turbidity problems. In addition, any aquatic organisms in the area would be eliminated. The other method of obtaining shell is to purchase them through commercial seafood processors or shucking houses. This method has no adverse impacts to the aquatic environment. In addition, shell should only be obtained from commercial sources where no impacts to habitat were made during shell acquisition. There are several commercial sources of riprap and shell, and no one source has been specified for use at the Hancock County Marsh site.

5.2 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION

During construction of the breakwater, marsh, and oyster cultch deployment, the fine-grained soft bottom habitat would be altered by the placement of breakwater materials. The footprint of the combined project is approximately, 212.9 acres (Table 5). Approximately 111.9 acres would be filled for construction of project elements including breakwater construction (19.9 acres), marsh creation (46 acres) and oyster reef creation (46 acres), resulting in a long-term, moderate impact to a relatively small project footprint. In addition, the flotation channels would be constructed to transport the barges carrying the fill material (approximately 101 acres). The sidecast material from the construction of the flotation channels would temporarily alter the seafloor morphology until waves naturally push the sidecast material back into excavated channels after construction. To the extent possible, materials from the flotation channel may be used beneficially to create marsh.

Direct

Direct impacts will be limited to the area directly around the construction site and piling installation areas where sediments will be disturbed by placement of hardened reef and breakwater material, dredging flotation channels, marsh material, and installing pilings. These adverse direct impacts will be short term and it is expected that ambient conditions will be restored following cessation of work each day. Once the structures are stabilized, a long-term beneficial impact is expected due to the newly created habitat that will attract infauna (aquatic animals that live in the sediment), shellfish, crustaceans, and transient fish.

Table 5. Summary of Proposed Action			
Project Activity	**Acreage Impacted**	**Habitat**	**Nature of Impact Improvement**
Living Shoreline (Breakwater)	19.9 acres	intertidal sediments off marsh edge; -3 to 6 ft contour.	Covering sediments with breakwater; establishment of a high relief reef/living shoreline
Marsh Creation	46 acres	~0-4 ft subtidal and intertidal Open water/marsh edge; soft sediments landward of submerged reef;	Beneficial use of dredge material or sediment from other sources to back fill and create a marsh on the shoreline side of the living shoreline
Oyster Reef	46 acres	Hard bottom substrate; previous oyster reefs	Cultch deployment of 46 acres of high relief oyster reef
Flotation Channel	101 acres	Soft sediment	Dredge and side cast a 55,008 ft of channel 80 ft wide facilitating a barge draft of 8 ft.
Total	212.9 acres		

Indirect

Indirect adverse impacts are not expected in the short or long term. Long-term indirect benefits are expected to EFH resources in close proximity to the Hancock County Marsh project due to anticipated increases in use of this area by transient adult and juvenile fish as foraging grounds.

Cumulative

Within the action area, major future changes are not anticipated at the project site and recreational use of the area is expected to continue at present levels in the near future. Listed species of sea turtle and Gulf sturgeon are not expected to be affected during their life cycles from project activities. The Hancock County Marsh Living Shoreline project will have a beneficial effect on the estuarine habitats in the area very shortly after construction. Fish and invertebrates would colonize the breakwaters relatively quickly, while marsh growth and oyster development may take longer; 3 to 5 years. The cumulative impact of these structures and the anticipated calm water conditions landward of the breakwaters are expected to create conditions favorable to SAV and oyster reef colonization and to generally improve water quality. Increases in SAV coverage, structural habitat, and reducing shoreline erosion will improve EFH in the area.

5.3 PROPOSED MITIGATIVE MEASURES AND GUIDELINES FOR EFH PROTECTION

1. Use of Best Management Practices (BMP)
Best management practices (BMPs) are measures to minimize and avoid all potential adverse impacts to EFH during Hancock County Marsh Living Shoreline project construction and monitoring. This conservation measure recommends the use of BMPs during construction to reduce impacts from project implementation. BMPs shall include but are not limited to:

a. Work barges would be moored for overnight and weekends/holidays in areas where previous impacts have occurred (flotation channels, deployment areas).
b. Spoil from flotation channels will be placed on the seaward side of the channel to facilitate current-driven backfilling of channels.

2. Drive Pilings Instead of Jetting Pilings
Pilings would be driven instead of jetting to reduce the disturbance of bottom sediments and bottom dwelling organisms.

3. Obtain Shell from Commercial Vendors Instead of From Dredged Sites
Where practicable, shell obtained from commercial vendors that did not or will not impact the aquatic environments will be utilized for reef construction.

4. Monitor Structures & Adaptively Manage Structures
Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design and completion. If immediate post-construction monitoring reveals that unavoidable impacts to EFH have occurred, appropriate coordination with regional EFH personnel will take place to determine appropriate response measures, possibly including mitigation. If additional adaptive management of the breakwater structure is necessary after monitoring evens, all minimization measures discussed above will be followed.

5. Post-Project Implementation Removal
Any temporary access channels will be filled in naturally following construction to re-establish baseline elevations. Monitoring will assess whether unexpected impacts to EFH have occurred.

6.0 CONCLUSIONS

Overall, there will not be a substantial adverse impact to EFH. The potential adverse impacts related to the Hancock County Marsh Living Shoreline project construction will be minimal and temporary. The potential long-term benefits to EFH, especially for shrimp, red drum, and juvenile coastal pelagics and reef fish include increased foraging habitat, increased cover for juveniles, improved water quality, and the potential for conditions favorable to SAV colonization (due to decreased wave energy).

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