Essential Fish Habitat Assessment

For the Proposed Oyster Cultch Relief and Reef Configuration Project

Mobile Bay, Alabama

Introduction

The purpose of this document is to present the findings of the Essential Fish Habitat (EFH) assessment conducted for the proposed Oyster Cultch Relief and Reef Configuration project in Mobile Bay, Alabama (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 proposed 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 proposed 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).

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

Project Overview

Since 2005, the oyster density on publicly harvest reefs has been in decline, due to damage associated with hurricanes Ivan and Katrina and drought conditions that have allowed for the proliferation of the predatory oyster drill (*Thais haemastoma*) on historically productive reefs. The Alabama Department of Conservation and Natural Resources – Marine Resources Division (AMRD) is proposing to investigate the merit of deploying different types of cultch material in various configurations to facilitate positive settlement of spat and growth of oysters upon selected reef areas in Mobile Bay, Alabama. This proposed project has four primary objectives: (1) restore subtidal reef habitats in various configurations and along a salinity gradient; (2) determine if there are differences in oyster settlement, growth, and survival on reefs of differing levels of relief and/or orientation relative to currents; (3) determine optimum reef material relief needed to restore oyster density on specific reefs within historical reef areas in which hydrology parameters such as oxygen and salinity and oyster recruitment and survival are highly variable; and (4) estimate the cost/benefits of deploying cultch in certain configurations as opposed to traditional cultch broadcast methods.

Two sites have been tentatively selected, including a 36-acre reef approximately 1 mile north-northeast of the mouth of East Fowl River (2014 Reef Planting Area), and Denton Reef (70 acres), located approximately 3 miles southeast of the mouth of East Fowl River, designated as Area VI by AMRD (see Figure 1). Physical conditions would determine which type of plot that would be deployed at each site. For example, previous physical data indicate dissolved oxygen at the benthic (bottom) interface at Denton Reef is consistently hypoxic (low oxygen) or anoxic (no oxygen) and not conducive to oyster growth. Therefore, using mounds at Denton Reef could place spat in areas of more suitable dissolved oxygen by elevating the oysters in the water column where dissolved oxygen is higher. Using this proposed design, nine mounds (three cultch treatments at three different depths and with three

different cultch types) would be created at Denton Reef. Three control plots would be established at this site. The control plots would use traditional oyster shell cultch and broadcast methods.

The proposed project would convert approximately 1.5 acres of unvegetated, soft-bottom estuarine habitat (mud or sand) to hard-bottom oyster reef. The area of influence would also include adjacent soft-bottom areas, and the surrounding water column habitat.

The proposed project would fill important data gaps pertaining to oyster restoration in Alabama coastal waters by evaluating the reef configurations, salinity gradients, and other factors affecting oyster establishment and survival in Mobile Bay.

Construction and Installation

The construction phase of the proposed project would include the deployment of oyster shell, limestone rock, and fossilized oyster shell in three experimental configurations including mounding, elongated furrows, and control plots using typical cultch broadcasting methods. Within the designated area(s), nine mounds, six furrows, and six control plots would be created. Control plots would be created using traditional cultch broadcast methods at 100 percent 1-inch bottom coverage in the vicinity of experimental plots. Control plots would cover approximately the same area as the experimental plots. Final site selection, cultch height, and reef area for the proposed project would be determined by the results of pre-monitoring surveys.

The contractor would secure a barge with barge spuds, changing positions as necessary to broadcast cultch material evenly. The corners of the mounds and furrows would be marked with weighted buoys and the contractor would use an excavator or high-pressure water hoses to deploy material and will check the entire area for proper height and uniformity. The final dimensions of constructed mounds and furrows, including total area and maximum height, would be dependent upon depth of the bottom in which it is placed to ensure compliance with the Army Corps of Engineers authorized minimum clearance requirement depth. The actual deployed dimensions of the mounds and furrows would also differ due to cascading effects of cultch material down the side slopes, and the direction of currents at each site.

Individual mound construction including total area and maximum height would depend on the depth of the bottom in which it is placed to ensure compliance with the USACE authorized minimum clearance requirement depth. The area of the base of each mound would be calculated to support reef material to attain the desired relief. Length, height, and orientation of each furrow would also depend on depth and direction of currents at study site. It is anticipated that the width of each furrow would be approximately 2 feet wide, although the actual width would depend on the cascading effect of material deployed to a specific maximum height. Furrows would be planted a minimum of 2 feet apart.

Duration and Timing of Construction

Planning, pre-monitoring, and site selection are anticipated to take 3 months (January–March of project year). The invitation to bid and bid process is anticipated to take 1 month (March of project year). Construction is anticipated to take 1 month and conclude by May of the first year. Construction would include acquiring, transporting, and deploying cultch material on areas and in configurations as determined by AMRD staff.

Site selection and pre-monitoring may include the use of side-scan sonar imaging, hand dredging, cane-pole sounding, and/or SCUBA quadrat sampling. Baseline data would be collected at each study site prior to project deployment, including an estimate of juvenile and adult oysters as well as an evaluation of existing cultch at each site (oyster shell, limestone rock, and fossilized shell).

For construction, a contractor would be hired to transport and deploy cultch material by push boat or barge. The cultch would be deployed off the deck using skid steers, excavator shovels, or high pressure water hoses. High-pressure water hoses would be used to distribute the cultch into three experimental configurations including mounding, elongated furrows, and control plots utilizing typical cultch broadcasting methods. Within the designated area(s) a total of nine mounds, six furrows, and six control plots would be created. The size and each mound's area and height would depend on the depth of the bottom in which it is placed and would comply with the United States Army Corps of Engineers (USACE)-authorized minimum clearance requirement depth. Length, height, and orientation of each furrow would also depend on the depth and direction of currents at the study site. It is anticipated that the width of each furrow would be approximately 2 feet wide, although the actual width would depend on the material deployed. Maintenance of the cultch mounds and furrows, including the deployment of additional cultch, may be needed in the event of a disaster such as a hurricane or tropical storm. Deployment of oyster cultch is an approved activity by USACE under a Nationwide Permit.

The construction phase of the proposed project would include the deployment of three types of material (oyster shell, fossilized oyster shell, and limestone rock) in three experimental configurations including mounding, elongated furrows, and control plots. A total of nine mounds would be constructed, including 3 built of oyster shell, 3 built of fossilized oyster shell, and 3 built of #4 limestone. The ideal dimensions of these mounds would be 15 ft wide x 15 ft long x 6 ft high, totaling approximately 17 cubic yards of material for each mound. Three larger control mounds would be constructed, one for each material type, sized approximately 50 ft wide x 50 ft long x 1 inch high, and totaling approximately 30 cubic yards of material for each mound control plot (Figure 2). In addition, three experimental furrows would be constructed, one for each material type, approximately 2 ft wide x 150 ft long x 1 ft high, totaling approximately 11 cubic yards. Each furrow would be constructed approximately 4 feet apart. Three control furrows would also be constructed, one for each material type, approximately 20 ft wide x 150 ft long x 1 ft high. Control furrows would be constructed approximately 10 feet apart (Figure 3). Individual mound and furrow construction will be dependent upon depth of the bottom in which it is placed to ensure compliance with the Army Corps of Engineers authorized minimum clearance requirement depth. Length, height, and orientation of each furrow will also be dependent upon depth and direction of currents at study site.

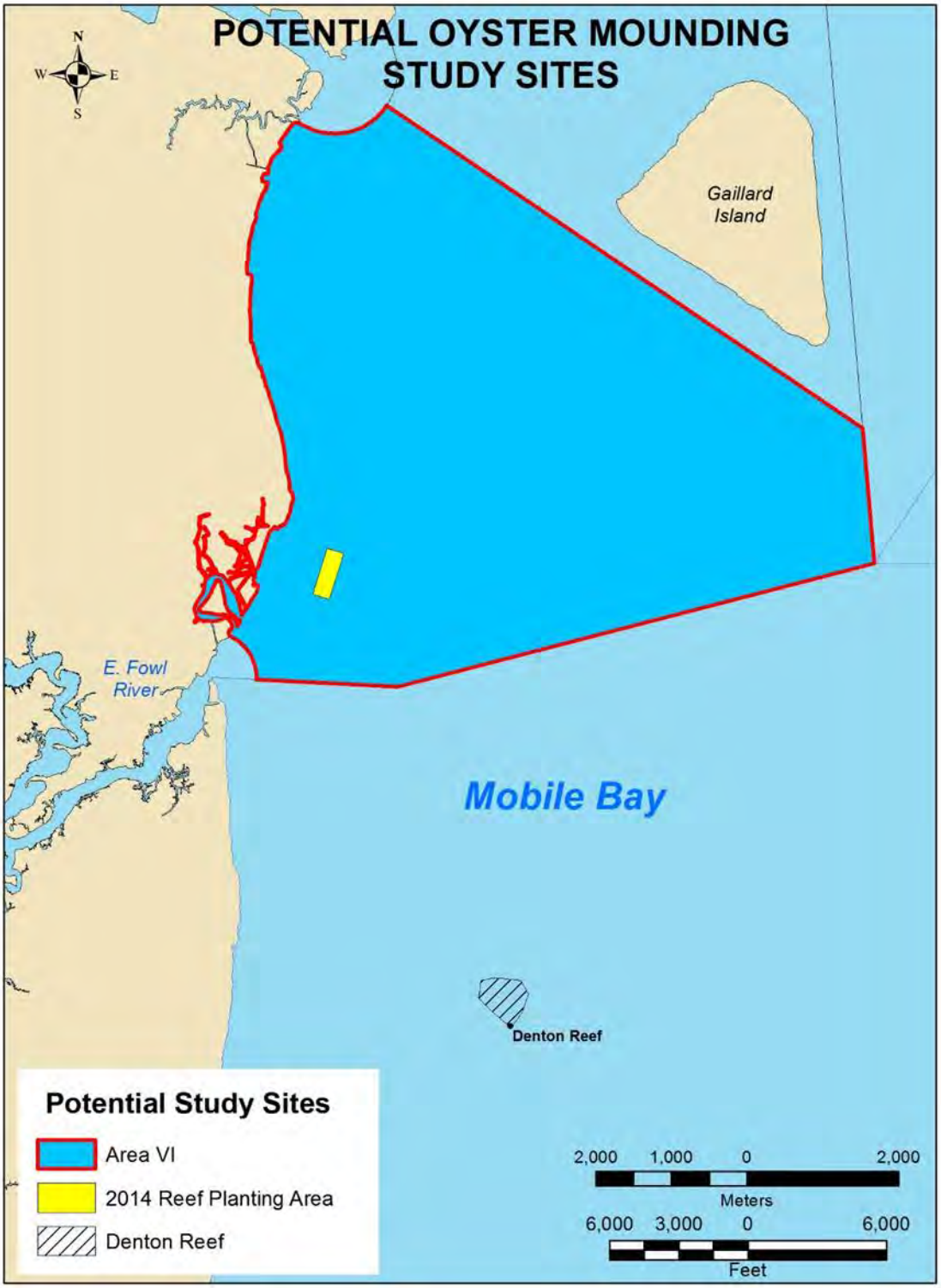

Figure 1. Potential Oyster Cultch Relief and Reef Configuration Project Area.

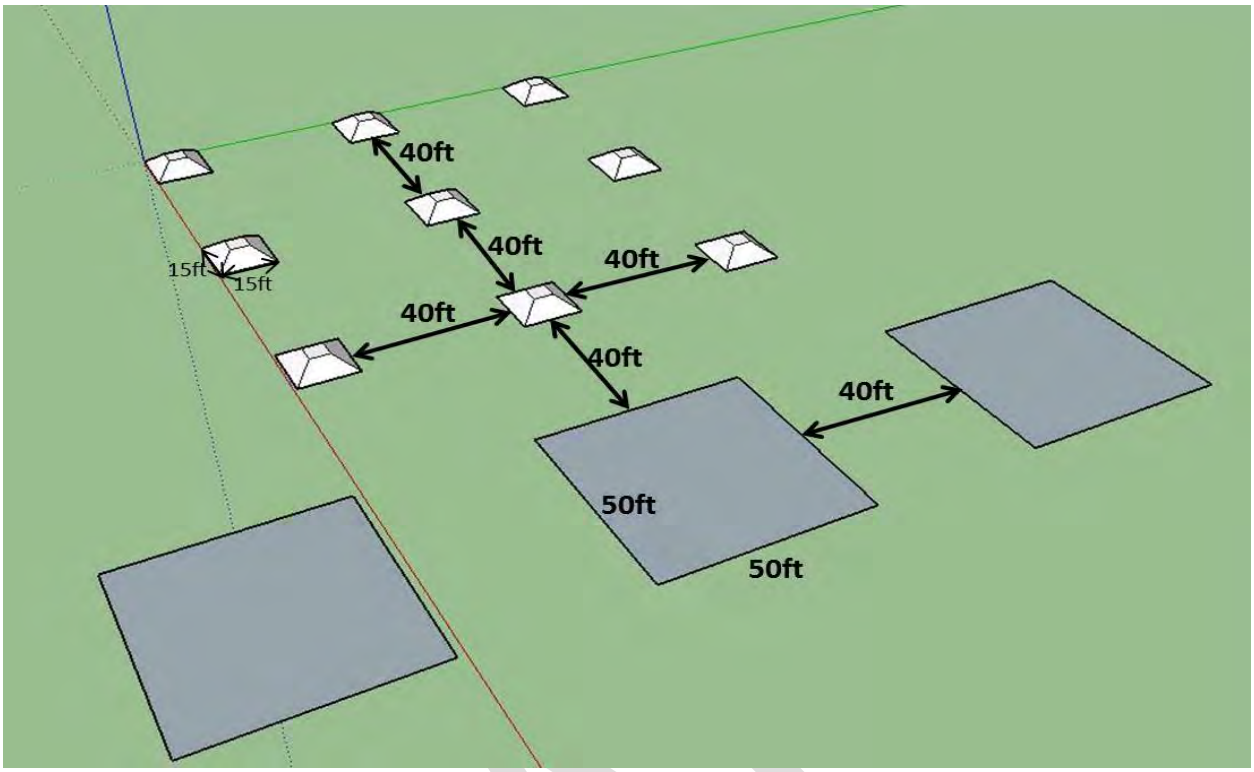

Figure 2: Schematic plan for mound construction and control mound construction.

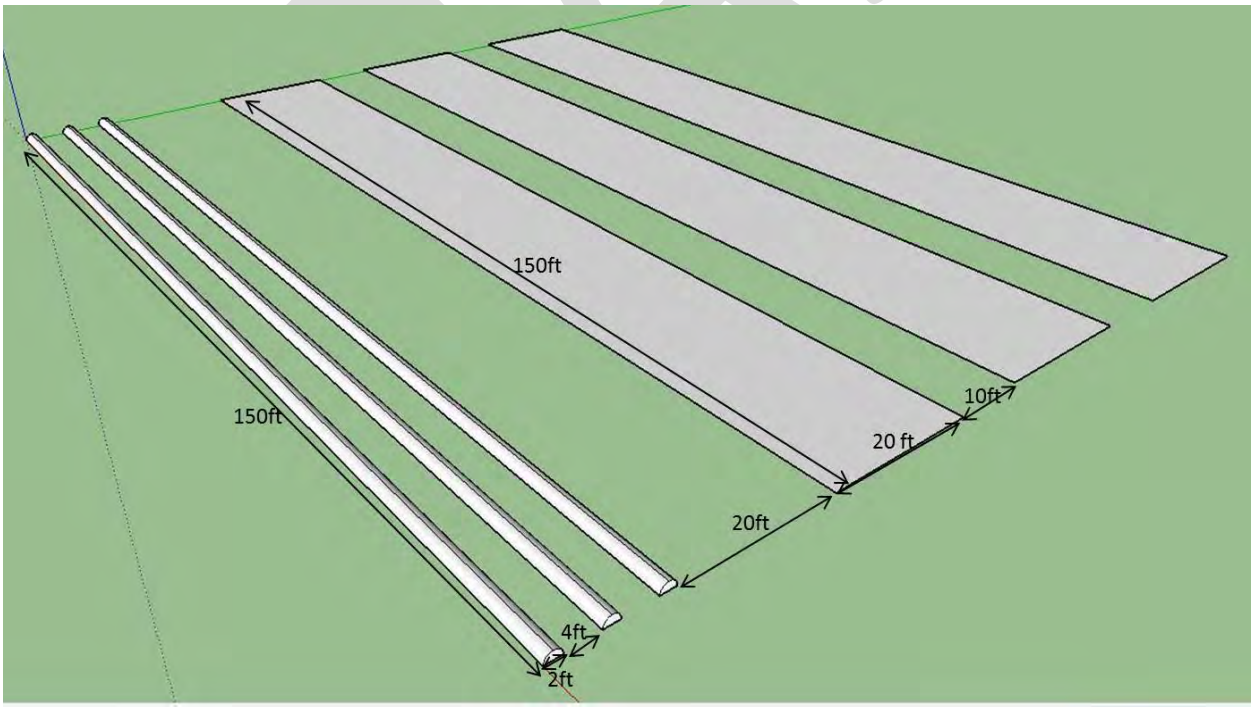

Figure 3: Schematic plan for furrow construction and control furrow construction.

Maintenance and Monitoring

Maintenance of the cultch mounds and furrows, including the deployment of additional cultch, may be necessary in the event of a disaster such as a hurricane or tropical storm. Deployment of oyster cultch is an approved activity by the US Army Corps of Engineers under a Nationwide Permit. All cultch material would be free of debris and contaminants.

Following the construction phase these mounds and furrows and control plots would be monitored for oyster settlement and growth annually for three years. Post-construction monitoring could include the use of hand dredging, cane pole sounding, and/or SCUBA quadrat sampling, typically performed at the end of the oyster growing season. The following data would be collected: (1) reef volume and footprint size; (2) oyster density and size class distribution; and (3) oyster settlement, survival and mortality. In addition, although not included in the budget of the proposed project, side-scan sonar imaging of each test area could be performed after cultch deployment. The following provides an overview of survey methods that would potentially be used to monitor the cultch material:

1. **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.
2. **Scuba Quadrat Sampling**—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.
3. **Hand Dredge**—A 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.

Essential Fish Habitat in the Project Area

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 proposed 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 and for the neonate and juvenile life stages of the highly migratory species (e.g., sharks)described above. 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),” (GMFMC 2015). 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 submerged aquatic vegetation (SAV), which is absent at proposed site; oyster reefs; and unvegetated soft bottom habitats.

One or more life stages of the managed species listed below in Table 1 could occur within the proposed project area in Mobile Bay, which also contains EFH for red drum and several species of shrimp, reef fishes, highly migratory species, and coastal migratory pelagics.

Table 1. EFH within the vicinity of the proposed Oyster Cultch Relief and Reef Configuration Project in Mobile Bay, Alabama

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Red Drum (*Sciaenops ocellatus*)	All[1]	Red Drum
Highly Migratory Species		
Scalloped hammerhead shark (*Sphyrna lewini*)	Neonate, Juvenile	Highly Migratory Species
Bonnethead shark (*Sphyrna tiburo*)	Neonate, Juvenile, Adult	Highly Migratory Species
Blacktip shark (*Carcharhinus limbatus*)	Neonate, Juvenile, Adult	Highly Migratory Species
Bull shark (*Carcharhinus leucas*)	Juvenile	Highly Migratory Species
Spinner shark (*Carcharhinus brevipinna*)	Juvenile	Highly Migratory Species
Atlantic sharpnose shark (*Rhizoprionodon terraenovae*)	Neonate, Juvenile, Adult	Highly Migratory Species
Finetooth shark (*Carcharhinus isodon*)	Neonate, Juvenile, Adult	Highly Migratory Species
Blacknose shark (*Carcharhinus acronotus*)	Adult	Highly Migratory Species
Great hammerhead shark (*Sphyrna mokarran*)	All[1]	Highly Migratory Species
Shrimp		
Brown shrimp (*Farfantepenaeus aztecus*)	All[1]	Shrimp
Pink shrimp (*Farfantepenaeus duararum*)	Larval, Juvenile	Shrimp
White shrimp (*Litopenaeus setiferus*)	All[1]	Shrimp
Coastal Migratory Pelagics		
King mackerel (*Scomberomorus cavalla*)	All[1]	Coastal Migratory Pelagics
Spanish mackerel (*Scomberomorus maculatus*)	All[1]	Coastal Migratory Pelagics
Cobia (*Rachycentron canadum*)	All[1]	Coastal Migratory Pelagics
Reef Fish		
Balistidae–Triggerfishes		

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Gray triggerfish (*Balistes capriscus*)	All[1]	Reef Fishes
Carangidae–Jacks		
Greater amberjack (*Seriola dumerili*)	All[1]	Reef Fishes
Lesser amberjack (*Seriola fasciata*)	All[1]	Reef Fishes
Almaco jack (*Seriola rivoliana*)	All[1]	Reef Fishes
Banded rudderfish (*Seriola zonata*)	All[1]	Reef Fishes
Labridae–Wrasses		
Hogfish (*Lachnolaimus maximus*)	All[1]	Reef Fishes
Lutjanidae–Snappers		
Queen snapper (*Etelis oculatus*)	All[1]	Reef Fishes
Mutton snapper (*Lutjanus analis*)	All[1]	Reef Fishes
Schoolmaster snapper (*Lutjanus apodus*)	All[1]	Reef Fishes
Blackfin snapper (*Lutjanus buccanella*)	All[1]	Reef Fishes
Red snapper (*Lutjanus campechanus*)	All[1]	Reef Fishes
Cubera snapper (*Lutjanus cyanopterus*)	All[1]	Reef Fishes
Gray (mangrove) snapper (*Lutjanus griseus*)	All[1]	Reef Fishes
Dog snapper (*Lutjanus jocu*)	All[1]	Reef Fishes
Mahogany snapper (*Lutjanus mahogoni*)	All[1]	Reef Fishes
Lane snapper (*Lutjanus synagris*)	All[1]	Reef Fishes
Yellowtail snapper (*Ocyurus chrysurus*)	All[1]	Reef Fishes
Wenchman (*Pristipomoides aquilonaris*)	All[1]	Reef Fishes
Vermilion snapper (*Rhomboplites aurorubens*)	All[1]	Reef Fishes
Malacanthidae–Tilefishes		
Goldface tilefish (*Caulolatilus chrysops*)	All[1]	Reef Fishes

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Blackline tilefish (*Caulolatilus cyanops*)	All[1]	Reef Fishes
Anchor tilefish (*Caulolatilus intermedius*)	All[1]	Reef Fishes
Blueline tilefish (*Caulolatilus microps*)	All[1]	Reef Fishes
Golden Tilefish (*Lopholatilus chamaeleonticeps*)	All[1]	Reef Fishes
Serranidae–Groupers		
Dwarf sand perch (*Diplectrum bivittatum*)	All[1]	Reef Fishes
Sand perch (*Diplectrum formosum*)	All[1]	Reef Fishes
Rock hind (*Epinephelus adscensionis*)	All[1]	Reef Fishes
Speckled hind (*Epinephelus drummondhayi*)	All[1]	Reef Fishes
Yellowedge grouper (*Epinephelus flavolimbatus*)	All[1]	Reef Fishes
Red hind (*Epinephelus guttatus*)	All[1]	Reef Fishes
Goliath grouper (*Epinephelus itajara*)	All[1]	Reef Fishes
Red grouper (*Epinephelus morio*)	All[1]	Reef Fishes
Misty grouper (*Epinephelus mystacinus*)	All[1]	Reef Fishes
Warsaw grouper (*Epinephelus nigritus*)	All[1]	Reef Fishes
Snowy grouper (*Epinephelus niveatus*)	All[1]	Reef Fishes
Nassau grouper (*Epinephelus striatus*)	All[1]	Reef Fishes
Marbled grouper (*Epinephelus inermis*)	All[1]	Reef Fishes
Black grouper (*Mycteroperca bonaci*)	All[1]	Reef Fishes
Yellowmouth grouper (*Mycteroperca interstitialis*)	All[1]	Reef Fishes
Gag (*Mycteroperca microlepis*)	All[1]	Reef Fishes
Scamp (*Mycteroperca phenax*)	All[1]	Reef Fishes
Yellowfin grouper (*Mycteroperca venenosa*)	All[1]	Reef Fishes

[1] All life stages include: Larval or Neonate, Juvenile, Adult, and Spawning Adult.

Managed Fish Species in the Project Area

The seasonal and year-round locations of designated EFH for the managed fisheries 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 for Highly Migratory Species (HMS) is described 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 (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.

Ecological Notes and Conclusions Regarding Effects of the Proposed Project

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, 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 (Bethea 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 (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. 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 2005). 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.

Coastal Migratory Pelagics FMP

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 proposed 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.

Environmental Consequences of the Proposed Action

Direct Impacts

Implementation of the proposed project would result in short-term, minor, adverse impacts on marine and estuarine fauna within near-shore, estuarine portions of Mobile Bay that are considered EFH for various life stages of the species managed under FMPs. The proposed project will not result in adverse, direct impacts to emergent wetlands, existing oyster reefs, or SAV. Potential impacts could include injury or mortality of less mobile benthic species due to burial during cultch deployment. Most motile fauna such as crabs, shrimp, and finfish will likely avoid the area of potential effect for the duration of in-water work, avoiding injury or mortality. A temporary increase in underwater noise and activity during project cultch deployment and a temporary increase in turbidity would also contribute to temporary disturbance or displacement of marine and estuarine fauna, affecting the habitat utilization of some

individuals considered under EFH fishery management plans. Turbidity would return to baseline levels following cultch placement. The proposed project would result in long-term, beneficial impacts on marine and estuarine fauna because it would create oyster reef habitat, which benefits oysters, but also provides important habitat for many other marine and estuarine species, including finfish, crabs, shrimp, mussels, and encrusting organisms. Because the proposed project is located in open water, with minimal staging areas on already developed land areas, there would be no impacts to wetlands, floodplains or groundwater.

The proposed project would result in long-term, beneficial impacts on FMP species and EFH because it would create oyster reef habitat, which provides important nursery habitat for many FMP species and their prey.

Indirect Impacts

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 Impacts

To evaluate the effects of the proposed project in combination with other past, present, and reasonably foreseeable future actions in the project vicinity, several other projects were identified that would contribute to or interact with the potential impacts of the proposed project. Several projects developed under the same NEPA analysis as this proposed project (i.e., *Alabama Trustee Implementation Group Draft Restoration Plan II and Environmental Assessment*) would have short-term, minor adverse impacts on EFH or managed fish species in coastal Alabama. Short-term impacts would result from projects with construction elements, such as the Little Lagoon Living Shoreline project and CAST Triage Center project, which would produce a negligible increase water turbidity during construction. The Oyster Grow-Out and Restoration Reef Placement is expected to have short-term, moderate, adverse impacts on water quality due to disturbance from the installation of pilings, and other oyster restoration projects would have short-term, adverse impacts during construction. The overall effects of these projects on EFH or managed fish, in combination with the proposed project, would be minor and temporary. There would be overall long-term, beneficial effects.

Proposed Mitigation 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. Several BMPs would include:

   - Cultch material would be free of debris and contaminants.
   - Fresh shell would be been properly aged or quarantined before being deployed.

- Cultch material would be placed in a manner to minimize disturbance of sediment.
- Methods would be employed to avoid turbidity impacts to ESA-listed species.
- Plan/drawings for intermittent breaks between oyster reef segment would be provided.
- A spill prevention and response plan would been developed.
- Design and materials used would avoid entanglement and entrapment risks for ESA-listed species.
- A monitoring plan would be included and final reports would be submitted to NMFS.
- Oyster reefs would not be constructed in smalltooth sawfish critical habitat, or critical habitat designated for nearshore reproduction of loggerhead sea turtle.
- Oyster reefs would not be built on submerged aquatic vegetation, live bottom, or hard or soft coral.
- Oyster reefs would not be built with materials that may create an entanglement risk to ESA-listed species.

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

   The contractor will follow the FWS' "Standard Manatee Conditions for In-Water Work" and "Sea Turtle and Smalltooth Sawfish Construction Conditions" (See Attachments A and B, respectively) 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. Specific measures would include: (1) All personnel associated with the project shall be instructed about the presence of manatees and sea turtles, and the need to avoid collisions with and injury to these species; (2) All project personnel would be informed that there are civil and criminal penalties for harming, harassing, or killing manatees and sea turtles which are protected under the Marine Mammal Protection Act and/or the Endangered Species Act; (3) All vessels associated with the project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom, and all vessels will follow routes of deep water whenever possible; (4) Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled or impede manatee movement, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment; and (5) All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s) or sea turtles, and all in-water operations, including vessels, must be shutdown if a manatee(s) or sea turtle(s) comes within 50 feet of the operation, and not resume until the animal(s) have moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Following these guidelines will help minimize collision and habitat disturbance, and will help minimize impacts to all estuarine fauna.

3. **Follow NOAA NMFS Southeast Region's "Vessel Strike Avoidance Measures and Reporting for Mariners" (See Attachment C)**

Conclusion

The construction activities proposed by this project would temporarily impact benthic habitat and EFH for all fisheries potentially occurring in Mobile Bay that are managed by NMFS and GMFMC

(Table 1). However, the absence of SAV at the proposed project site (Vittor & Associates 2004, 2009) will minimize disturbances to those managed fish species, especially reef fishes, which are commonly associated with this habitat type during one or more of their life stages while within estuarine habitat. Several BMPs would be employed to minimize disturbance to important fish habitats and to avoid any lasting adverse impacts from project construction. The project would create approximately 1.4 acres of subtidal oyster habitat which will likely benefit EFH over the longer term. The results of the project would provide important information for future oyster restoration projects, which would have long-term beneficial impacts on water quality in Mobile Bay. Based on the discussion above, NOAA Restoration Center has determined the project would not have a substantial adverse effect on federally managed fishery species or their essential fish habitat.

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ATTACHMENT A
STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or in Vero Beach (1-772-562-3909) for south Florida, and emailed to FWC at ImperiledSpecies@myFWC.com.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8½ " by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at http://www.myfwc.com/WILDLIFEHABITATS/manatee_sign_vendors.htm. Questions concerning these signs can be forwarded to the email address listed above.

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:

Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

ATTACHMENT B
SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701

SEA TURTLE AND SMALLTOOTH SAWFISH CONSTRUCTION CONDITIONS

The permittee shall comply with the following protected species construction conditions:

a. The permittee shall instruct all personnel associated with the project of the potential presence of these species and the need to avoid collisions with sea turtles and smalltooth sawfish. All construction personnel are responsible for observing water-related activities for the presence of these species.

b. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing sea turtles or smalltooth sawfish, which are protected under the Endangered Species Act of 1973.

c. Siltation barriers shall be made of material in which a sea turtle or smalltooth sawfish cannot become entangled, be properly secured, and be regularly monitored to avoid protected species entrapment. Barriers may not block sea turtle or smalltooth sawfish entry to or exit from designated critical habitat without prior agreement from the National Marine Fisheries Service's Protected Resources Division, St. Petersburg, Florida.

d. All vessels associated with the construction project shall operate at "no wake/idle" speeds at all times while in the construction area and while in water depths where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will preferentially follow deep-water routes (e.g., marked channels) whenever possible.

e. If a sea turtle or smalltooth sawfish is seen within 100 yards of the active daily construction/dredging operation or vessel movement, all appropriate precautions shall be implemented to ensure its protection. These precautions shall include cessation of operation of any moving equipment closer than 50 feet of a sea turtle or smalltooth sawfish. Operation of any mechanical construction equipment shall cease immediately if a sea turtle or smalltooth sawfish is seen within a 50-ft radius of the equipment. Activities may not resume until the protected species has departed the project area of its own volition.

f. Any collision with and/or injury to a sea turtle or smalltooth sawfish shall be reported immediately to the National Marine Fisheries Service's Protected Resources Division (727-824-5312) and the local authorized sea turtle stranding/rescue organization.

g. Any special construction conditions, required of your specific project, outside these general conditions, if applicable, will be addressed in the primary consultation.

Revised: March 23, 2006
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ATTACHMENT C
VESSEL STRIKE AVOIDANCE MEASURES AND REPORTING FOR MARINERS

Vessel Strike Avoidance Measures and Reporting for Mariners NOAA Fisheries Service, Southeast Region

Background
The National Marine Fisheries Service (NMFS) has determined that collisions with vessels can injure or kill protected species (e.g., endangered and threatened species, and marine mammals). The following standard measures should be implemented to reduce the risk associated with vessel strikes or disturbance of these protected species to discountable levels. NMFS should be contacted to identify any additional conservation and recovery issues of concern, and to assist in the development of measures that may be necessary.

Protected Species Identification Training
Vessel crews should use an Atlantic and Gulf of Mexico reference guide that helps identify protected species that might be encountered in U.S. waters of the Atlantic Ocean, including the Caribbean Sea, and Gulf of Mexico. Additional training should be provided regarding information and resources available regarding federal laws and regulations for protected species, ship strike information, critical habitat, migratory routes and seasonal abundance, and recent sightings of protected species.

Vessel Strike Avoidance
In order to avoid causing injury or death to marine mammals and sea turtles the following measures should be taken when consistent with safe navigation:

1. Vessel operators and crews shall maintain a vigilant watch for marine mammals and sea turtles to avoid striking sighted protected species.

2. When whales are sighted, maintain a distance of 100 yards or greater between the whale and the vessel.

3. When sea turtles or small cetaceans are sighted, attempt to maintain a distance of 50 yards or greater between the animal and the vessel whenever possible.

4. When small cetaceans are sighted while a vessel is underway (e.g., bow-riding), attempt to remain parallel to the animal's course. Avoid excessive speed or abrupt changes in direction until the cetacean has left the area.

5. Reduce vessel speed to 10 knots or less when mother/calf pairs, groups, or large assemblages of cetaceans are observed near an underway vessel, when safety permits. A single cetacean at the surface may indicate the presence of submerged animals in the vicinity; therefore, prudent precautionary measures should always be exercised. The vessel shall attempt to route around the animals, maintaining a minimum distance of 100 yards whenever possible.

6. Whales may surface in unpredictable locations or approach slowly moving vessels. When an animal is sighted in the vessel's path or in close proximity to a moving vessel and when safety permits, reduce speed and shift the engine to neutral. Do not engage the engines until the animals are clear of the area.

Additional Requirements for the North Atlantic Right Whale

1. If a sighted whale is believed to be a North Atlantic right whale, federal regulation requires a minimum distance of 500 yards be maintained from the animal (50 CFR 224.103 (c)).

2. Vessels entering North Atlantic right whale critical habitat are required to report into the Mandatory Ship Reporting System.

3. Mariners shall check with various communication media for general information regarding avoiding ship strikes and specific information regarding North Atlantic right whale sighting locations. These include NOAA weather radio, U.S. Coast Guard NAVTEX broadcasts, and Notices to Mariners. Commercial mariners calling on United States ports should view the most recent version of the NOAA/USCG produced training CD entitled "A Prudent Mariner's Guide to Right Whale Protection" (contact the NMFS Southeast Region, Protected Resources Division for more information regarding the CD).

4. Injured, dead, or entangled right whales should be immediately reported to the U.S. Coast Guard via VHF Channel 16.

Injured or Dead Protected Species Reporting

Vessel crews shall report sightings of any injured or dead protected species immediately, regardless of whether the injury or death is caused by your vessel.

Report marine mammals to the Southeast U.S. Stranding Hotline: 877-433-8299
Report sea turtles to the NMFS Southeast Regional Office: 727-824-5312

If the injury or death of a marine mammal was caused by a collision with your vessel, responsible parties shall remain available to assist the respective salvage and stranding network as needed. NMFS' Southeast Regional Office shall be immediately notified of the strike by email (takereport.nmfsser@noaa.gov) using the attached vessel strike reporting form.

For additional information, please contact the Protected Resources Division at:

NOAA Fisheries Service
Southeast Regional Office
263 13th Avenue South
St. Petersburg, FL 33701
Tel: (727) 824-5312
Visit us on the web at http://sero.nmfs.noaa.gov