Final

ESSENTIAL FISH HABITAT ASSESSMENT

Ocean Era, Inc. - Velella Epsilon
Marine Aquaculture Facility
Outer Continental Shelf
Federal Waters of the Gulf of Mexico

September 30, 2020

U.S. Environmental Protection Agency
Region 4
Water Protection Division
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Atlanta Georgia 30303

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RHA Section 10 Permit
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1.0 Introduction and Federal Coordination

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) sets forth a mandate for NOAA's National Marine Fisheries Service (NMFS), regional fishery management councils (FMC), and other federal agencies to identify and protect important marine fish habitat. The essential fish habitat (EFH) provisions of the MSA support one of the nation's overall marine resource management goals of maintaining sustainable fisheries. Essential to achieving this goal is the maintenance of suitable marine fishery habitat quality and quantity. The FMCs, with assistance from NMFS, have delineated EFH for federally managed species. Federal action agencies which fund, permit, or carry out activities that may adversely affect EFH are required to consult with NMFS regarding the potential impacts of their actions on EFH and respond in writing to NMFS or FMC with any recommendations.

The MSA, administered by the NMFS and regional FMCs, requires collaboration to stop or reverse the continued loss of fish habitats. Congress mandated the identification of habitats essential to managed species and measures to conserve and enhance this habitat. Under the MSA, Congress directs NMFS and the eight regional FMCs, under the authority of the Secretary of Commerce, to describe and identify EFH in Fishery Management Plans (FMPs); minimize, to the extent practicable, the adverse impacts on EFH; and identify other actions to encourage the conservation and enhancement of EFH.

On November 9, 2018, the U.S. Environmental Protection Agency Region 4 (EPA) received a complete application for a Clean Water Act (CWA) National Pollutant Discharge Elimination System (NPDES) permit from Kampachi Farms (name has since changed to Ocean Era, Inc.) for the point-source discharge of pollutants from a marine aquaculture facility in federal waters of the Gulf of Mexico (Gulf). On November 10, 2018, the U.S. Army Corps of Engineers Jacksonville District (USACE) received a complete application for Department of Army (DA) permit pursuant to Section 10 of the River and Harbors Act (RHA), 1899 (Section 10), for structures and work affecting navigable waters from Kampachi Farms (now Ocean Era, Inc.).

Given that the action of permitting the proposed project involves more than one federal agency, the EPA has elected to act as the lead agency to fulfill the consultation responsibilities as allowed by 50 CFR § 600.920(b).[1] In the consultation request, the EPA has also notified the NMFS that the EPA is acting as the lead agency as required by 50 CFR § 600.920(b). The USACE is a cooperating and co-federal agency for the EFH consultation request. The completion of this abbreviated consultation shall satisfy the EPA's and USACE's obligations under MSA Section 305(b)(2).

This EFH assessment was prepared by the EPA and the USACE to jointly consider the potential effects that the proposed actions may have on EFH under the jurisdiction of the NMFS as required by 50 CFR § 600.920(e)(1). The EPA and the USACE (action agencies) have reviewed the proposed activity and determined that the level of detail provided in this EFH assessment is commensurate with the complexity and magnitude of the potential adverse effects of the proposed action as required by 50 CFR 600.920(e)(2), and meets the information requirements that all EFH assessments must include according to 50 CFR § 600.920(e)(3). The EPA and the USACE are providing this EFH assessment for consideration by the NMFS in compliance with the MSA Section 305(b)(2).

The EPA and USACE are coordinating the interagency review process as required by the interagency Memorandum of Understanding for Permitting Offshore Aquaculture Activities in Federal Waters of the Gulf

[1] 50 CFR § 600.920(b) allows a lead agency: "If more than one Federal agency is responsible for a Federal action, the consultation requirements of sections 305(b)(2) through (4) of the Magnuson-Stevens Act may be fulfilled through a lead agency. The lead agency should notify NMFS in writing that it is representing one or more additional agencies."

of Mexico (Aquaculture MOU),[2] and conducting a comprehensive analysis of all applicable environmental requirements under the National Environmental Policy Act (NEPA); however, a consolidated cooperation process under NEPA is not being used to satisfy the EFH assessment requirements as described in 50 CFR § 600.920(e)(1).[3] The NMFS is a cooperating agency for the NEPA analysis and has provided scientific expertise related to the NEPA analysis for the proposed action including information about: site selection, Endangered Species Act (ESA) listed species, and marine mammal protection. While some information related to the EFH Assessment is within the coordinated NEPA evaluation developed by multiple federal agencies, this EFH Assessment is being provided as a stand-alone document to comply with the consultation process under the MSA.

[2] On February 6, 2017, the Memorandum of Understanding for Permitting Offshore Aquaculture Activities in Federal Waters of the Gulf of Mexico became effective for seven federal agencies with permitting or authorization responsibilities.

[3] 50 CFR § 600.920(e)(1) states that "Federal agencies may incorporate an EFH Assessment into documents prepared for other purposes such as Endangered Species Act (ESA) Biological Assessments pursuant to 50 CFR part 402 or National Environmental Policy Act (NEPA) documents and public notices pursuant to 40 CFR Part 1500."

2.0 Proposed Action

Ocean Era, Inc. (applicant) is proposing to operate a pilot-scale marine aquaculture facility (Velella Epsilon) in federal waters of the Gulf. The proposed action is the issuance of the CWA and RHA permits under the respective authorities of the EPA and the USACE as required to operate the facility. The EPA's proposed action is the issuance of a NPDES permit that authorizes the discharge of pollutants from an aquatic animal production facility into waters of the United States. The USACE's proposed action is the issuance of a DA authorization pursuant to Section 10 of the RHA that authorizes anchorage to the sea floor, structures and work in, over, under, and affecting navigable waters.

3.0 Proposed Project

The proposed project would allow the applicant to operate a pilot-scale marine aquaculture facility with up to 20,000 almaco jack (*Seriola rivoliana*) being reared in federal waters for a period of approximately 12 months. Based on an estimated 85 percent survival rate, the operation is expected to yield approximately 17,000 fish. Final fish size is estimated to be approximately 4.4 lbs/fish, resulting in an estimated final maximum harvest weight of 80,000 lbs (or 74,800 lbs considering the survival rate).

The fingerlings will be sourced from brood stock that are located at Mote Aquaculture Research Park and were caught in the Gulf near Madeira Beach, Florida. As such, only filial 1 (F1) progeny will be stocked into the offshore net pen. Following harvest, cultured fish would be landed in Florida and sold to federally-licensed dealers in accordance with state and federal laws.

A single offshore strength (PolarCirkel-style) manufactured submersible fish pen will be deployed on an engineered multi-anchor swivel (MAS) mooring system. The design provided for the engineered MAS uses three concrete deadweight anchors for the mooring; however, the final anchor design is likely to utilize embedment anchors instead. The cage material for the proposed project is constructed with rigid and durable materials (copper mesh net with a diameter of 4 mm wire and 40 x 40 mm mesh square). The mooring lines for the proposed project will be constructed of steel chain (50 mm diameter) and rope (36 mm diameter) that are attached to a floating cage that will rotate in the prevailing current direction; the floating cage position that is influenced by the ocean currents will maintain the mooring rope and chain under tension during most times of operation. The bridle line that connects from the swivel to the cage will be encased in a rigid pipe. Structural information showing the current MAS with deadweight anchors and net-pen array is provided in the Appendix A.[4]

The copper cage design is flexible and self-adjusts to suit the constantly changing wave and current conditions. As a result, the system can operate floating on the ocean surface or submerged within the water column of the ocean. When a storm approaches the area, the operating team simply opens a valve to flood the floatation system with water, causing the entire net pen array to submerge. A buoy remains on the surface, marking the net pen's position and supporting the air hose. When the net pen approaches the bottom, the system will maintain the cage several meters above the sea floor. Submerged and protected from the storm above, the system is still able to rotate around the MAS and adjust to the currents. After storm events, the operating team pumps air back into the floatation system via a hose, making the net pen array buoyant, causing the system to rise back to or near the surface position to resume operational conditions. The proposed project cage will have at least one properly functioning global positioning system device to assist in locating the system in the event it is damaged or disconnected from the mooring system.

[4] The anchoring system for the proposed project is being finalized by the applicant. The proposed project will utilize appropriately sized deadweight or, more likely, embedment anchors. Both anchor types are considered within the EFH assessment and are included for EFH consultation purposes. The selected final anchor design will be available in the administrative record for the NPDES or USACE permit.

4.0 Proposed Action Area

The proposed project would be placed in the Gulf at an approximate water depth of 130 feet (40 m), generally located 45 miles southwest of Sarasota, Florida. The proposed facility will be placed within an area that contains unconsolidated sediments that are 3 – 10 ft deep (see Table 1). The applicant will select the specific location within that area based on diver-assisted assessment of the sea floor when the cage and anchoring system are deployed. More information about the proposed project area boundaries are shown in Appendix B.

Table 1: Target Area with 3' to 10' of Unconsolidated Sediments

Location	Latitude	Longitude
Upper Left Corner	27° 7.70607' N	83° 12.27012' W
Upper Right Corner	27° 7.61022' N	83° 11.65678' W
Lower Right Corner	27° 6.77773' N	83° 11.75379' W
Lower Left Corner	27° 6.87631' N	83° 12.42032' W

The proposed facility location was selected with assistance from NOAA's National Ocean Service, National Ocean Service National Centers for Coastal Ocean Science (NCCOS). The applicant and the NCCOS conducted an exhaustive site screening process to identify an appropriate project site. Some of the criteria considered during the site screening process included avoidance of corals, coral reefs, submerged aquatic vegetation, and hard bottom habitats; and avoidance of marine protected areas, marine reserves, and habitats areas of particular concern (HAPC). This siting assessment was conducted using the Gulf AquaMapper tool developed by NCCOS.[5]

Upon completion of the site screening process with the NCCOS, the applicant conducted a Baseline Environmental Survey (BES) based on guidance developed by the NMFS and EPA.[6] The BES included a geophysical investigation to characterize the sub-surface and surface geology of the sites and identify areas with a sufficient thickness of unconsolidated sediment near the surface while also clearing the area of any geohazards and structures that would impede the implementation of the aquaculture operation.[7] The geophysical survey for the proposed project consisted of collecting single beam bathymetry, side scan sonar, sub-bottom profiler, and magnetometer data within the proposed area. The BES report noted that were no physical, biological, or archaeological features that would preclude the siting of the proposed aquaculture facility at one of the four potential locations shown in Table 1.

[5] The Gulf AquaMapper tool is available at: https://coastalscience.noaa.gov/products-explorer/

[6] The BES guidance document is available at: http://sero.nmfs.noaa.gov/sustainable_fisheries/Gulf_fisheries/aquaculture/

[7] The BES constitutes additional results to support the evaluation of habitat and site-specific effects that the proposed project may have on EFH within the proposed action area in accordance with 50 CFR § 600.920(e)(4)(i). The BES was provided to the NMFS by the applicant.

5.0 Assessment and Ecological Notes on the EFH Fisheries and Species

5.1 EFH Overview

According to the NEPA documentation and the Ocean Discharge Criteria Evaluation prepared in support of the NPDES permit for the proposed project, which discuss the habitat in the eastern portion of the Gulf, and the portion of the west Florida shelf, the area specific to the proposed project is known to support commercially important invertebrates and fishes. The proposed area consists of a wide variety of marine habitats including unconsolidated sediments (sand and gravel) and low-relief hard bottom habitat, providing critical support for commercially and recreationally important fishes and invertebrates in the eastern Gulf.

The seasonal and year-round locations of designated EFH for the managed fisheries are depicted on figures available from the NMFS.[8] The NMFS selected 27 species from seven existing Fisheries Management Units (FMUs). Table 2 lists the 27 species (plus various coral reef fish assemblages) which are known to reside in Gulf waters and which are managed under the MSA. The listed species are considered ecologically significant to their respective FMU, and their collective habitat types occur throughout marine and estuarine waters in the Gulf.

The MSA defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity" (MSA § 3(10)). EFH must be designated for the fishery (16 USC § 1853(a)(7)). The final rule clarifies that every FMP must describe and identify EFH for each life stage of each managed species. The EFH assessment is based on species distribution maps and habitat association tables. In offshore areas, EFH consists of those areas depicted as “adult areas”, “spawning areas”, and “nursery areas”.

5.2 Shrimp Fishery

The brown, white and pink shrimp yields in the Gulf are highly dependent upon the abundance and health of estuarine marshes and seagrass beds. The prey species (food source) for these shrimp depend on similar vegetated coastal marshes and seagrass beds.

Brown Shrimp

Brown shrimp are generally more abundant in the central and western Gulf and found in the estuaries and offshore waters to depths of 120 m. Post-larve and juveniles typically occur within estuaries while adults occur outside of bay areas. In estuaries, brown shrimp post-larve and juveniles are associated with shallow vegetated habitats, but also are found over silty sand and non-vegetated mud bottoms. In Florida, adult areas are primarily seaward of Tampa Bay, and associated with silt, muddy sand, and sandy substrates.

Spawning area: Florida waters to edge of continental shelf; year round
Nursery area: Tampa Bay

White Shrimp

White shrimp are offshore and estuarine dwellers and are pelagic or demersal depending on their life stage. The eggs are demersal and larval stages are planktonic, and both occur in nearshore marine waters. Adult white shrimp are demersal and generally inhabit nearshore Gulf waters in depths less than 33 m on soft mud or silty bottoms. In Florida, white shrimp are not common east or south of Apalachee Bay and are not expected to be impacted by the discharges.

Spawning area: off Mississippi and Alabama; March to October

[8] Designated EFH for managed fisheries are available at: http://sero.nmfs.noaa.gov/maps_gis_data/habitat_conservation/efh_Gulf/

Nursery area: Mississippi Sound

Pink Shrimp

Juvenile pink shrimp inhabit most estuaries in the Gulf but are most abundant in Florida. Juveniles are commonly found in estuarine areas with seagrass. Post-larve, juvenile, and subadults may prefer coarse sand/shell/mud mixtures. Adults inhabit offshore marine waters, with the highest concentration in depths of 10 to 48 m. According to the NMFS species distribution map, pink shrimp use Tampa Bay from the larval stage until the species matures to the late juvenile stage.

Spawning area: Mississippi, Alabama, and Florida offshore; year round

Nursery area: major nursery areas in Tampa Bay and Florida west coast state waters; summer and fall in the northern Gulf

Table 2: EFH Species within the Central and Eastern Gulf

Species	EFH
Shrimp (Brown, White, Pink, Royal Red)	All estuaries; 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 Gulf of Mexico (GMFMC) and the South Atlantic FMC (SAFMC) out to depths of 35 fathoms, Crystal River, Florida, to Naples, Florida, to 25 fathoms and in Florida Bay to 10 fathoms. Marsh, seagrass, mangrove and open water habitats.
Coastal Migratory Pelagics	All estuaries; the US/Mexico border to Florida from estuarine waters out to depths of 100 fathoms.
Red Drum	All estuaries; 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 SAFMC between depths of 5 and 10 fathoms.
Reef Fish	All 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. Reef, seagrass, and mangrove habitat.
Spiny Lobster	From Tarpon Springs, Florida, to Naples, Florida, out to 10 fathoms; and Cape Sable, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC out to depths of 15 fathoms. Hardbottom habitats with macroalgae, seagrass and mangrove habitats.
Coral	Distributed throughout the Gulf including: the North and South Tortugas Ecological Reserves, East and West Flower Garden Banks, McGrail Bank, and the southern portion of Pulley Ridge; the pinnacles and banks from Texas to Mississippi, at the shelf edge and at the Florida Middle Grounds, the southwest tip of the Florida reef tract, and predominant patchy hard bottom offshore of Florida from approximately Crystal River south to the Florida Keys.
Deepwater Coral	The Viosca Knoll Lease Area south of Mississippi and the Green Canyon Lease Area south of central Louisiana. The Twin Ridges area south of Cape San Blas, Florida. Alderdice, McGrail, and Sonnier Banks off Louisiana.

Royal Red Shrimp
Royal red shrimp are most abundant in the northeastern Gulf in water depths between 270 and 550 m. Little is known about the larvae. Distribution maps were not available by the NMFS for the royal red shrimp due to the limited knowledge and information available for the species. The permitted discharges will take place at or near the surface, thus there should be no impact on the primary EFH.

Spawning area: unknown
Nursery area: unknown

5.3 Red Drum Fishery

Red Drum
In the Gulf, red drum occur in a variety of habitats, ranging from depths of about 43 m offshore to very shallow estuarine waters. They commonly occur in all the Gulf's estuaries where they are associated with a variety of substrate types including sand, mud, and oyster reefs. Estuaries are important to red drum for both habitat requirements and for dependence on prey species which include shrimp, blue crab, striped mullet and pinfish. The GMFMC considers all estuaries to be EFH for the red drum. Schools of large red drum are common in the deep Gulf waters with spawning occurring in deeper water near the mouths of bays and inlets, and on the Gulf side of the barrier islands. The Tampa Bay EFH estuarine map shows red drum juveniles to be abundant or highly abundant in the fall and winter and common in the spring and summer.

Spawning area: Gulf wide from nearshore to just outside state waters, fall and winter
Nursery area: major bays and estuaries including Mobile Bay and Tampa Bay, year round

5.4 Reef Fish
Many species of snapper and grouper (mutton, dog, lane, gray and yellowtail snapper- and red, gag and yellowfin groupers) occupy inshore areas during juvenile stages where they feed on estuarine-dependent prey. As these species mature they generally move to offshore waters and change their feeding habits. However, reef fish species still depend on estuarine species for prey.

Red Grouper
The red grouper is demersal and occurs throughout the Gulf at depths from 3 to about 200 m, preferring 30 to 130-m depths. Juveniles are associated with inshore hard bottom habitat, and grass beds, rock formations, while shallow reefs are preferred for nursery areas. Species distribution maps show that spawning for the red grouper occurs throughout much of the Gulf waters off Florida, including the Florida Middle Grounds. Nursery areas occur within and around the selected site.

Spawning area: Florida continental shelf, well offshore, extending from south of Apalachicola Bay all the way to west of the Florida Keys; April to May
Nursery area: extensively throughout the continental shelf off Florida and along the northern Gulf, year round

Black Grouper
The black grouper occurs in the eastern half of the Gulf. The species is demersal and is found from shore to depths of 170 m. Adults occur over wrecks and rocky coral reefs. Juveniles travel into estuaries occasionally. Species distribution maps for the black grouper indicate that the range of the species occurs within the Gulf, outside of state waters.

Spawning area: throughout eastern Gulf to 170-m depth, spring and summer
Nursery area: probably the same as the red grouper

Gag Grouper
The gag grouper is demersal and is most common in the eastern Gulf, especially the west Florida shelf. Post larvae and pelagic juveniles move through inlets, coastal lagoons and high salinity estuaries in April-May where they settle into grass flats and oyster beds. Late juveniles move offshore in the fall. Adults prefer hard bottom areas, offshore reefs and wrecks, coral and live bottom. The species EFH distribution maps indicate presence throughout the Gulf including estuarine areas.

Spawning area: spawning areas are not specified on EFH maps
Nursery area: pelagic waters until post larvae or juvenile

Scamp
Scamp are demersal and widely distributed in the shelf areas of the Gulf, especially off Florida. Juveniles prefer inshore hard bottoms and reefs in depths of 13 to 36 m. Adults prefer high relief hard bottom areas. The species EFH distribution maps indicate presence throughout the Gulf including estuarine areas. Presence in these areas is based only on records for adults.

Spawning area: spawning area not specified in the EFH maps
Nursery area: nurseries not specified in the EFH maps

Red Snapper
Red snapper is demersal and found over sandy and rocky bottoms, around reefs, and underwater objects in depths to 218 m. Juveniles are associated with structures, objects or small burrows, or barren sand and mud bottoms in shelf waters ranging from 20 to 200 m. Adults favor deeper water in the northern gulf preferring submarine gullies and depressions, and over coral reefs, rock outcroppings, and gravel bottoms. Spawning occurs in offshore waters over fine sand bottoms away from reefs. Gulf distribution map show red snapper nursery areas within the estuarine waters of the Mississippi Sound, and Tampa Bay offshore of state waters

Spawning area: spawning occurs throughout the Gulf, June to October
Nursery area: extensive throughout the Gulf, year-round**,** including Mississippi Sound andTampa Bay

Vermillion Snapper
Vermillion snapper are found over reefs and rocky bottom from depths of 2 to 220 m in the shelf areas of the Gulf spawning occurs in offshore areas, with juveniles occupying the same areas as the adults.

Spawning area: EFH maps not available, not specified in literature reviewed
Nursery area: EFH maps not available, not specified in literature reviewed

Gray Snapper
The gray snapper generally occurs in the shelf waters of the Gulf and is particularly abundant in south and southwest Florida. Gray snapper occurs in almost all the Gulf's estuaries but are most common in Florida. Adults are demersal and mid-water dwellers, occurring in marine, estuarine, and riverine habitats. They are found among mangroves, sandy grass beds, and coral reefs, and over sandy muddy bottoms. Spawning occurs offshore, with post larvae moving into estuarine habitat over dense beads of Halodule and Syringodium grasses. Juveniles are marine, estuarine, and riverine found in most types of habitats. They appear to most prefer Thalassia grass flats, marl bottoms, seagrass meadows and mangrove roots. Species distribution maps

indicate that nursery areas exist within estuarine areas including the Mississippi Sound and Tampa Bay. Major adult areas are encountered from the Mississippi Sound across Gulf waters to west of Tampa Bay, where year-round adult areas occur within Florida state waters and into the southern half of Tampa Bay.

Spawning area: spawning areas probably exist in the Gulf off many of the nursery areas, but have not been positively identified
Nursery area: found in coastal waters throughout the Gulf, including Mississippi Sound and Tampa Bay

Yellowtail Snapper

Juvenile yellowtail snapper are found in nearshore nursery areas over vegetated sandy substrate and in muddy shallow bays. Thalassia beds and mangrove roots are preferred habitat of the yellowtail snapper. Late Juvenile and adults prefer shallow reef areas. According to the Gulf distribution map, this species has nursery areas within the 3 League Line and Tampa Bay. Spawning and adult areas occur in Gulf waters outside of the 3 League Line through the Florida Middle Ground and southern Apalachicola areas. EFH is not designated in the state waters of Mississippi or Alabama.

Spawning area: west and north of Tampa Bay; spring and summer
Nursery area: throughout the western and southern coast of Florida, including Tampa Bay

Lane Snappers

The snappers seem to prefer mangrove roots and grassy estuarine areas as well as sandy and muddy bottoms. Juveniles favor grass flats, reefs and soft bottom areas, to offshore depths of 33 m. Adults occur offshore at sand bottoms, natural channels, banks, and manmade reef and structures. Gulf distribution maps indicate that the lane snapper use shallow coastal waters including the Mississippi Sound and Tampa Bay and areas outside of state waters as nursery areas.

Spawning area: throughout the adult areas, summer
nursery areas: shallow coastal areas throughout the Gulf including Mississippi Sound and Tampa Bay.

Greater Amberjack

Greater amberjack seems to prefer habitats that are marine but not estuarine. Based on the Gulf distribution maps, greater amberjack occur outside the barrier islands across Gulf waters, and usually over reefs, wrecks and around buoys. Spawning and nursery areas are similar.

Spawning area: throughout the adult areas in most of the Gulf; year round
Nursery area: throughout the adult areas; year round

Lesser Amberjack

Juvenile lesser amberjack are found offshore in the late summer and fall in the northern Gulf, along with smaller juveniles, in areas associated with sargassum. Adults and spawning areas are found offshore year-round in the northern gulf where they are associated with oil and gas rigs and irregular bottom. The Gulf distribution map shows the range of the species throughout much of the Gulf and into the Atlantic coastline.

Spawning area: in adult areas, offshore, in the northern Gulf; year-round
Nursery area: probably similar to adult areas year-round; EFH map not available

Tilefish
Tilefish occur throughout the continental shelf in the Gulf, usually at depths from 50-200 m.

Spawning area: throughout the adult area from March to September
Nursery area: throughout the adult area; year round

Triggerfish
Larval and juvenile gray triggerfish are associated with grass beds, Sargassum and mangrove estuaries. Adults seem to prefer offshore waters associated with reefs. A general species distribution map was not available, however a map showing catches per hour by trolling methods within the Gulf was available from the National Oceanic and Atmospheric Administration (NOAA).[9] This map indicated that there is a record of occupancy for gray triggerfish in state waters of Mississippi/Alabama and Florida.

Spawning area: EFH map not available; assumed to be adult preferred areas offshore
Nursery area: EFH map not available; assumed to be estuarine areas throughout the Gulf

5.5 Coastal Migratory Pelagic Fishery

Collectively, these species are commonly distributed from the estuaries throughout the marine waters of the entire Gulf. However, estuaries are very important, since they contain the major prey base for these species.

King Mackerel
King mackerel are found throughout the Gulf and seldom venture into brackish waters. Juveniles occasionally use estuaries but are not estuarine dependent, and nursery areas occur in marine environments. According to the species distribution map, adult areas are also used for nurseries and spawning (May to November). These areas occur outside of the Mississippi Sound, across state waters, throughout the Gulf and into Tampa Bay.

Spawning area: throughout the Gulf, estuaries and coastal waters in adult areas; May to November
Nursery area: adult areas; year-round**,** marine waters, estuaries used occasionally

Spanish Mackerel
Adult Spanish mackerel tolerate brackish to oceanic waters and often inhabit estuaries. Estuarine and coastal waters also offer year-round nursery habitat. Juveniles appear to prefer marine salinities and sandy bottoms. Adults and spawning areas typically occur in offshore areas. According to the species distribution map, EFH for adult and nursery areas occurs throughout the selected site. Spawning areas occur in Gulf waters off the coast of Florida.

Spawning area: waters off the coast on the western (Summer and Fall) and eastern Gulf (Spring and Summer)
Nursery area: coastal waters throughout the Gulf

Cobia
Cobia only occasionally inhabit estuaries. Spawning occurs in nearshore areas and larvae are found in estuarine and offshore waters. Nursery areas are the same as the adult areas which include coastal areas, bays and river mouths. The range of cobia extends throughout the Gulf nearshore areas, with the summer adult areas and year-round nursery areas from the Mississippi Sound into Gulf waters and to the adult area

[9] The map is available at: http://christensenmac.nos.noaa.gov/Gulf-efli/gtrigger.gif

(spring, summer, and fall) and year-round nursery area that extends from just inside Gulf water, halfway into Tampa Bay.

Spawning area: occurs throughout the adult areas except in bays and estuaries in the northern Gulf, Spring and Summer
Nursery area: coastal areas, bays and river mouths

Dolphin (Mahi-Mahi)

Dolphin are primarily an oceanic species, but occasionally enter coastal waters with high enough salinity. They are common in coastal waters of the northern Gulf mainly during the summer months. It is an epipelagic species known for aggregating underneath or near floating objects, especially Sargassum. Spawning occurs throughout the adult areas of the open Gulf year-round, with peaks in early spring and fall. Larvae are usually found over depths of greater than 50 m and are most abundant at depths over 180 m. Adults occur over depths up to 1,800 m, but are most common in waters at 40 to 200 m in depth. Nursery areas are year-round in oceanic and coastal waters where salinity is high.

Spawning: throughout the adult areas in open waters of the Gulf; year-round
Nursery area: throughout the adult areas in open waters of the Gulf; year-round

Bluefish

Bluefish can be found in Gulf estuaries but are more common in estuaries and waters of the Atlantic Ocean. Spawning grounds are located on the outer half of the continental shelf Nursery areas occur inshore along beaches and in estuaries, inlets and rivers. Gulf distribution maps were not available for this species and therefore EFH could not be identified, but may be assumed to include nursery areas within the Mississippi Sound and Tampa Bay.

Spawning area: not specified in literature reviewed, EFH map not available
Nursery area: not specified in literature reviewed; EFH map not available, but probably exists within the Mississippi Sound and Tampa Bay

5.6 Spiny Lobster Fishery

The principal habitat for the spiny lobster is offshore reefs and seagrass. Spiny lobsters spawn in offshore waters along the deeper reef fringes. Adults are known to inhabit bays, lagoons, estuaries, and shallow banks. According to the species distribution map, spiny lobsters use the lower half of Tampa Bay for nursery areas. According to the GMFMC, Tampa Bay seems to be the upper limit for spiny lobster abundance due to the higher salinities found south of the Bay. The Tampa Bay-specific distribution map indicates that spiny lobster in the Bay are rare. However, the Gulf distribution maps indicate that Tampa Bay is used as an adult area year-round, and as a nursery area.

Spawning area: throughout the adult area, particularly north and south of Tampa Bay; March to July
Nursery area: lower half of Tampa Bay used as nursery; year-round

5.7 Coral and Coral Reefs

The three primary areas in the Gulf where hermatypic corals are concentrated are the East and West Flower Garden Banks, the Florida Middle Grounds, and the extreme southwestern tip of the Florida Reef Tract, the Tortugas Ecological Reserve HAPC and the Pulley Ridge HAPC. A number of other identified areas along the west Florida Shelf, i.e., Long Mound, Many Mounds, North Reed Site, and the West Florida Wall are all on the west Florida shelf in depths of 200-1000 m and contain deep water (low light) coral communities. Results

from recent research expeditions indicate that the west Florida shelf may have more deep-water coral coverage than other areas in the Gulf.

5.8 Highly Migratory Species

In addition to the managed fish species described in the previous section, another group of fish with highly migratory habits have also been examined. This group includes billfish (blue marlin, white marlin and sailfish), swordfish, tunas (yellow fin, bluefin and skipjack), and sharks (black tip, bull, dusky, silky, mako, Atlantic sharpnose, tiger and longfin mako). Most are found beyond the 50, 100 and 200 m contours.

6.0 Assessment of EFH and HAPC in the Gulf

The categories of EFH and HAPC for managed species which were identified in FMP Amendments of the Gulf FMC and which may occur in marine waters of the Gulf are shown in Table 3. These habitats require special consideration to promote their viability and sustainability. Some of the habitat categories presented in Table 3 are not present in the area affected by the proposed project. Impacts on habitats present or potentially present are discussed in the following paragraphs. Descriptions of the habitats were mostly excerpted from the *Generic Amendments for Addressing EFH Requirements, HAPC, and Adverse Effects of Fishing in the Following Fishery Management Plans for the Gulf of Mexico* (GMFMC, 1998; GMFMC, 2005).

Table 3: EFH and HAPC Identified in Fishery Plan Amendments of the Gulf and Presence in Area Affected by the Proposed Action

EFH	Presence
Water Column	Yes
Vegetated Bottoms	Yes
Non-vegetated Bottoms	Yes
Live Bottoms	Yes
Coral Reefs	No: solitary specimens may exist in action area
Geologic Features	Yes
Continental shelf fisheries	Yes
West Florida Shelf	Yes
Habitat Areas of Particular Concern	**Presence**
Florida Middle Grounds	No: located outside of action area
Florida Keys National Marine Sanctuary	No: located outside of action area
Florida Bay	No: located outside of action area
Dry Tortugas	No: located outside of action area
Pulley Ridge	No: located outside of action area
Madison-Swanson and Steamboat Lumps Marine Reserves	No: located outside of action area

6.1 Water Column EFH

The flow-averaged total ammonia concentration was calculated using the loading and current velocity information from the NCCOS modelling report for the proposed project. It was estimated that the total ammonia discharged from the cage at the maximum fish biomass will be 9.8 kg/day and the biochemical oxygen demand (BOD) at 59.3 kg/day. The flow-averaged ammonia concentration was estimated at about 4.7×10^{-3} mg/l at the cage. EPA's published ammonia criteria for saltwater is 4-day average is equal to 3.5×10^{-2} mg/L, and the 1-hr average is equal to 2.33×10^{-1} mg/l. BOD is estimated at 6.8×10^{-4} mg/l.

At the maximum biomass of 36,367 kg, the max feeding rate is estimated at 399 kg/day. The maximum solid waste production is estimated at 154 kg/day. Due to factors concerning the small size of the project and relatively small amounts of pollutants discharged, location, over bottom depth, and average current velocity, the discharges of wastes from the proposed project are expected to have a minor impact to water column EFH. It is expected that the effluent will undergo rapid dilution and constituents will be difficult to detect

within short distances from the cage.[10]

The proposed facility will be covered by a NPDES permit as an aquatic animal production facility with protective conditions required by the Clean Water Act. The NPDES permit will contain conditions that underly and support the EPA's determination that no significant environmental impacts will occur from the proposed project. The aquaculture-specific water quality conditions placed in the NPDES permit will generally include a comprehensive environmental monitoring plan. The applicant will be required to monitor and sample certain water quality, sediment, and benthic parameters at a background (upstream) location and near the cage occuring at a frequency that is correlated to fish production levels. Additionally, the NPDES permit will include effluent limitations expressed as best management practices (BMPs) for feed managment, waste collection and disposal, harvest discharge, carcass removal, materials storage, maintenance, record keeping, and training. Moreover, the NPDES permit will also require a quality assurance plan to ensure appropriate standards are met when sampling and an emergency management plan to establish operational procedures during disaster events such as hurricanes. Compliance with these conditions will ensure that no significant environmental impacts will occur from the proposed project.

6.2 Benthic EFH

Discharges from net-pen aquaculture can impact benthic habitat due to the deposition of solid wastes, comprised of fish feces and uneaten food, onto the seafloor. Due to factors concerning the small size of the project and relatively small amounts of pollutants discharged, location, over bottom depth, and average current velocity, the discharges of solid wastes from the cage are expected to have only minor impacts on benthic habitat and the supported communities.

Modeling of the project estimates the total solids discharge (fecal and fish) occurring at maximum fish biomass to be about 154 kg/day and organic carbon at 28 kg/day. The slow settling velocities of fecal and food pellets, 0.032 m/s and 0.095 m/s respectively, and variability in current directionality, should cause solids deposition to be distributed over a large area of the seafloor. Assuming a direct relationship between waste loading and fish biomass, based on several estimates from large scale fish farms, it's roughly estimated that the maximum solids load to the seafloor will range from 1.0-5.0 g/m^2/day with about 35% of that as organic carbon.

6.2.1 Vegetated Bottoms

Seagrasses and macroalgae have long been recognized as important primary producers in marine habitats. Due to the depths of the area affected by the proposed draft permit, seagrasses are unlikely to be present. The distribution of benthic algae is ubiquitous throughout the Gulf from bays and estuaries out to depths of 200 m. It is a significant source of food for fish and invertebrates. The wide gently sloping continental shelf, particularly in the eastern Gulf, provides a vast area where benthic species of algae can become established and drift along the bottom and continue to grow even when detached from the substrate. Benthic algae also form large mats that drift along the bottom. The cage employed will be anchored within an expanse of unconsolidated sediments unlikely to have attached algal communities. Nutrient loading from the small amounts of deposited solid wastes are not likely to effect marine plants.

6.2.2 Unconsolidated Sediments

Unconsolidated sediments provide habitat for a diverse invertebrate community consisting of several

[10] Further information about EPA's analysis and determination for impacts to water quality, seafloor, and benthic habitat can be found in the final NPDES permit and the Ocean Discharge Criteria (ODC) Evaluation, as well as other supporting documents developed for the NPDES and Section 10 permits such as the Biological Evaluation that was created to comply with the ESA and the Environmental Assessment that was developed to comply with NEPA.

hundred of burrowing species and well as benthic fish and macro-invertebrate communities living directly on the sea floor. These habitats also provide foraging for fishes associated with nearby demersal habitat. Unconsolidated seafloor habitat may affect shrimp and fish distributions directly in terms of feeding and burrowing activities or indirectly through food availability, water column turbidity, and related factors. The small amounts of solid waste deposition predicted from the proposed project should minimize any potential physical impacts to unconsolidated seafloor habitat. Organic carbon loading is likely to have little measurable effect on associated benthic communities.

6.2.3 Live Bottoms

Live bottoms are defined as those areas that contain biological assemblages consisting of such sessile invertebrates as sea fans, sea whips, hydroids, anemones, ascidians, sponges, bryozoans, seagrasses, or corals living upon and attached to naturally occurring hard or rocky formations with rough, broken, or smooth topography favoring the accumulation of turtles and fishes. These communities are scattered across the shallow waters of the west Florida Shelf and within restricted regions of the rest of the Gulf. Hard substrate on the west Florida shelf ranges from scattered low relief limestone outcroppings to major structures or groups of structures which are high relief, biologically developed areas with extensive inhabitation by hermatypic corals, octocorals and related communities. Additionally, the NPDES permit will require the proposed facility to be placed at least 500 meters from any hardbottom habitat to protect those communities from physical impacts due to the deposition of solids and potential impacts due to organic enrichment; the DA permit will not authorize the anchor system to be placed on vegetated and/or hardbottom habitat (see mitigation measures shown in Section 7).

6.2.4 West Florida Shelf

The west Florida shelf is composed mainly of carbonate sediments. These sediments are in the form of quartz-shell sand (> 50 percent quartz), shell-quartz sand (< 50 percent quartz), shell sand, and algal sand. The bottom consists of a flat limestone table with localized relief due to relict reef or erosional structures. The benthic habitat types include low relief hardbottom, thick sand bottom, coralline algal nodules, coralline algal pavement, and shell rubble. The west Florida shelf provides a large area of scattered hard substrates, some emergent, but most covered by a thin veneer of sand, that allow the establishment of a tropical reef biota in a marginally suitable environment. The only high relief features are a series of shelf edge prominences that are themselves the remnants of extensive calcareous algal reef development prior to sea level rise and are now, in most cases, too deep to support active coral communities.

Along the west Florida shelf are areas with substantial relief. In an area south of the Florida Middle Grounds, in water depths of 46 to 63 m, is a ridge formed from limestone rock termed the Elbow, and it is about 5.4 km at its widest and has a vertical relief of 6.5 to 14 m. South of Panama City are two notable areas with high relief. The Madison Swanson Marine Reserve are in 66 to 112 m of water and have rock ledges with 6 to 8 m of relief and are covered with coral and other invertebrate growth. The Mud Banks are formed by a ledge that has a steep drop of 5 to 7 m. The ledge extends for approximately 11 to 13 km in 57 to 63 m of water. The “3 to 5s”, a series of ledges located southwest of Panama City, occur in water depths of 31 to 42 m of water. The ledges are parallel to the 36.5-m isobath and have relief of 5.5 to 9 m. The features listed above are part of a larger area of shelf-edge reefs that extend along the 75-m isobath offshore of Panama City to just north of the Tortugas which also includes the Twin Ridges, The Edges, Steamboat Lumps Marine Reserve (Koenig et. al: 2000). According to Koenig et. Al (2000), the northeastern portion of this area represents the dominant commercial fishing grounds for gag and contains gag and scamp spawning aggregation sites. Two of the areas, Madison Swanson and Steamboat Lumps, were designated as marine reserves on June 19, 2002 for a four-year period to protect a portion of the gag spawning aggregations and to protect a portion of the offshore population of male gag.

Another west Florida shelf region with notable coral communities is bounded by the waters of Tampa Bay on the north and Sanibel Island on the south. The area consists of a variety of bottom types. Rocky bottom occurs at the 18 m contour where sponges, alcyonarians, and the scleractinians, Solenastrea hyades, and Cladocora arbuscula are especially prominent.

The Pulley Ridge HAPC is a 100+ km-long series of north-south trending, drowned, barrier islands approximately 250 km west of Cape Sable, Florida. The ridge is a subtle feature about 5 km across with less than 10 m of relief. The shallowest parts of the ridge are about 60 m deep. The southern portion of the ridge hosts an unusual variety of zooxanthellate scleractinian corals, green, red and brown macro algae, and typically shallow-water tropical fishes. The corals Agaricia sp. and *Leptoceris cucullata* are most abundant, and form plates up to 50 cm in diameter and account for up to 60% live coral cover at some localities. Less common species include: *Montastrea cavernosa, Madracis formosa, M. decactis, Porities divaricata,* and *Oculina tellena*. Sponges, calcareous and fleshy algae, octocorals, and sediment occupy surfaces between the corals. Coralline algae appear to be producing as much or more sediment than corals, and coralline algal nodule and cobble zones surround much of the ridge in deeper water (greater than 80 m). The fishes of Pulley ridge comprise a mixture of shallow water and deep species with more than 60 species present.

7.0 Federal Action Agency Determination and Mitigation

The implementing regulations of MSA define adverse effect as "any impact that reduces quality and/or quantity of EFH. Adverse effects may include direct or indirect physical, chemical, or biological alterations of the waters or substrate and loss of, or injury to, benthic organisms, prey species and their habitat, and other ecosystem components, if such modifications reduce the quality and/or quantity of EFH. Adverse effects to EFH may result from actions occurring within EFH or outside of EFH and may include site-specific or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions" (50 CFR 600.910(a)).

The EPA and USACE have determined that the minimal short-term impacts associated with the discharge will not result in substantial adverse effects on EFH, HAPC, or managed species in any life history stage, either immediate or cumulative, in the proposed project area. A summary of findings is presented in Table 4. Any potentially harmful physical characteristics and chemical constituents present at the time of discharge should disperse rapidly as the waste streams undergo physical dilution processes. Major adverse impacts to any benthic or demersal EFH are unlikely to occur as a result of the discharge. The high degree temporal and spatial patchiness regarding the distribution of plankton assemblages in the water column should greatly limit plankton exposure to potentially harmful water quality conditions. Major adverse impacts to any benthic EFH are unlikely to occur because of the installation of the proposed MAS mooring system.

The EPA will require mitigation measures to be incorporated into the NPDES permit to avoid or limit organic enrichment and physical impacts to habitat that may support associated hardbottom biological communities. The NPDES permit will require a condition that the proposed project must be positioned at least 500 m from any hardbottom habitat. The DA permit condition will state that the proposed MAS anchor system shall be installed on substrate devoid of vegetated and/or hardbottom habitat.

The federal action agencies used multiple sources to support the determinations described within this EFH assessment including the analysis of potential impacts that the NMFS used as the basis for its EFH determination for up to twenty commercial scale offshore marine aquaculture facilities in the Gulf (NMFS, 2009). Additionally, the EFH determination for the proposed project is also supported by the NMFS' concurrence with EPA's EFH determination for the eastern Gulf Oil and Gas General NPDES Permit (NMFS, 2016). These assessments and determinations have been provided to the NMFS and are incorporated by reference pursuant to 50 CFR § 600.920(e)(5).[11]

On March 8, 2019, EPA provided the EFH assessment to NMFS and initiated abbreviated consultation with the NMFS. On March 12, 2019, NMFS concurred with the EFH determination made by EPA and USACE. After completion and concurrence of the assessment, minor changes were made to the EFH document, though the updates did not change the findings of the assessment. On August 2, 2019 EPA provided an updated EFH assessment that included minor modifications and clarifications to NMFS for concurrence. The minor revisions did not change the EFH determination or EPA-required mitigation measures that were sent to NMFS previously. On August 23, 2019, NMFS concurred with the determination made within the EFH assessment and did not make any conservation recommendations.

[11] 50 CFR § 600.920(e)(5) states that "The assessment may incorporate by reference a completed EFH Assessment prepared for a similar action, supplemented with any relevant new project specific information, provided the proposed action involves similar impacts to EFH in the same geographic area or a similar ecological setting. It may also incorporate by reference other relevant environmental assessment documents. These documents must be provided to NMFS with the EFH Assessment."

Completion of the abbreviated consultation with NMFS satisfies EPA's obligations under MSA § 305(b)(2). More information about the EFH consultation including the assessment and consultation coordination documents are provided in the EA.

Table 4: Summary of Potential Impacts to EFH and Geographically Defined HAPC

EFH	Presence	Impact Assessment	Reason
Continental Shelf Fisheries	Yes	No Significant Impact	No exposure
Coral Reefs	No	No Significant Impact	Not present
Geologic Features	Yes	No Significant Impact	No exposure
Live Bottoms	Yes	No Significant Impact	Limited solid waste deposition
Non-vegetated Bottoms	Yes	No Significant Impact	Limited solid waste deposition
Vegetated Bottoms	Yes	No Significant Impact	Limited solid waste deposition
Water Column	Yes	No Significant Impact	Low levels of ammonia and BOD will be quickly diluted and dissipated
West Florida Shelf	Yes	No Significant Impact	Limited solid waste deposition
Habitat Ares of Particular Concern	**Presence**	**Impact Assessment**	**Reason**
Dry Tortugas	No	No Significant Impact	Avoided
Florida Bay	No	No Significant Impact	Avoided
Florida Keys National Marine Sanctuary	No	No Significant Impact	Avoided
Florida Middle Grounds	No	No Significant Impact	Avoided
Madison-Swanson and Steamboat Lumps Marine Reserves	No	No Significant Impact	Avoided
Pulley Ridge	No	No Significant Impact	Avoided

References

Gulf Fishery Management Council. 1998. General Amendment for Addressing EFH Requirements in the Fishery Management Plans of the Gulf.

Gulf Fishery Management Council. 2003. Reef Fish Amendment 21, Continuation of Madison-Swanson and Steamboat Lumps Marine Reserves, to be Reviewed via Conference Call. News Release. April 8, 2003.

Gulf Fishery Management Council. 2005. General Amendment Number 3 for Addressing EFH Requirements in the Fishery Management Plans of the Gulf.

Gulf Fishery Management Council. 2010. 5-Year Review of the Final Generic Amendment Number 3. Addressing EFH Requirements, Habitat Areas of Particular Concern, and Adverse Effects of Fishing in the Fishery Management Plans of the Gulf.

Koenig, CC, Coleman, CC, Grimes, CB, Fitzhugh, GR, Scanlon, KM, Gledhill, CT, Grace, M. 2000. Protection of Fish Spawning Habitat for the Conservation of Warm-Temperate Reef-Fish Fisheries of Shelf-Edge Reefs of Florida. Bulletin of Marine Science, 66(3): 593-616, 2000.

NMFS (National Marine Fisheries Service). 2000. EFH: A Marine Fish Habitat Conservation Mandate for Federal Agencies. St. Petersburg, FL.

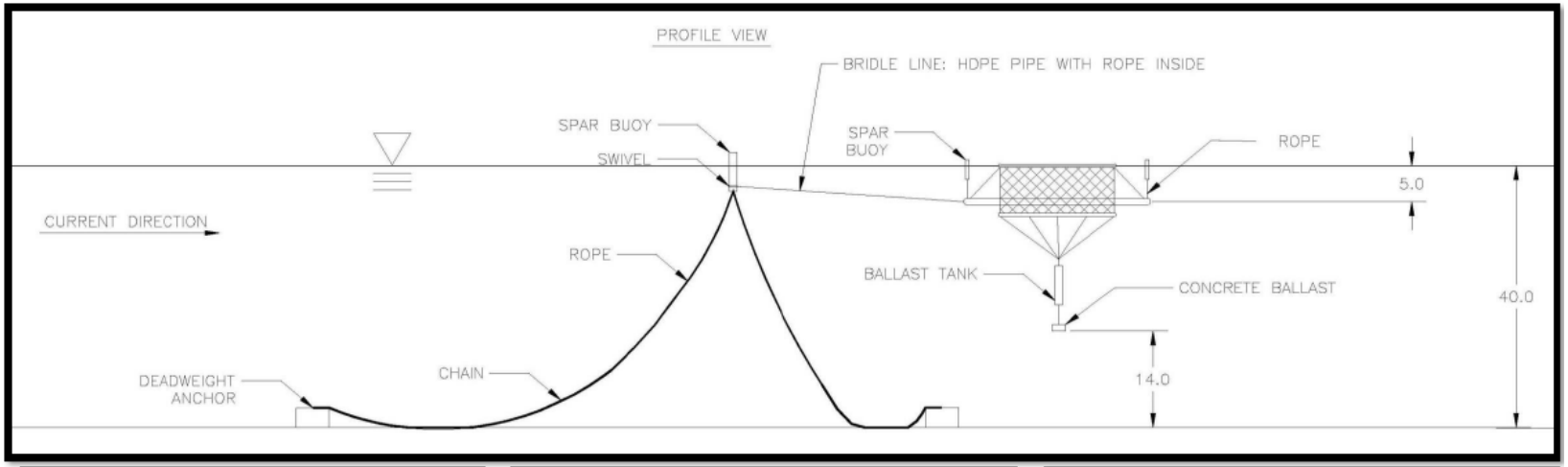
NMFS (National Marine Fisheries Service). 2009. Essential Fish Habitat (EFH) Review of the Fishery Management Plan for Regulating Offshore Marine Aquaculture in the Gulf of Mexico.

NMFS (National Marine Fisheries Service). 2015. EFH – Gulf. NOAA Southeast regional Office. Ver: 082015. http://sero.nmfs.noaa.gov/habitat_conservation/efh/guidance_docs/efh_gmfmc_ver082015.pdf

NMFS (National Marine Fisheries Service). 2016. EFH concurrence for the eastern Gulf of Mexico Oil and Gas General NPDES Permit.

U.S. Department of Commerce and U.S. Department of Interior. Federal Inventory Sites of the Eastern Gulf Region. http://www.mpa.gov/mpaservices/atlas/Gulf/gome.thml.

Appendix A – Cage and Mooring Detail



1) Deadweight Anchors (concrete):
- Three (3) anchors equally spaced @:
  - 120m from mooring centerline
  - 120 degrees from each other
- Each @ 4.5m x 4.5m x 4.5m (91 m3)
- Concrete friction factor = 0.5 on wet sand
- Each has an effective weight of 217 MT

2) Mooring Chain (Grade 2 steel):
- 80m length on each anchor
- 50mm (2") thick links
- No load = 70m length of each on seafloor
- Design load = some entirely off seafloor/ others completely on seafloor

3) Mooring Lines (rope):
- 40m length on each chain
- AMSTEEL®-BLUE
- 36mm (1 1/2") thick lines

4) Spar Buoy w/ Swivel (steel):

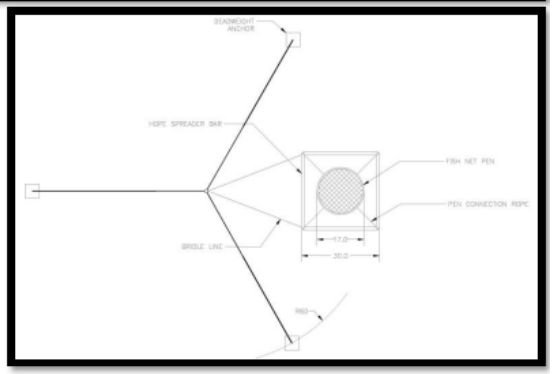
5) Bridle Lines (rope inside HDPE pipe):
- Three (3) ~30m bridle lines (rope) from swivel to spreader bar
- AMSTEEL®-BLUE
- 33.3mm (1 5/16") lines inside HDPE pipe

6) Spreader Bar (HDPE):
- Header Bar (load bearing) connected to Bridle Lines
  - 30m in length
  - 0.36m OD DR 11 HDPE pipe
- Side and Rear Bars (smaller load bearing)
  - 30m in length
  - 0.36m OD DR 17 HDPE pipe
- Four (4) corner spar buoys

7) Net Pen Connection Lines (rope):
- Four (4) ~13m connection lines (rope)
- Connected from Spreader Bar to Net Pen Float Rings
- AMSTEEL®-BLUE
- 33.3mm (1 5/16") lines

8) Net Pen Frame Structure (HDPE):
- Top Frame Structure
  - 18m in diameter
  - One (1) HDPE side-by-side Float Rings
    - On the sea surface
    - ~ 0.36m OD DR 11 HDPE pipe
  - One (1) HDPE net ring (railing)
    - Connected ~ 1.0m above Float Rings
    - Connected to Net Pen Mesh
    - ~ 0.15m OD DR 17 HDPE pipe
- Bottom Frame Structure
  - 18m in diameter
  - One (1) HDPE sinker ring
    - 7.0m below Float Rings
    - Connected to Net Ring
    - ~ 0.36m OD DR 11 HDPE pipe
  - One (1) HDPE net ring
    - 7.0m below float rings
    - Connected to copper alloy mesh
    - ~ 0.15m OD DR 17 HDPE pipe

9) Net Pen Mesh (copper alloy):
- 17m diameter x 7m depth
- Top connected to top net ring (railing)
- Bottom connected to bottom net ring
  - 4mm wire diameter
  - 40mm x 40mm mesh square
- Effective volume of 1,600m^3

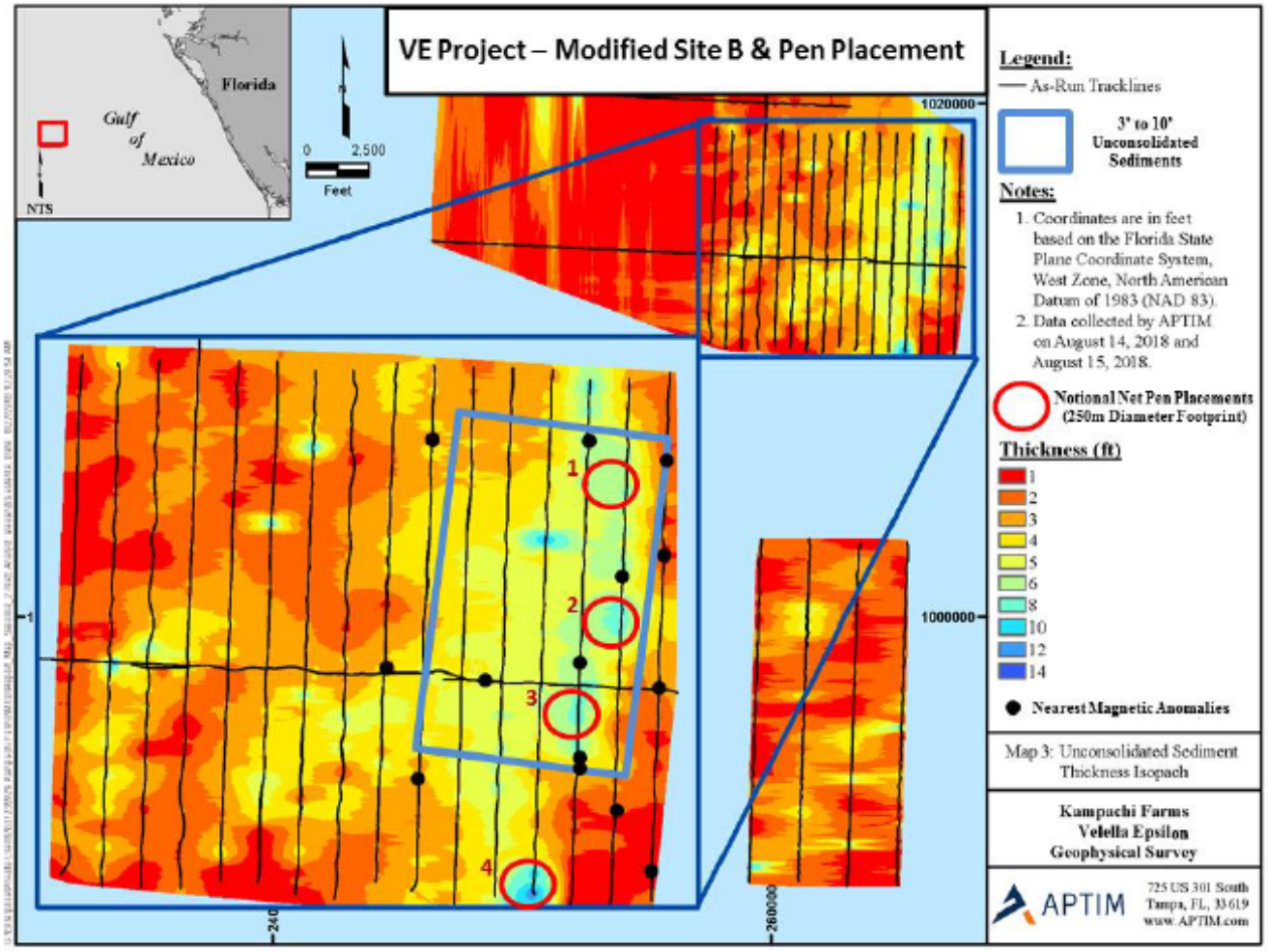


10) Shackle Point Connection (steel):
- One (1) ~0.13m^2 shackle plate
- Four (4) connection lines
  - 12 mm in diameter x 10m in length
  - Connected from shackle plate to HDPE sinker ring
- ~1m Grade 2 steel chain (32mm) connected to Floatation Capsule

11) Floatation Capsule (steel):
- ~ 1.5m in diameter x ~3.45m in length
- Effective floatation volume = 6m^3
- ~3m Grade 2 steel chain (32mm) connected to Counter Weight

12) Counter Weight (concrete):
- ~ 1.1m in diameter x ~2.2m in length
- Effective weight of 5 MT

Appendix B – Location Area



Position	° Decimal ' Latitude	° Decimal ' Longitude	Decimal ° Latitude	Decimal ° Longitude	Perimeter (km)	Area (km²)
Modified Site B from BES Report						
Upper Left	27° 7.86863' N	83° 13.45827' W	27.131143° N	83.224303° W		
Upper Right	27° 7.83079' N	83° 11.63237' W	27.130512° N	83.193872° W		
Lower Right	27° 6.43381' N	83° 11.69349' W	27.107230° N	83.194890° W		
Lower Left	27° 6.50261' N	83° 13.52658' W	27.108377° N	83.225442° W		
Center	27° 7.11266' N	83° 12.58604' W	27.118543° N	83.209767° W	11.1571	7.7237
Targeted Subset Area of Modified Site B from BES Report (3' to 10' Unconsolidated Sediments)						
Upper Left	27° 7.70607' N	83° 12.27012' W	27.128445° N	83.204502° W		
Upper Right	27° 7.61022' N	83° 11.65678' W	27.126837° N	83.194278° W		
Lower Right	27° 6.77773' N	83° 11.75379' W	27.112962° N	83.195897° W		
Lower Left	27° 6.87631' N	83° 12.42032' W	27.114605° N	83.207005° W		
Center	27° 7.34185' N	83° 12.02291' W	27.122365° N	83.200382° W	5.2273	1.6435
Notional Net Pen Placements within Modified Site B from BES Report						
1	27° 7.54724' N	83° 11.85393' W	27.125787° N	83.197565° W		
2	27° 7.17481' N	83° 11.82576' W	27.119580° N	83.197095° W		
3	27° 6.93930' N	83° 11.94780' W	27.115655° N	83.199130° W		
4	27° 6.52579' N	83° 12.09175' W	27.108763° N	83.201530° W	0.7854	0.0491