

Essential Fish Habitat Assessment
For the Proposed Oyster Grow-Out and Restoration Reef Placement Project
Baldwin and Mobile Counties, Alabama

Introduction

The purpose of this document is to present the findings of an Essential Fish Habitat (EFH) Assessment for the proposed Oyster Grow-Out and Restoration Reef Placement project, located in Baldwin and Mobile Counties, 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 would 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, as well as substrates from the shoreline to the seaward limit of the Exclusive Economic Zone (EEZ).

This assessment will include a description of the proposed project; 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

The proposed project would create up to three off-bottom oyster grow-out areas, or oyster gardens, in the Mississippi Sound and Bon Secour Bay. The Alabama Cooperative Extension System (ACES) would implement the proposed project, in coordination with its other oyster gardening activities. Oysters would be grown at each site for at least one year and then placed on priority locations for oyster reef restoration, including nearshore living shorelines and intertidal reefs. Figure 1 shows approximate locations for the proposed grow-out sites, two in Mississippi Sound/Portersville Bay and one in Eastern Mobile Bay/Bon Secour Bay. These locations would allow for an evaluation of whether there are geographic variations in oyster survival and growth at different water salinities. The sites would have the following approximate coordinates:

1. Point aux Pins site: 30.375747°, -88.312770°
2. Bayou Sullivan site: 30.368304°, -88.220170°
3. Bon Secour Bay site: 30.253360°, -87.799806°

The targeted volume of each grow-out site is 20,000–25,000 oysters under the proposed project, or 48,000–50,000 oysters per site when supplemented from the Auburn University Shellfish Lab hatchery. The ACES would work with the Alabama Department of Conservation and Natural Resources – Marine Resources Division (AMRD) and other restoration practitioners to determine the need for additional locations for other oyster gardening program grow-out sites. If additional locations are needed to provide oysters for restoration projects in Alabama waters, this project would help to identify potential sites and successful management practices.

Grow-out sites would likely be placed in unvegetated soft bottom habitats. One-year-old oysters grown at each site would be placed on existing yet to be determined oyster reefs or artificial living shoreline structures.

Construction and Installation

Within the first year of the proposed project, permits would be obtained. The three grow-out sites would employ off-bottom oyster growing techniques. Specifically, grow-out baskets would be suspended in the middle of the water column, above the sediment to decrease predation by oyster drills.

At each grow-out site, 12 to 20 tapered 12"-diameter pilings would be installed by pushing them into the sediment. A stainless or galvanized steel cable (e.g., boat lift cable) would be strung between the pilings, to which oyster baskets would be attached at regular intervals and hang, suspended in the water column. A single layer of oysters would be placed on the bottom of each oyster basket. Each grow-out site would occupy approximately 0.25 acres. Figure 2 shows the likely schematic of pilings and grow-out structures (baskets), which would be suspended approximately 12" to 18" above the bottom substrates.

Final siting will be contingent upon securing the necessary permitting/compliance requirements through regulatory authorities and/or subleases of riparian right areas from the State of Alabama. Project sites would be leased and managed by the Alabama Cooperative Extension System, out of Auburn University.

Duration and Timing of Construction

The proposed project would last for a total duration of approximately five years. Planning and permitting is expected to take approximately 8-12 months. Once permits are obtained, pilings would be installed to create the grow-out sites. Each site would be installed in one day, depending on weather, and would be setup to produce oysters after approximately 6 months.

Maintenance and Monitoring

A project-specific monitoring plan would be developed and likely would include annual survivorship monitoring at the grow-out sites and restoration reef locations. Monitoring would be conducted for the entire duration of the project (approximately five years). In addition, oyster larval recruitment surveys would be conducted near the grow-out sites to determine the effectiveness of the sites in providing larval supply to reefs in the vicinity. This monitoring would likely include: (1) an evaluation of oyster health at each grow-out-site during pre-spawn, spawning, and post-spawn periods; (2) an evaluation of oyster growth at reefs and living shoreline projects near the grow-out sites; and (3) the placement of settlement plates near the grow-out areas to assess larval setting.

After growing oysters at the grow-out sites for 1-year, vessels would be used to place live oysters on existing reef sites including both existing living shoreline sites in Mobile Bay and Mississippi Sound and artificial reefs constructed of cultch. If the cultched sites are located in areas open for harvest, these reefs would not be subject to harvest for a minimum of 2 years.

Predator control techniques may be necessary to reduce predation by oyster drills, and would be applied to different plots within the grow-out sites to determine which methods are most successful. Techniques could include installing a copper ring to the support pilings and/or suspending the baskets from wire that is never below the surface of the water. Various predator reduction techniques would be monitored over a five year period and the grow-out site infrastructure would be adaptively managed to establish the most successful predator controls on more plots to increase oyster survival.



Figure 1. Proposed Sites of the Oyster Grow-Out and Restoration Reef Placement Project.

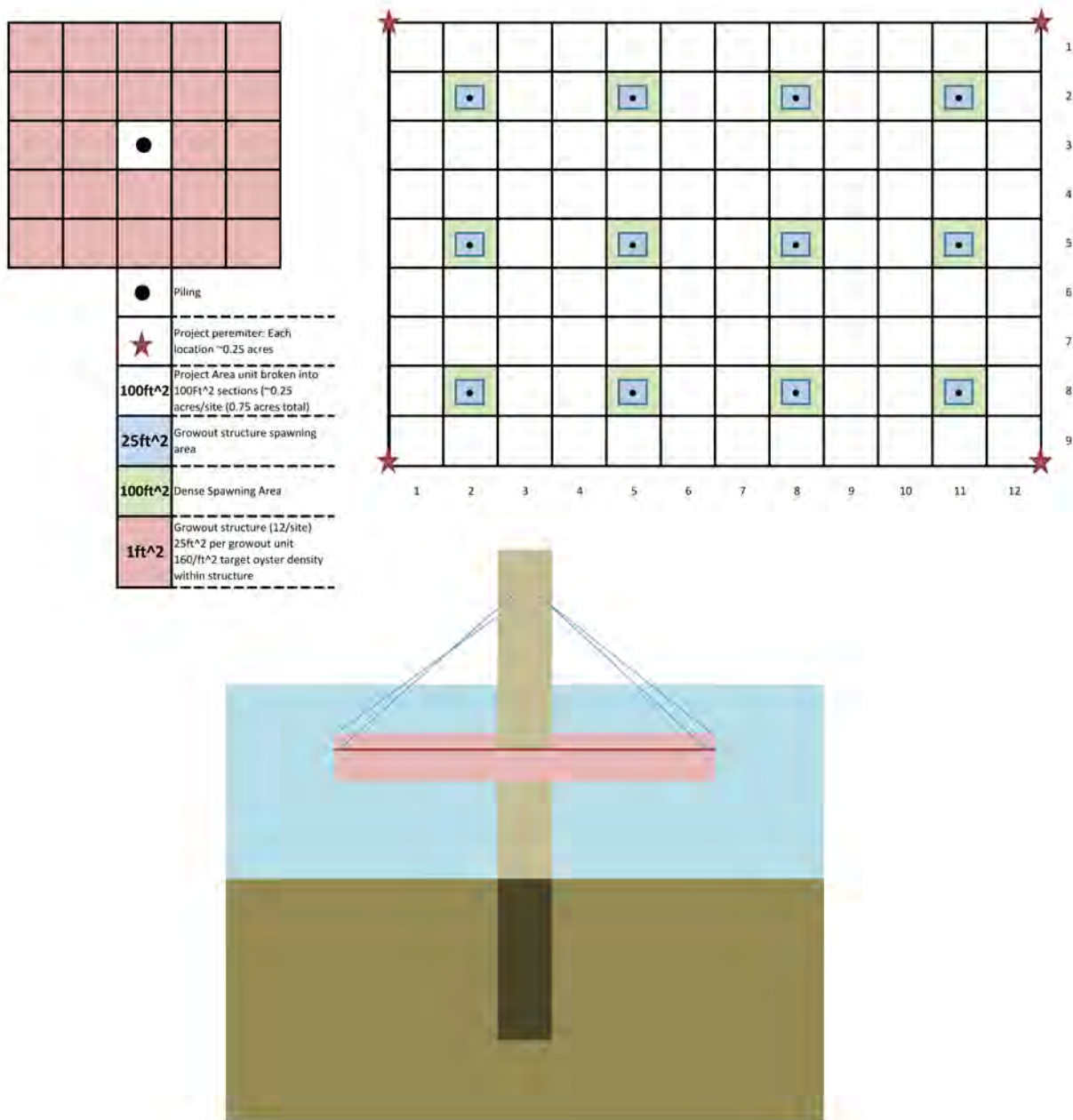


Figure 2. Proposed layout of an oyster grow-out site.

Depending on the success of these grow-out areas, additional sites may be considered in the future. The ACES will work with the AL TIG, AMRD, and other restoration practitioners to determine the need for additional locations for other oyster gardening program grow-out sites. If additional locations are needed, locations for other oyster grow-out sites that could enhance oyster spawning success throughout the Mobile Bay, Bon Secour Bay, Mississippi Sound, and Perdido Bay and contribute to

restoration success of projects in Alabama will be identified. Additionally, ACES will work with the AL TIG, AMRD, and other restoration practitioners to identify and prioritize restoration locations where oysters will be planted once mature. The identification of restoration locations would be used to plan other oyster restoration projects that seek to increase healthy oyster populations and to contribute to sustainable oyster populations in Alabama.

Essential Fish Habitat in the Project Area

The entire Alabama estuarine system is important in sustaining viable fisheries in the Gulf, which includes the subtidal and intertidal shoreline areas where the proposed project would occur. Managed species are found in a variety of habitats, including high and low salinity, small and large bays, tidal marshes and open waters, and channelized and natural waterways (GMFMC 1998).

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. 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 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).” 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.

One or more life stages of the managed species listed below in Table 1 could occur within the proposed project sites in Mobile Bay and Mississippi Sound, which contain 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 Grow-Out and Restoration Reef Placement Project in Mobile and Baldwin Counties, Alabama

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Red Drum (<i>Sciaenops ocellatus</i>)	All ¹	Red Drum
Highly Migratory Species		
Scalloped hammerhead shark (<i>Sphyrna lewini</i>)	Neonate, Juvenile	Highly Migratory Species
Bonnethead shark (<i>Sphyrna tiburo</i>)	Neonate, Juvenile, Adult	Highly Migratory Species
Blacktip shark (<i>Carcharhinus limbatus</i>)	Neonate, Juvenile, Adult	Highly Migratory Species
Bull shark (<i>Carcharhinus leucas</i>)	Juvenile	Highly Migratory Species

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Spinner shark (<i>Carcharhinus brevipinna</i>)	Juvenile	Highly Migratory Species
Atlantic sharpnose shark (<i>Rhizoprionodon terraenovae</i>)	Neonate, Juvenile, Adult	Highly Migratory Species
Finetooth shark (<i>Carcharhinus isodon</i>)	Neonate, Juvenile, Adult	Highly Migratory Species
Blacknose shark (<i>Carcharhinus acronotus</i>)	Adult	Highly Migratory Species
Great hammerhead shark (<i>Sphyrna mokarran</i>)	All ¹	Highly Migratory Species
Shrimp		
Brown shrimp (<i>Farfantepenaeus aztecus</i>)	All ¹	Shrimp
Pink shrimp (<i>Farfantepenaeus duararum</i>)	Larval, Juvenile	Shrimp
White shrimp (<i>Litopenaeus setiferus</i>)	All ¹	Shrimp
Coastal Migratory Pelagics		
King mackerel (<i>Scomberomorus cavalla</i>)	All ¹	Coastal Migratory Pelagics
Spanish mackerel (<i>Scomberomorus maculatus</i>)	All ¹	Coastal Migratory Pelagics
Cobia (<i>Rachycentron canadum</i>)	All ¹	Coastal Migratory Pelagics
Reef Fish		
Balistidae–Triggerfishes		
Gray triggerfish (<i>Balistes capriscus</i>)	All ¹	Reef Fishes
Carangidae–Jacks		
Greater amberjack (<i>Seriola dumerili</i>)	All ¹	Reef Fishes
Lesser amberjack (<i>Seriola fasciata</i>)	All ¹	Reef Fishes
Almaco jack (<i>Seriola rivoliana</i>)	All ¹	Reef Fishes
Banded rudderfish (<i>Seriola zonata</i>)	All ¹	Reef Fishes
Labridae–Wrasses		
Hogfish (<i>Lachnolaimus maximus</i>)	All ¹	Reef Fishes
Lutjanidae–Snappers		

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Queen snapper (<i>Etelis oculatus</i>)	All ¹	Reef Fishes
Mutton snapper (<i>Lutjanus analis</i>)	All ¹	Reef Fishes
Schoolmaster snapper (<i>Lutjanus apodus</i>)	All ¹	Reef Fishes
Blackfin snapper (<i>Lutjanus buccanella</i>)	All ¹	Reef Fishes
Red snapper (<i>Lutjanus campechanus</i>)	All ¹	Reef Fishes
Cubera snapper (<i>Lutjanus cyanopterus</i>)	All ¹	Reef Fishes
Gray (mangrove) snapper (<i>Lutjanus griseus</i>)	All ¹	Reef Fishes
Dog snapper (<i>Lutjanus jocu</i>)	All ¹	Reef Fishes
Mahogany snapper (<i>Lutjanus mahogoni</i>)	All ¹	Reef Fishes
Lane snapper (<i>Lutjanus synagris</i>)	All ¹	Reef Fishes
Yellowtail snapper (<i>Ocyurus chrysurus</i>)	All ¹	Reef Fishes
Wenchman (<i>Pristipomoides aquilonaris</i>)	All ¹	Reef Fishes
Vermilion snapper (<i>Rhomboplites aurorubens</i>)	All ¹	Reef Fishes
Malacanthidae–Tilefishes		
Goldface tilefish (<i>Caulolatilus chrysops</i>)	All ¹	Reef Fishes
Blackline tilefish (<i>Caulolatilus cyanops</i>)	All ¹	Reef Fishes
Anchor tilefish (<i>Caulolatilus intermedius</i>)	All ¹	Reef Fishes
Blueline tilefish (<i>Caulolatilus microps</i>)	All ¹	Reef Fishes
Golden Tilefish (<i>Lopholatilus chamaeleonticeps</i>)	All ¹	Reef Fishes
Serranidae–Groupers		
Dwarf sand perch (<i>Diplectrum bivittatum</i>)	All ¹	Reef Fishes
Sand perch (<i>Diplectrum formosum</i>)	All ¹	Reef Fishes
Rock hind (<i>Epinephelus adscensionis</i>)	All ¹	Reef Fishes
Speckled hind (<i>Epinephelus drummondhayi</i>)	All ¹	Reef Fishes

Management Unit / Species	Life stage(s) Found at Project Site(s)	NOAA Fisheries Management Plan
Yellowedge grouper (<i>Epinephelus flavolimbatus</i>)	All ¹	Reef Fishes
Red hind (<i>Epinephelus guttatus</i>)	All ¹	Reef Fishes
Goliath grouper (<i>Epinephelus itajara</i>)	All ¹	Reef Fishes
Red grouper (<i>Epinephelus morio</i>)	All ¹	Reef Fishes
Misty grouper (<i>Epinephelus mystacinus</i>)	All ¹	Reef Fishes
Warsaw grouper (<i>Epinephelus nigritus</i>)	All ¹	Reef Fishes
Snowy grouper (<i>Epinephelus niveatus</i>)	All ¹	Reef Fishes
Nassau grouper (<i>Epinephelus striatus</i>)	All ¹	Reef Fishes
Marbled grouper (<i>Epinephelus inermis</i>)	All ¹	Reef Fishes
Black grouper (<i>Mycteroperca bonaci</i>)	All ¹	Reef Fishes
Yellowmouth grouper (<i>Mycteroperca interstitialis</i>)	All ¹	Reef Fishes
Gag (<i>Mycteroperca microlepis</i>)	All ¹	Reef Fishes
Scamp (<i>Mycteroperca phenax</i>)	All ¹	Reef Fishes
Yellowfin grouper (<i>Mycteroperca venenosa</i>)	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 NOAA Fisheries website (<https://www.fisheries.noaa.gov/resource/map/essential-fish-habitat-mapper>). 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 (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 ichthyofauna 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. The proposed project will provide for increasing opportunities for oyster restoration projects in Alabama estuarine waters, which would benefit brown shrimp. The deployment of oysters produced at the grow-out sites will improve water quality and provide 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 waters. 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 sites 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 in the vicinity of the proposed project sites 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 the proposed project 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 grow-out and restoration reef placement 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 life stages of the species managed under FMPs. The project will not result in adverse, direct impacts to emergent wetlands, existing oyster reefs, or submerged aquatic vegetation. 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 Impacts

Implementation of the project would result in short-term, minor, adverse impacts on subtidal (nearshore) and intertidal estuarine fauna within the footprint of the grow-out sites. Temporary effects on FMP species and EFH would include noise, increases in turbidity, and visual disturbances during the construction and operation of the grow-out sites, as a result of human presence and boat traffic. Construction of the three grow-out sites could result in injury or mortality of less mobile benthic species during the installation of 12 to 20 tapered 12"-diameter pilings by pushing them into the sediment to support the suspended oyster baskets. However, most mobile species such as finfish, crabs, and shrimp would likely avoid the area for the duration of in-water work, avoiding injury or mortality. Turbidity and noise levels would return to baseline levels following the installation of the grow-out sites.

The benefits of the project would outweigh its impacts to estuarine and marine resources. The proposed project would result in long-term, beneficial impacts on FMP species and EFH because it would grow oysters, which provide important habitat and improve water quality for many FMP species and their prey. The grow-out sites would enhance spat production, potentially increasing oyster abundance and recruitment in Alabama waters. The proposed project and the oysters produced would also benefit other marine and estuarine species such as crabs, gobies, blennies, and gulf toadfish that are associated with oyster reef habitat.

Indirect Impacts

Indirect adverse impacts are not expected in the short or longer term. Once the proposed project is complete and the grow-out sites are producing oysters, 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 increase water turbidity during construction. The Oyster Cultch Relief and Reef Configuration project is expected to have short-term, moderate, adverse impacts on water quality due to disturbance from the construction of experimental mounds and furrows of oyster cultch, 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 long-term, beneficial effects on EFH and managed fish species as a result of all projects discussed above.

Proposed Mitigation Measures and Guidelines for EFH Protection

The ACES and AMRD, 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:

- Care would be taken to not place the grow-out areas over existing oyster reefs or submerged aquatic vegetation.
- Installing the support pilings by pushing them into the sediment without using a vibratory hammer or an impact hammer, in order to minimize noise and associated disturbance to wildlife.
- Project construction and operation would be performed in a manner to minimize disturbance of bottom substrates and avoid or minimize increases in water turbidity.
- Installing the Point aux Pins site during the summer when Gulf sturgeon are not likely present (May 1 and September 30) because the site is in proximity to critical habitat in Mississippi Sound.
- Oyster shells or spat produced from the grow-out would be free of debris and contaminants.
- A spill prevention and response plan would be developed;
- Site design and materials used would avoid entanglement and entrapment risks for Gulf Sturgeon, sea turtles, bottlenose dolphin, West Indian manatee, or other protected species. All cables used for the project would be kept taut at all times from the weight of the oyster baskets, so there would be no entanglement risk.
- A monitoring plan is included and final reports would be submitted to NMFS.

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 1 and 2, 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.

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

Conclusion

The construction activities proposed by this project would impact benthic habitat and EFH 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 will construct three oyster grow-out sites, covering a total of less than one acre, which would have no lasting effect on most managed fish species. The provision of oysters for other restoration project in Alabama estuarine waters would benefit EFH over the long term. The results of the proposed project would provide important information to support the development of future oyster “gardening” projects. The proposed project would also provide a source of oysters for future oyster restoration projects in Alabama, which would have long-term beneficial impacts on estuarine water quality. Based on the discussion above, NOAA Restoration Center has determined that the proposed Oyster Grow-Out and Restoration Reef Placement 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

DRAFT

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

DRAFT



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

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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>

NMFS Southeast Region Vessel Strike Avoidance Measures and Reporting for Mariners; revised February 2008.