Subject: DWH-Early Restoration- Essential Fish Habitat Consultation Initiation-Mobile County Oyster Reef Restoration-Alabama
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Date: 2/20/2014 3:15 PM
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Mr. Thompson,
Attached is the Essential Fish Habitat Assessment for the Mobile County Oyster Reef Restoration project in Alabama. 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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Attachments:

DWH-ER-FINAL_EFH_Mobile County Alabama Oyster Reef Restoration.docx 2.2 MB

Essential Fish Habitat Assessment

for the proposed Oyster Reef Restoration Project in Mobile County, Alabama

Introduction

The purpose of this document is to present the findings of the Essential Fish Habitat (EFH) assessment conducted for the proposed Oyster Reef Restoration in Mobile County, Alabama Project (proposed project) as required by the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.) (Magnuson-Stevens Act). The objectives of this EFH Assessment are to describe how the actions proposed by the Oyster Reef Restoration in Mobile County, Alabama Project affect EFH designated by the National Marine Fisheries Service (NMFS) and Gulf of Mexico Fisheries Management Council (GMFMC), for the area of influence of the project. 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 influence of the Oyster Reef Restoration in Mobile County, Alabama Project would be approximately 319 acres of subtidal habitat in Mobile County, Alabama located near other oyster reefs currently managed by the Alabama Department of Conservation and Natural Resources (ADCNR), and within the footprint of historic oyster reefs. This assessment will include a description of the proposed action; a summary of EFH within the vicinity of the proposed project; a description of each Fishery Management Plan; an analysis of the direct, indirect and cumulative effects of the proposed project on EFH for the managed fish species and their major food sources; and proposed mitigation measures selected to avoid or minimize potential negative effects of the proposed project.

Project Description

The proposed project is intended to provide ecological restoration and recovery of ecosystem services that were lost as a result of the *Deepwater Horizon* (DWH) oil spill. This project would consist of construction of a low relief oyster reef which would enhance oyster biomass production and subtidal habitat through the selective placement of oyster cultch in Alabama's estuarine waters. Cultch placements promote the settlement and growth of oyster spat and have been successful in producing new oysters in Alabama (Gregalis et al. 2009). The proposed project would be located in Lower Mobile Bay and Mississippi Sound within the footprint of existing and historic oyster bottoms that are publicly owned and managed by the Alabama Department of Conservation and Natural Resources, Marine Resources Division (Figure 1). Areas for the placement of cultch material would be selected based on environmental conditions such as salinity and rainfall, and surveys would be conducted to determine favorable conditions for spat settlement and survival. The estimated cost for this project is $3.2 million.

<u>Project Location</u>
The proposed project site is located in Mobile County, Alabama, in the estuarine waters of Mobile Bay and Mississippi Sound (Figure 1). It is located north of Dauphin Island and south of Mon Louis Island. Alabama State Roads (SR) 188 and 193 would be the primary roadways used to access shoreline areas adjacent to the proposed project site for boat launching. The city of Mobile, Alabama is approximately 33.5 miles from the proposed project site. Nearby

communities include Bayou La Batre, Theodore, Dauphin Island, Tillman's Corner, and Grand Bay, MS.

Figure 1. Proposed Alabama Oyster Reef Restoration Project Location

Construction and Installation

Construction activities would include planting of oyster cultch material, which could include commercially obtained oyster shell, quarried fossilized oyster shell from the Gulf States, or rock aggregate such as limestone and calica. Approximately 30,000 to 40,000 cubic yards of suitable oyster cultch will be deposited at the reef locations using standard placement practices. These include transport of cultch to the site using a shallow draft barge and/or small boat and dispersal of cultch from the boat using a water cannon to place the material at a density of 50-150 cubic yards per acre over approximately 319 acres of subtidal habitat. Placement of cultch will be near or on existing and historic public oyster reefs located between the -3.0' to -7.0' MLLW (Mean Lower Low Water) contour. This work would be performed by a contractor. Within the project footprint described above, final locations for cultch placement would be determined based on seasonal surveys to determine where environmental conditions are favorable for spat settlement and survival.

Origin of Cultch Material

Because there are a variety of materials suitable for use as cultch, the bottom type in the project area would be assessed to select the material that would result in the least amount of cultch loss due to sinking through sediment or silting. A particular cultch type would also be identified in project documents as the proposed project is further refined. Natural oyster shell is preferred if it is available and affordable within the constraints of the estimated project budget. Oyster shell may be from shucked oysters collected from oyster dealers or restaurants by the contractor. Contractors stockpile oyster shell from Alabama or any other state where it is economically feasible to collect resources. Buried oyster shell may be found at some quarries and may be considered as a possible substitute for oyster shell from restaurants and processors, depending on composition and availability. Other common cultch materials include #57 limestone, calica, crushed granite, clam shell, and crushed concrete aggregate. Some of these materials may be purchased locally and their potential use would depend on cultch preference and availability on a project to project basis. For this project, it is anticipated that cultch material would be purchased from local oyster processing facilities as has occurred during past cultch placement projects in Alabama.

Transport of Cultch Material to the Project Site

The contractor could transport cultch material to the proposed project site in numerous ways. While this component of the proposed project would be further refined prior to project initiation in a construction/implementation action plan, the following provides an overview of the transportation process.

Dump trucks would pick up cultch material from local processing facilities and transport it to the staging area for the project. These trucks would be loaded by front-end loaders or similar equipment. The material would then be transported dockside and stored there until there is enough to load onto barges for transport to the project site. Quarried cultch products, such as limestone and other aggregates, may be loaded by hopper and barged directly to the site.

Once at the staging area, oyster cultch is generally loaded onto one or multiple barges by a skid steer loader or track excavator and transported via a tug or push boat to the planting site. Between two and six barges can be brought to the planting site with a push boat. These boats stay off the reef site. SAV are not present along the proposed barge routes or at the proposed project site (Stout and Lelong 1981, Vittor 2004, Vittor 2009).Generally, two to three barges in addition to a water cannon barge are deployed over the planting site.

Deployment of Cultch Material

ADCNR representatives would mark the planting site with buoys and measure the barge loads on site. Cultch may be planted using high pressure water cannons to blow it off the barge, skid steers, or other industrial equipment. Push boats would be used to move the barges around the project site to ensure even distribution of the cultch.

In more shallow locations, barges may be light-loaded and use shallow draft push boats to access these areas. Alternatively smaller vessels could be used. These small vessels may include tonging skiffs (10 to 20 feet), dredge skiffs (15 to 35 feet), and small shrimping vessels (15 to 35 feet). If small boats are used for final deployment (in depths of less than 3 feet), skid steers would load cultch from the barge onto small planting vessels. These small vessels would then transport the cultch to the shallow water site and the cultch would be pushed overboard using hand tools or high-pressure water spray from on-board wash down pumps. Light loading and

planting with small vessels could increase the number of working days and cost to complete a project. SAV are not present along the proposed barge or small vessel routes or at the proposed project site (Stout and Lelong 1981, Vittor 2004, Vittor 2009).

Vehicle and Barge Operation

The following assumptions about vehicle and barge operation for the implementation of the proposed project are based on the last two planting operations conducted by ADCNR. It is anticipated that between four and eight barges filled with material would be deployed in a single day. A work day would range from between 8 and 14 hours, depending on the distance from the staging area to the planting destination and the number of barges being used. This also includes time for ADCNR representatives to measure barge loads at the project site, deployment, and reloading of barges for deployment the following day. Skid steers and/or excavators would be used for reloading and hoppers may be used for quarried materials.

On a daily basis, the implementation of the proposed project would include the use of two skid steers for 4 hours; two excavators for 4 hours; two push boats for 6 to 8 hours; six unpowered barges for 6 to 8 hours; and two to four diesel-powered pumps for six high pressure hoses for 6 to 8 hours. Contractors retained for this component of the proposed project would provide all equipment for loading and unloading cultch.

Duration and Timing of Construction

The time required to implement the proposed project depends on the amount of cultch required, capability of contractor (e.g., equipment available and experience of personnel including loading machine operators and push boat captains), and method of deployment (blow off or small boat planting). Barge blow offs may deploy around 5,000 cubic yards in about 3 days but small vessels may take 4 or 5 days to deploy the same amount of cultch. Planting of oyster cultch could occur twice over a one year period, once in the fall and once in the spring, assuming suitable conditions are present. Ideally all cultch placement would occur during peak larval production between April and May and between September and October. Spawning continues throughout the summer months and even to a limited degree in the winter. The spring spawning peak is triggered when water temperature increases to 20°C, and the fall spawning peak begins when there is a sharp decline in water temperature.

Operations and Maintenance

ADCNR would conduct monitoring of oyster growth and density to determine growth success and viability. They would conduct annual scuba dive monitoring in late summer and would collect additional dredge samples to determine if additional dives are necessary. The following provides an overview of survey methods that would potentially be used to determine how the reef is performing.

1. **Quadrat Surveys**
   Transect lines with 10 randomly spaced bags would be deployed. Divers would then swim along the transect line placing one square yard quadrats next to each bag. All oysters and cultch material found in the quadrant would then be bagged, with each bag representing one sample. These samples would measure large oysters (3 inches and greater), small oysters (between 2 and 3 inches), and spat (from 0 to 2 inches) and

count half shells, boxes, and oyster drills. All material would then be returned to the reef from where it was collected.

2. **Hand Dredge**
   Dredge would be towed from a vessel in a circular fashion at 2 to 3 knots for an average of 90 seconds. Once the sample is retrieved on deck of the vessel, a sampler would count large oysters, small oysters, spat, half shells, boxes, and drills. All material would then be returned to the reef from where it was collected.

3. **Cane Pole Sounding**
   A sampler would detect bottom type and sediment depth by tapping bottom sediments with a cane pole or piece of PVC. When used in conjunction with a GPS device, the extent of substrate type (reef) would be determined.

4. **Gill Net Sampling**
   Gill nets could be deployed to survey fin fish density and species diversity associated with the benthic habitat of the reef.

Post-deployment surveys may include some or all of the above survey methods. Traditionally, ADCNR performs annual quadrat dives in early August of each year. Additional quadrat surveys may be included throughout the year on sites of interest including monitoring of recently planted oyster reefs. At least one additional quadrat survey and two or three hand dredge surveys within a year is a reasonable estimate of post-deployment survey operations.

If monitoring indicates the presence of excessive algal growth, cultch may be cultivated (tilled) using a bagless commercial dredge or other cultivating equipment. Bottom type, oyster density, silting, and fouling all play a role in determining suitability for cultivation. The optimal time to cultivate coincides with the optimal time to plant cultch (Spring = April/May, Fall = September/October). The goal is to de-foul and expose the cultch surface for oyster settlement, increasing the probability of contact between larvae and cultch.

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 project's area of effect is identified and described for various life stages of 55 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 1 presents the EFH within the vicinity of the proposed project.

EFH is separated into estuarine and marine components. The estuarine component is defined as, "all estuarine waters and substrates (mud, sand, shell, rock and associated biological communities), including the sub-tidal vegetation (grasses and algae) and adjacent inter-tidal vegetation (marshes and mangroves)," (*Generic Amendment Number 3 for Addressing Essential Fish Habitat Requirements, Habitat Areas of Particular Concern, and Adverse Effects of Fishing*

in the following Fishery Management Plans of the Gulf of Mexico, Gulf of Mexico Fishery Management Council, *March 2005*). The proposed project is within a near-shore estuarine system; there is no marine component to this project. Estuarine fishes include species that inhabit the estuary for part of their life cycle and are commonly associated with SAV beds (absent at proposed site), oyster reefs, and unvegetated soft bottom habitats.

Table 1. EFH within the vicinity of the proposed Oyster Restoration Project in Mobile County, Alabama

Management Unit / Species	Lifestage(s) Found at Location	FMP
Red Drum (*Sciaenops ocellatus*)	ALL	Red Drum
Highly Migratory Species Scalloped Hammerhead Shark Bonnethead Shark Blacktip Shark Bull Shark Spinner Shark Atlantic Sharpnose Shark	 Neonate, Juvenile Adult Neonate, Juvenile Juvenile, Adult Juvenile Neonate	Highly Migratory Species
Shrimp 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 **Balistidae - Triggerfishes** Gray triggerfish (Balistes capriscus) **Carangidae - Jacks** Greater amberjack (Seriola dumerili) Lesser amberjack (Seriola fasciata) Almaco jack (Seriola rivoliana) Banded rudderfish (Seriola zonata) **Labridae - Wrasses** Hogfish (Lachnolaimus maximus) **Lutjanidae - Snappers** Queen snapper (Etelis oculatus) Mutton snapper (Lutjanus analis) Schoolmaster (Lutjanus apodus) Blackfin snapper (Lutjanus buccanella) Red snapper (Lutjanus campechanus)	ALL	Reef Fish

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) Marbled grouper (Epinephelus inermis) Black grouper (Mycteroperca bonaci) Yellowmouth grouper (Mycteroperca interstitialis) Gag (Mycteroperca microlepis) Scamp (Mycteroperca phenax) Yellowfin grouper (Mycteroperca venenosa)		

Managed Fish Species:

The seasonal and year-round locations of designated EFH for the managed fisheries (Figure 2) are 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 Highly Migratory Species (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; Crystal River, Florida, to Naples, Florida, between depths of 5 and 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the South Atlantic Fishery Management Council (SAFMC) between depths of 5 and 10 fathoms.

- **Reef Fish and Coastal Migratory Pelagics FMPs**: EFH for reef fish and coastal migratory pelagics includes all Gulf of Mexico estuaries; the US/Mexico border to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms.

- **Highly Migratory Species**: HMS may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. Although many of the species frequent other oceans of the world, the Magnuson Stevens Act only authorizes the description and identification of EFH in federal, state, or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico and the Atlantic coast of the United States, to the seaward limit of the U.S. Exclusive Economic Zone (waters 3 to 200 miles offshore). 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 proposed project site 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 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 Louisiana to the southern west coast of Florida, and the Florida Keys; offshore from the mid-coast of Texas to eastern Louisiana; Atlantic coast of Florida through New Jersey.
  - Adults (≥180 cm TL): Coastal areas in the Gulf of Mexico along the southern Texas coast and eastern Louisiana through the Florida Keys; offshore from southern Texas to eastern Louisiana; Atlantic coast of Florida to Long Island, New York.

  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 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 coast from the mid-coast 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, North Carolina.

  Blacktip Shark:
  - Neonate/YOY (≤75 cm TL): Coastal areas in the Gulf of Mexico from Texas through the Florida Keys; 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; Atlantic coastal areas localized off of the southeast Florida coast and from West Palm Beach, Florida to Cape Hatteras, North Carolina.
- 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 Hatteras.

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; Atlantic coast from Florida to South Carolina.

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; Atlantic 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 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; Atlantic coast throughout 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; Atlantic from the mid-coast of Florida to Cape Hatteras, North Carolina.
- Juveniles (61 to 71 cm TL): Gulf of Mexico coastal areas from Texas through the Florida Keys; Atlantic from the mid-coast of Florida to Cape Hatteras, North Carolina, 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; Atlantic from the mid-coast of Florida to Maryland.

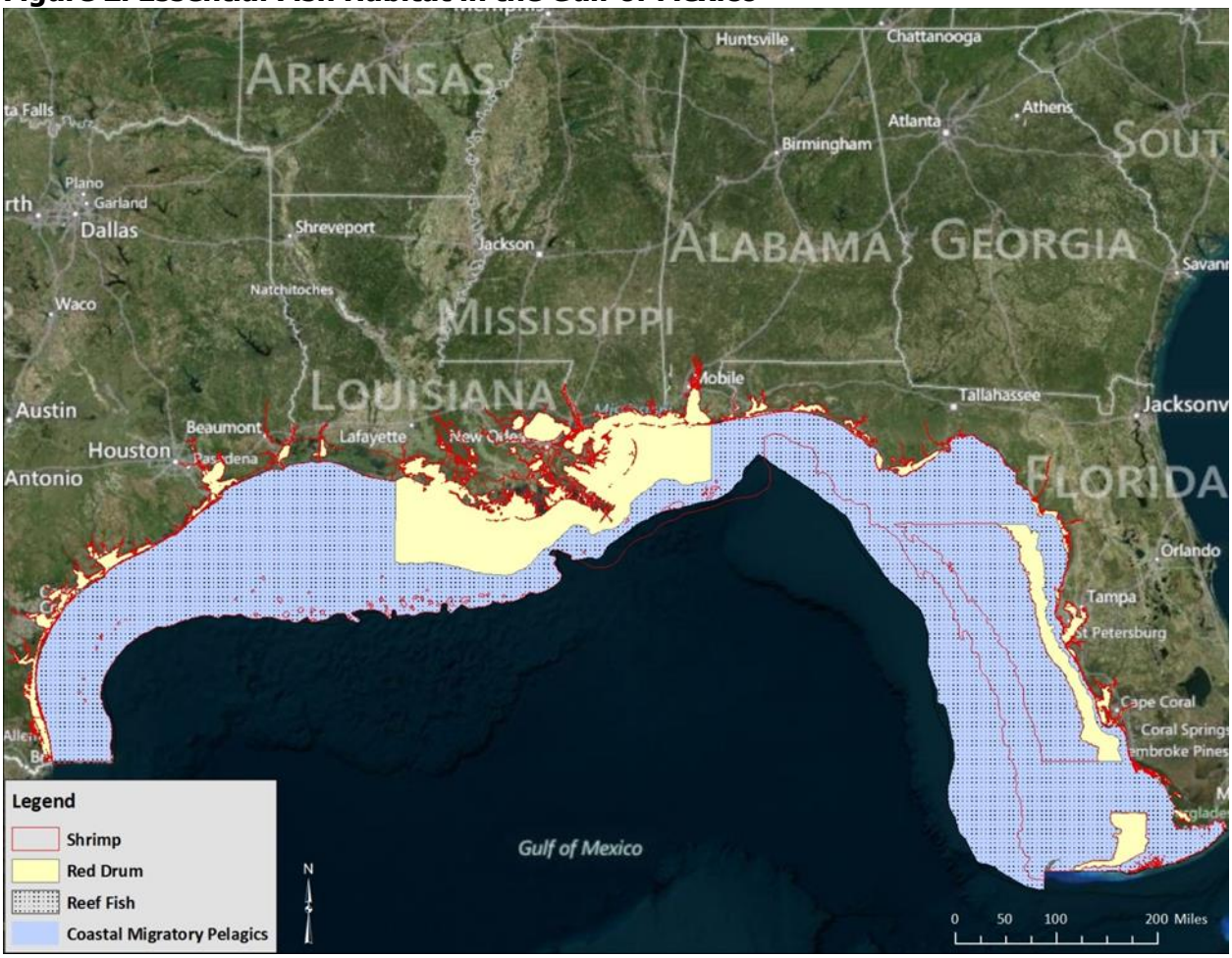
- **Shrimp FMP**: EFH for shrimp consists of Gulf of Mexico waters and substrates extending from the US/Mexico border to Fort Walton Beach, Florida, from estuarine waters out to depths of 100 fathoms; Grand Isle, Louisiana, to Pensacola Bay, Florida, between depths of 100 and 325 fathoms; Pensacola Bay, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC 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 FMPs**: 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 GMFMC and the SAFMC 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.

- **Reef Fish FMP:** 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 GMFMC and the SAFMC from estuarine waters out to depths of 100 fathoms.

Figure 2. Essential Fish Habitat in the Gulf of Mexico



Ecological Notes and Potential Impacts to EFH Fisheries and Species

Red Drum

The red drum is very common in the northern Gulf of Mexico and utilizes the estuarine zone during all life stages. Habitat use is highest for nearshore hard bottoms, nearshore sand/shell, estuarine SAV (submerged aquatic vegetation), and estuarine soft bottoms. 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 (ADCNR 2011). Red drum habitat could be impacted initially and temporarily by construction activities when oyster cultch materials are deposited in the benthic zone. There will likely be short term impacts to benthic invertebrate populations and small icthyofauna and temporary displacement of adult fish. However, these potential impacts will be short term and negligible. The creation of additional oyster reef habitat will result in increased foraging habitat for red drum and should provide long term positive benefits.

Highly Migratory Species

Estuarine waters like those found at the proposed project site provide EFH resources for various life stages of HMS. Sharks enter the shallow estuarine bay waters to forage and feed (Bathea et al. 2007).

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 of Mexico; 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; pink shrimp inhabit the Gulf coastal area from estuaries to depths of about 65 m offshore and is the dominant species off southern Florida. Brown and white shrimp are generally more abundant in the central and western Gulf, whereas pink shrimp are generally more abundant in the eastern Gulf. Royal red shrimp are not estuarine-dependent and spend their lives in depths of 100 to 300 fathoms (GCFMC 2005).

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. Postlarval, early juvenile, and late juvenile brown shrimp use estuarine habitat for survival. Brown shrimp are common in oyster reef habitats. Potential impacts to habitat for this species include migratory disruption and benthic habitat alteration. Mud bottom habitat will likely be modified during construction activities in addition to mixing of sediment in the water column. Brown shrimp emigrate to estuaries as post-larvae from February-April on high tides at night and typically leave as sub-adults during full and new moons at night during different parts of the year. Construction activities will take precaution to avoid peak migration periods and time of day. Restoration will benefit these species from short to long term. Oyster cultch deployment will produce additional habitat that the species can utilize for cover and feeding.

White Shrimp
White shrimp utilize both offshore and estuarine habitats, 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. Postlarval white shrimp arrive in the area of the proposed Alabama Oyster Restoration site from May-September. Offshore, postlarval white shrimp are found in the upper 2 meters of the water column, but become benthic upon reaching the nursery areas of estuaries, seeking shallow water with muddy-sand bottoms that are high in organic detritus (GCFMC 2004). 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 ft. on soft mud or silty bottoms (GMFMC 2006). White shrimp in the vicinity of the proposed project will potentially be affected in the same way as brown shrimp, and similar precautions will be taken to minimize impacts during peak migration periods. Like brown shrimp, white shrimp will benefit from restoration due to the creation of additional oyster reef habitat, which they utilize for foraging and refuge.

Pink Shrimp
Juvenile pink shrimp inhabit most estuaries in the Gulf of Mexico, but are most abundant in Florida. Juveniles are commonly found in estuarine areas where SAV is present. Postlarval, juvenile, and subadult pink shrimp may prefer coarse sand/shell/mud mixtures. Adults inhabit offshore marine waters, with the highest concentrations in depths of 30 to 144 feet (GMFMC 2006). Pink shrimp have been reported to use areas of Mobile Bay as nursery habitat. Juveniles may be present year round but are most abundant during the summer and spring (NOS 1998). The absence of SAV at the proposed project site will minimize impacts on pink shrimp relative to brown and white shrimp, but similar precautions will be taken during project implementation to ensure minimal impacts.

Royal Red Shrimp
Royal red shrimp is a deep water species that is abundant east of the Mississippi River on the continental shelf in water depths ranging from 800 to 1,600 feet. These shrimp are only found within the EEZ and are managed cooperatively between state and federal partners (GMFMC 2005). Because royal red shrimp are not present in estuarine habitats during any life stages, this species will not be affected by the work proposed at the Alabama Oyster Reef Restoration site.

<u>Coastal Migratory Pelagics FMP</u>
The managed coastal migratory pelagics which may potentially be present at the proposed project site are Spanish mackerel, king mackerel, and cobia. The king and Spanish mackerel are jointly managed between the GMFMC and the SAFMC. The proposed project site is in the western zone of the king mackerel range, which extends from Texas to the Alabama/Florida border. The western zone group of king mackerel winter in the waters of southern Texas and Mexico, and migrate north to their spawning grounds in the summer (NMFS 2013). Like king mackerel, Spanish mackerel and cobia migrate south during the winter months and return north to their spawning grounds in the spring (GMFMC & SAFMC 1983). Mackerel tend to feed exclusively on other fishes while cobia feed on both fishes and crustaceans. The estuarine

components of the EFH in the Mobile Bay are used for feeding, foraging, and resting during summer months. Habitat use for all life stages is primarily water column, so habitat impacts from restoration activities would involve temporary displacement and short term decreased water quality from sediment mixing. Adults typically only use these shallow areas in the pursuit of prey and typically prefer higher salinity waters (GCFMC 2004). These impacts would be short in duration, transitioning to intermediate and long term benefits to the species due to increased oyster reef habitat, which increases the abundance of prey items.

Non-managed coastal migratory pelagics include cero mackerel, dolphin, little tunny, and bluefish. Adult dolphin have been reported in Mobile Bay throughout the year (NOS 1998), and based on correlations between water temperature larval presence, spawning in the Northern Gulf of Mexico likely occurs from April through December, with a peak in early fall (Ditty et. al. 2004). Little tunny is a schooling species that occurs in tropical and subtropical waters. They are common offshore, but can be found in inshore waters over reefs. Little tunny larvae are often found in nearshore and offshore waters near shoals and banks (GMFMC 2004). Cero mackerel primarily occur in the Caribbean, although some are caught in South Florida (Collette and Russo 1979). Bluefish occur in the Gulf of Mexico primarily from northwestern Florida to northeastern Texas (Heinemann 2002). Larvae have been collected in the Gulf of Mexico in waters less than 100 meters deep (Ditty and Shaw 1995).

Reef Fish

The reef fish fishery includes numerous species that are present in the estuarine zone during one or more life stages. Most are transitory species that use inshore environments only part of the year. Only mutton and gray snapper use the estuarine zone as adults for feeding. All reef species listed in Table 1 have the potential to use this zone as early or late juveniles for growth and feeding habitat. Impact of the project to habitat for reef fishes will be low, as most reef species do not utilize the habitat in the project area. Reef fish abundance is much higher in the southern and eastern Gulf of Mexico, where grouper and snapper species are more common. Juveniles of these species typically use SAV beds in estuarine environments for food and cover (GCFMC 2004). Given the lack of SAV beds in the study area, it is unlikely that there is an abundance of juvenile reef species in the area. Project construction could result in short term displacement of feeding adults, and possible mortality to larval fish that did not successfully evade construction activities. The proposed oyster cultch deployment could benefit gray and lane snapper as they prefer shell/sand bottom.

Impacts to EFH

Minor spatially and temporally limited impacts would be expected to near-shore, estuarine portions of Mobile Bay and Mississippi Sound that are considered EFH for various lifestages of the species managed under FMPs. The project will not result in adverse, direct impacts to emergent wetlands, existing oyster reefs, or SAV (Stout and Lelong 1981, Vittor 2004, Vittor 2009). Most motile fauna such as crabs, shrimp, and finfish will likely avoid the area of potential effect during construction. 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. However, following construction, there is expected to be increased habitat utilization by these species and a beneficial, long-term impact is anticipated.

Environmental Consequences of the Proposed Action

Direct

During project implementation, the restoration of approximately 319 acres of historic oyster reef in the estuarine waters of Alabama through the selective placement of cultch material could result in temporary increases in local turbidity and suspended sediment concentrations in the water column. These adverse effects would be minor, localized, and short term as particles would settle out within a few hours of placement and any impacts would quickly be undetectable. Because the proposed project site itself is located in open water, with minimal staging areas on already developed land areas, there would be no impacts to wetlands, floodplains or groundwater.

Indirect

Indirect adverse impacts are not expected in the short or longer term. Once the proposed project is complete and oysters are established within the project area, beneficial indirect effects on water quality are expected as a result of increased filtration capacity from the newly established bivalves (Coen et al. 2007). Oysters can also indirectly enhance EFH by offsetting the effects of coastal nutrient loading, reducing the frequency and magnitude of hypoxia and fish kills (Dalrymple 2013). Additionally, oyster reefs have been shown to indirectly promote SAV colonization, which may further enhance EFH, due to sediment stabilization and increased water clarity (Meyer et al. 1997).

Cumulative

The proposed project will have a beneficial cumulative impact on EFH. Adverse impacts due to project implementation are likely to be minor, localized, and temporary. Cumulative longer term beneficial impacts are expected to EFH resources in and around the Alabama Oyster Reef Restoration Project, as the restored oyster reef habitat is expected to increase fauna abundance and utilization of EFH by resident and transient fish and invertebrate species as habitat, foraging and spawning grounds. Increased oyster abundance resulting from the project is likely to have longer term beneficial impacts on water quality and clarity.

Proposed Mitigative Measures and Guidelines for EFH Protection

ADCNR, in consultation with the contractors, will take all practicable precautions to avoid and minimize negative impacts to EFH.

1. **Use of Best Management Practices (BMP)**
   Best management practices (BMPs) are measures to minimize and avoid potential adverse impacts to EFH during project construction and monitoring. This project requires the use of BMPs during construction to reduce impacts from project implementation.

2. **Follow Manatee and Sea Turtle Standard FWS conditions**

The contractor will follow the FWS' standard manatee construction conditions and standard sea turtle and smalltooth sawfish conditions, as required under Endangered Species Section 7 consultations (Appendix A). The construction procedures outlined in these documents require boats to operate at idle speeds and ensure that contractors observe the construction area for manatees and sea turtles. Following these guidelines will help minimize potential prop dredging, and subsequent bottom disturbance, and will help minimize impacts to individual fish species.

3. **Obtain Shell from Shucking Houses Instead of From Dredged Sites**
   Where practicable, shell obtained from shucking houses will be used for reef construction.

4. **Monitor Structure & Adaptively Manage Structure**
   Monitoring will be conducted before, during, and after project implementation to ensure compliance with project design and restoration success. 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.

Conclusion:

The construction activities proposed by this project will impact benthic habitat used by managed fish species (Table 1). However habitat impacts are expected to be temporary and minor. Additionally, the absence of SAV beds at the proposed project site (Stout and Lelong 1981, Vittor 2004, Vittor 2009) will minimize disturbances to those managed fish species which are commonly associated with this habitat type during one or more of their life stages. The project will create approximately 319 acres of subtidal oyster habitat which will likely benefit EFH over the longer term.

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