Essential Fish Habitat Assessment: Texas Project Site

voestalpine Stahl GmbH
San Patricio County, Texas

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Project No. 0172451
San Patricio County, Texas

Alicia Smith

Partner-in-Charge

Graham Donaldson

Project Manager

Travis Wycoff

Project Consultant

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
T: 281-600-1000
F: 281-600-1001

Texas Registered Engineering Firm F-2393

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LIST OF ACRONYMS

BACT	Best Available Control Technology
CCL	Corpus Christi Liquefaction
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CO_2e	Carbon Dioxide Equivalents
CWA	Clean Water Act
DRI	Direct-Reduced Iron
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ERM	Environmental Resources Management
FMC	Fisheries Management Council
FMP	Fishery Management Plan
GHG	Greenhouse Gas
GMFMC	Gulf of Mexico Fisheries Management Council
HAP	Hazardous Air Pollutants
HBI	Hot-Briquetted Iron
PM	Particulate Matter
PSD	Prevention of Significant Deterioration
LNG	Liquefied Natural Gas
MLT	Mean Low Tide
MSA	Magnuson-Stevens Fishery Conservation and Management Act
NASS	National Agriculture Statistics Service
NO_X	Nitrogen Oxides
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
PM	Particulate Matter
POCCA	Port of Corpus Christi Authority
PPT	Parts Per Thousand
PSD	Prevention of Significant Deterioration
PSU	Practical Salinity Units
SAFMC	South Atlantic Fishery Management Council
SH	State Highway
SIL	Significant Impact Level
SO_2	Sulfur Dioxide
SPCDD	San Patricio County Drainage District
SPMWD	San Patricio Municipal Water District
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
TPWD	Texas Parks and Wildlife Department
TPY	Ton per year

TSP	Total Suspended Particulates
TSS	Total Suspended Solids
TXNDD	Texas Natural Diversity Database
USACE	U.S. Army Corps of Engineers
USDA	US Department of Agriculture
USFWS	US Fish and Wildlife Service
USGS	US Geological Service
VA	voestalpine Stahl GmbH
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

In accordance with the Clean Air Act, voestalpine Stahl GmbH (voestalpine or VA) intends to submit a Greenhouse Gas (GHG) Permit Application to the Environmental Protection Agency (EPA) for a potential hot-briquetted iron (HBI) production facility ('the Project') located south of the City of Gregory in San Patricio County, Texas. voestalpine plans to initiate construction of the Project in April 2014, and begin operation by the fourth quarter of 2015.

The purpose of this Essential Fish Habitat (EFH) Assessment is to provide the results of an assessment of the potential impacts of the proposed Project on habitat designated as EFH as defined by the 1996 amendment to the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The information provided in this assessment is presented for utilization in informal consultations between federal agencies as outlined in the requirements for GHG permit applications. Accordingly, this analysis provides information and recommendations on the National Marine Fisheries Service (NMFS) determinations of effect on EFH by the proposed Project.

Temporary adverse effects to EFH are anticipated during construction and intermittent dredging associated with the Project. These effects include the disruption of the substrate, temporary impairment of water quality due to turbidity, and the increase of suspended solids. These effects are expected to be marginal.

No indirect effects to water quality or operational impacts to EFH are expected. A determination of *may affect, but is not likely to adversely affect* was reached for six of the eight EFH species analyzed in this report. The other two species will not be affected by the proposed Project. In light of the anticipated impacts, use of best management practices, and mitigations projects, the overall determination for the EFH in the Action Area is "*may affect, but is not likely to adversely affect*".

TABLE ES-1: Anticipated Effects on EFH Habitat and Species Potentially Occurring in the Action Area

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
Red drum (1)	Sciaenidae	*Sciaenops ocellatus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
Reef Fish (43)	Snappers (14)	Lutjanidae	SAV; Mangroves; Emergent marsh; Soft bottom; Open water	May affect, but is not likely to adversely affect

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
	Groupers (18)	Serranidae	SAV; Mangroves; Sand/shell; Soft bottom; Open water	May affect, but is not likely to adversely affect
	Tilefishes (5)	Malacanthidae	Open water	May affect, but is not likely to adversely affect
	Jacks (4)	Carangidae	Open water	May affect, but is not likely to adversely affect
	Gray triggerfish	*Balistes capriscus*	Mangroves; Sand/shell substrate	May affect, but is not likely to adversely affect
	Hogfish	*Lachnolaimus maximus*	Submerged aquatic vegetation	May affect, but is not likely to adversely affect
Coastal Migratory Pelagics (3)	King mackerel	*Scomberomerus cavalla*	Open water	May affect, but is not likely to adversely affect
	Spanish mackerel	*Scomberomerus maculatus*	Open water	May affect, but is not likely to adversely affect
	Cobia	*Rachycentron canadum*	Open water	May affect, but is not likely to adversely affect
Shrimp (4)	Brown shrimp	*Penaeus aztecus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
	White shrimp	*Penaeus setiferus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
	Pink shrimp	*Penaeus duorarum*	SAV; Sand/shell; Open water	May affect, but is not likely to adversely affect
	Royal red shrimp	*Pleoticus robustus*	Sand/shell; Soft bottoms	May affect, but is not likely to adversely affect
HMS	Lemon shark	*Negaprion brevirostris*	Shallow coastal areas; mangroves	.May affect, but is not likely to adversely affect
	Bull shark	*Carcharhinus leucas*	Shallow areas in estuaries	May affect, but is not likely to adversely affect
	Finetooth shark	*Carcharhinus isodon*	Shallow coastal areas	May affect, but is not likely to adversely affect

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
	Spinner shark	*Carcharhinus brevipinna*	Shallow coastal areas	May affect, but is not likely to adversely affect
	Scalloped hammerhead shark	*Sphyrna lewini*	Beaches and shallow coastal areas	May affect, but is not likely to adversely affect
	Bonnethead shark	*Sphyrna tiburo*	Shallow coastal waters with sandy or mud bottoms	May affect, but is not likely to adversely affect
	Blacktip shark	*Carcharhinus limbatus*	Shallow coastal waters	May affect, but is not likely to adversely affect
	Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Shallow coastal waters with sand, seagrass, and mud	May affect, but is not likely to adversely affect

1.0 INTRODUCTION

The purpose of this document is to present the Essential Fish Habitat (EFH) assessment conducted by ERM on behalf of voestalpine Stahl GmbH (voestalpine or VA) for the proposed construction of a hot-briquetted iron (HBI) production facility in San Patricio County, Texas.

The objective of this EFH assessment is to describe potential adverse effects and mitigation measures to designated EFH for federally-managed fisheries species within the proposed Action Area. This assessment describes the proposed action and analyzes the direct and indirect effects on EFHs for the managed fish species, their habitat and their major food sources. This EFH assessment has been prepared as a supplement to a Greenhouse Gas (GHG) Permit Application submitted to the Environmental Protection Agency (EPA).

1.1 PROPOSED ACTION

VA intends to construct a hot-briquetted iron (HBI) production facility ('the Project') located south of the City of Gregory in San Patricio County, Texas. (Figure 2-1).

1.2 AGENCY REGULATIONS

1.2.1 Magnuson-Stevens Fishery Conservation and Management Act

The Magnuson-Stevens Fishery Conservation and Management Act (MSA) (16 U.S.C. 1801-1884) was originally established in 1976, and was recently amended in 2007. The MSA is the primary law governing marine fisheries management in United States federal waters, and is administered by the National Marine Fisheries Service (NMFS, a.k.a. the NOAA Fisheries Service) division of the National Oceanic and Atmospheric Administration (NOAA) within the U.S. Department of Commerce. The purposes of the MSA include:

- Conservation of fishery resources;
- To support the enforcement of international fishery agreements;
- To promote domestic commercial and recreational fishing under sound conservation and management principles;
- To provide for the preparation and implementation of fishery management plans which will achieve and maintain optimum yield from each fishery;
- To establish Regional Fishery Management Councils to prepare, monitor, and revise fishery management plans under circumstances that enable participation by the States, fishing industry, consumer and environmental organizations, and other interested parties, and which take into account the social and economic needs of the States;
- To encourage development of underutilized fisheries; and

- To promote the protection of “essential fish habitat”.

1.2.1 *Essential Fish Habitat Defined*

The 1996 amendments to the MSA set forth a mandate for the National Marine Fisheries Service (NMFS) and regional fishery management councils (FMC) to identify and protect important marine and anadromous fish habitat. The MSA defines EFH as those “waters and substrate necessary to fish for spawning, feeding, breeding, or growth to maturity”. For the purpose of interpreting the definition of EFH, “waters” include aquatic areas and their associated physical, chemical, and biological properties; “substrate” includes sediment, hard bottom, structures underlying the waters, and associated biological communities; “necessary” means habitat required to support a sustainable fishery and a healthy ecosystem; and “spawning, breeding, feeding, or growth to maturity” covers the full life cycle of a species.

The Gulf of Mexico Fisheries Management Council (GMFMC) has designated EFH for all federally managed species in fishery management plans (FMP). The GMFMC has developed seven FMPs, described as the following waters and substrate areas in the Gulf of Mexico:

Red Drum FMP: all estuaries in the Gulf of Mexico; 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 FMP: all estuaries in the Gulf of Mexico; 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.

Coastal Migratory Pelagics FMP: all estuaries in the Gulf of Mexico; 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.

Shrimp FMP: all estuaries in the Gulf of Mexico; 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.

Stone Crab FMP: all estuaries in the Gulf of Mexico; from the US/Mexico border to Sanibel, Florida, from estuarine waters out to depths of 10 fathoms; and from Sanibel, Florida, to the boundary between the areas covered by the GMFMC and the SAFMC from estuarine waters out to depths of 15 fathoms.

Spiny Lobster FMP: from Tarpon Springs, 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 out to depths of 15 fathoms.

Coral FMP: the total distribution of coral species and life stages throughout the Gulf of Mexico including: coral reefs in the North and South Tortugas Ecological Reserves, East and West Flower Garden Banks, McGrail Bank, and the southern portion of Pulley Ridge; hard bottom areas scattered along 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.

2.0 PROJECT DESCRIPTION

The Project consists of the development, construction and operation of a production facility that will utilize a natural gas-based process to produce HBI, a superior form of direct-reduced iron (DRI), from iron ore and iron oxide pellets. VA plans to ship the HBI overseas to be utilized by their steel division in Linz, Austria.

2.1 PROJECT SCHEDULE

The first construction phase of the Project is scheduled to start in or around April 2014. First production is expected for the last quarter of 2015, with consideration of a second phase being initiated subsequently depending on market conditions. VA plans to acquire enough land for this initial phase of construction, as well as for a potential future expansion.

2.2 PROJECT LOCATION

The proposed facility is to be located on an approximately 478-acre parcel of land that is a portion of 1,114 acres of land currently owned by the Port of Corpus Christi Authority (POCCA). The Project site area is located south of the City of Gregory, TX, east of the City of Portland, TX, and west of the City of Ingleside, TX. Texas State Highway (SH) 361 traverses northwest to southeast east of the site, SH 35 traverses west to east just north of the site, and U.S. Highway 181 traverses northeast to southwest west of the site. The immediate surrounding area is a mixture of industrial and residential development (Figure 2-1).

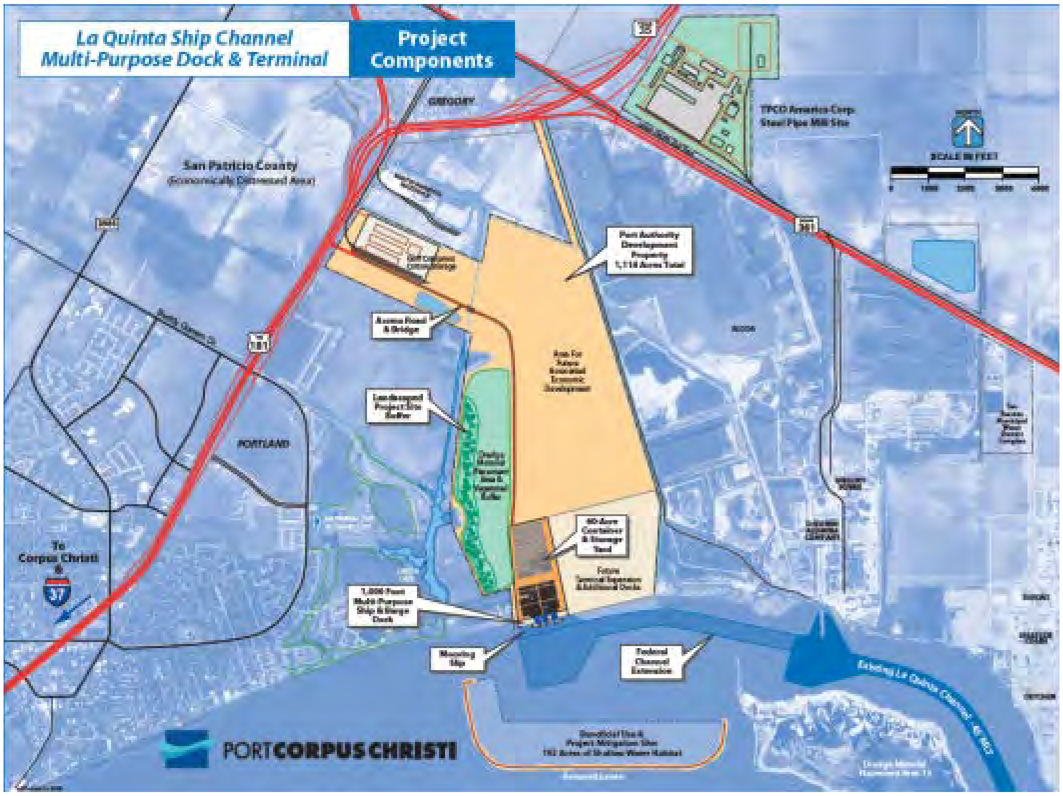
The POCCA property is bounded on the east by a drainage easement known as La Quinta Ditch, which parallels La Quinta Road, and on the south by Corpus Christi Bay. The 478-acre Project site consists of approximately 473-acres interior to the POCCA boundary, and 5 acres associated with the dock along the southern boundary of the POCCA property. The northern boundary of the Project site is located parallel to and approximately 140 feet south of the northern POCCA boundary. The eastern boundary of the Project site is located parallel to and approximately 250 feet west of the eastern POCCA boundary along La Quinta Ditch. The majority of the southern boundary of the Project is located approximately 2,140 feet north of the proposed POCCA bulkhead; however, a portion of the Project site extends south to an approximately 1,000-ft wide dock along the southern POCCA boundary at the north shore of Corpus Christi Bay.

FIGURE 2-1: Aerial Map

2.3 *SITE DESCRIPTION*

The selected site is a greenfield location owned by the POCCA that is part of a long-term federally funded development of the proposed La Quinta Trade Gateway Terminal (terminal). The terminal is currently being considered on the southern portion of the Project site, and will require extension of the existing 45 foot deep La Quinta Ship Channel, construction of a 1,000 foot long ship dock with cranes, a 60 acre container storage yard, an access road and bridge, and over 400 acres for other facilities, including the proposed VA Project (Figure 2-2). Depending on commercial agreements, POCCA could build and own the ship and barge dock that VA would lease, or VA could build and own their own ship and barge dock. Extension of the La Quinta Ship Channel, a spur of the Corpus Christi Ship Channel, to the Project site is currently underway and should be completed in 2013. Additional funds for the terminal development will be needed before POCCA's plans for the terminal can advance beyond preliminary engineering. VA will utilize the POCCA planning documents and permits where possible and plans to locate their production facility within the area designated as "Future Associated Economic Development" in Figure 2-2. VA currently plans to lease the 478-acre Project site from POCCA.

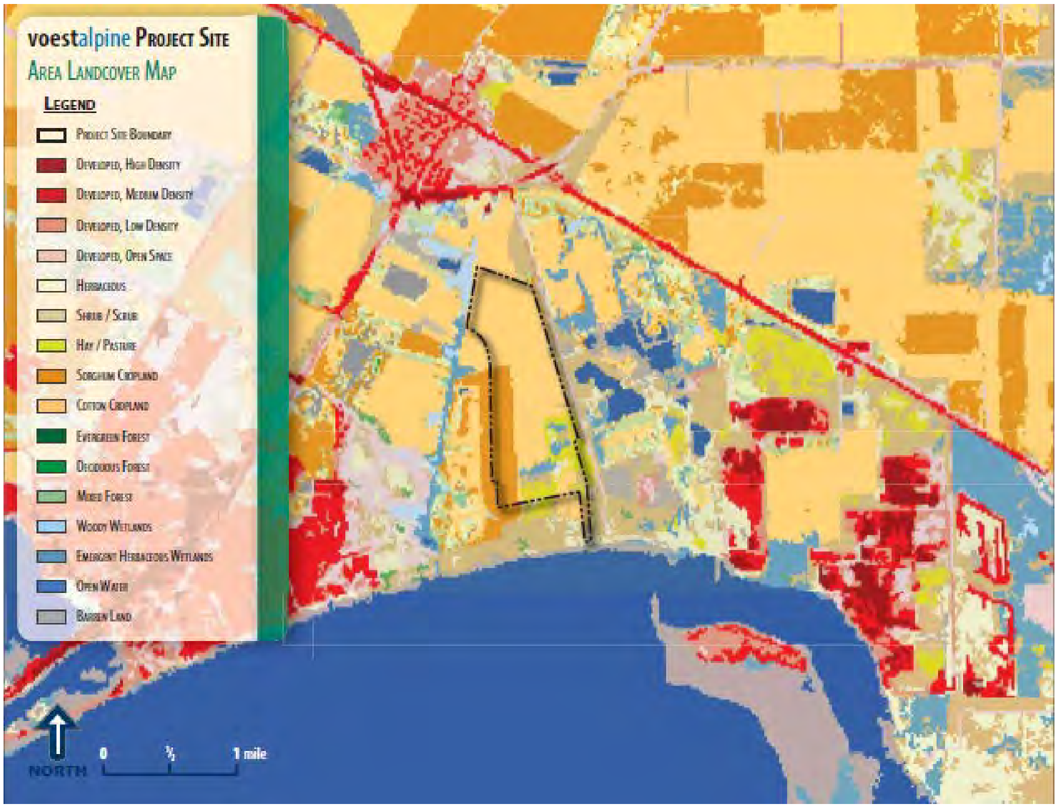
FIGURE 2-2: POCCA Planned Development



Adjacent property north of the POCCA site consists of a lightly developed commercial and industrial area and SH 35. Immediately north of the highway are residences and commercial buildings associated with the City of Gregory. Directly east of the site are disturbed areas and disposal ponds associated with the Sherwin Alumina Company. Corpus Christi Bay is located immediately south of the site. Immediately west of the site is a dredged material placement area. West of the dredge material placement area is a San Patricio County Drainage District (SPCDD) Ditch and Green Lake, which are just east of the Northshore Golf and Country Club and residences associated with the City of Portland. There are several pipelines that traverse west to east across the site, and a communications tower is located in the southeastern portion of the site.

The land cover of the site is comprised primarily of cultivated cropland (Figure 2-3). According to the latest land cover data from the U.S. Department of Agriculture National Agriculture Statistics Service (USDA NASS) the site contains areas of cotton, sorghum, shrubland, deciduous forest, herbaceous grassland, and herbaceous and woody wetlands. According to the USDA-National Resource Conservation Service (NRCS) Web Soil Survey, soils on-site include clay, clay loam, sandy clay loam, and fine sandy loam soils. Soil boring logs taken by Dames and Moore in 1996 indicate that surficial soils are generally gray silty clay between 6 and 10 feet in depth, with underlying layers of brown sandy clay.

FIGURE 2-3: Landcover Map



2.4 SITE HISTORY

Historic environmental documents provided by POCCA, USGS topographic quadrangle maps dating from 1918, and aerial photographs from 1950 to the present were reviewed to determine the historical use of the Project site. Desktop analysis of these studies and photographs indicates that the Project site has exhibited a variety of land uses including oil and gas exploration, agricultural farm land and support structures, tenant residence, and native ranch land. In the late 1970s Tenneco Energy acquired the Project site for potential future development, and leased it to a tenant farmer. The POCCA purchased the property from Tenneco Energy in late 1996.

The Army Corps of Engineers issued an approved jurisdictional determination and Department of the Army Permit SWG-2001-23269 to the POCCA on August 27, 2004 to construct a container terminal, pursuant to Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act. The original permit authorizes the dredging of 1,250,000 cubic yards of material from 29.5 acres of the bay bottom (27.1 acres of shallow unvegetated bay bottom and 2.4 acres of low density seagrass) to a depth of -39 feet mean low tide (MLT). The permit also authorizes the discharge of fill material into the 4 acres of jurisdictional wetlands along the existing shoreline, for a total authorized fill of 33.5 acres of jurisdictional waters of the U.S. A condition of the permit is that the permittee will plant 19.2 acres of seagrass and 6.6 acres of smooth cordgrass as mitigation within a 200-acre beneficial use site. The beneficial use site will consist of an armored levee and spoil island built as mitigation for the federal deepening and widening project for the existing La Quinta Channel and the federal extension of the La Quinta Channel (USACE, 2004). Permit #23269 was amended on June 17, 2009 to authorize an extension of time to complete the previously authorized work and was renamed Permit SWG-2001-02261. An additional amendment to SWG-2001-02261 was approved on January 3, 2011 to increase the authorized dredging depth to -45 feet MLT with an additional 4 feet of advanced maintenance and 2 feet of allowable over-depth, as well as grant a ten year extension of time to complete the project and conduct maintenance dredging.

During consultations regarding the existing permit, the POCCA and USACE coordinated with the NMFS to minimize impacts to EFH and provide a mitigation plan for impacts resulting from the proposed container terminal at the project site. The NMFS submitted an email, dated March 23, 2004, stating that they anticipate that any adverse effects that might occur on marine and anadromous fishery resources would be minimal, and therefore NMFS did not object to issuance of the existing POCCA permit.

Dredging for the federal extension of the La Quinta Channel and turning basin is currently ongoing. The POCCA has not yet initiated dredging or grading work for the proposed La Quinta terminal as of the publication date of this assessment.

2.5 *EMISSIONS CONTROLS*

San Patricio County is currently in attainment status; therefore, this Project will need to meet the requirements of a prevention of significant deterioration (PSD) permit.

Per 30 TAC §116.111(a)(2)(c), new or modified facilities must utilize Best Available Control Technology (BACT), with consideration given to the technical practicability and economic reasonableness of reducing or eliminating the emissions from the facility.

The Project will utilize BACT to control emissions and minimize impacts to the surrounding environment. Emission controls include baghouse and wet scrubbers to minimize dust emissions from process sources, and water and chemical suppression to minimize dust emissions from fugitive sources. Criteria pollutant emissions are limited from the main reactor and reformer through the use of state of the art combustion of natural gas.

Predicted emissions concentrations from the Project are shown in Table 2 below:

TABLE 2-1: Modeled Emissions for all Pollutants Associated with the Project.

Pollutant	*Average Emission Rate (lb/hour)*	*Annual Emission Rate (ton/year)*
TSP	22.07	92.28

PM_{10}	18.56	76.94
$PM_{2.5}$	16.50	67.91
NO_x	140.33	380.2
SO_2	2.96	9.06
CO	368.42	538.80
CO_2	583,740	1,811,454
CO_2e	583,871	1,811,862
VOC	8.3	31.61
Formaldehyde	0.01	0.05
n-Hexane	0.30	1.30
Total HAP	0.31	1.37

2.6 *NOISE*

The natural habitat areas (i.e., sensitive receptors), within the Action Area, include the coastal marsh, tidal flats, open bay and spoil island habitat within the Action Area. The noise levels at these areas associated with construction of the terminal will be within "acceptable" ranges based on those decibels considered safe for humans.

Noise travels differently in water and marine noise requires additional consideration. Underwater noise in Corpus Christi Bay is affected by natural sources (i.e., wind, wave, and surf) and anthropogenic sources such as vessel traffic and construction. The loudest underwater noise at the Project site would likely be associated with pile-driving activities occurring during construction of the ship dock. These noises are expected to be comparable to those of the pile-driving activities associated with the POCCA terminal, estimated at 100 dB at 100 feet. A common formula for calculating noise levels in water is to add 62 dB to the noise level referenced in air, thus underwater noise from pile driving activities is estimated at 162 dB at 100 feet (NOAA, 2012). Operational noises occurring underwater would be associated with ship berthing, loading, and unloading activities at the dock, as well as the potential operation of water intake and discharge pumps. These noises are expected to fall within the range of current noise-generating activities that occur in Corpus Christi Bay.

Noise from pile-driving activities has been shown to affect fish with swim bladders, such as those in the family Sciaenidae. At sound levels over 200 dB, fish have been shown to exhibit effects ranging from minor hemorrhaging, to internal injuries, to death (BOEM, 2012). Fishes from the Scianidae family that are common to Corpus Christi Bay and may occur in the vicinity of the pile-driving activities for the project include, but are not limited to: red drum (*Sciaenops ocellatus*), black drum (*Pogonias cromis*), Atlantic croaker (*Micropogonias undulatus*), and speckled trout (*Cynoscion nebulosus*). Any injury to these and other fish species from noise associated with construction of the Project would likely be limited to the initial strike of the pile-driver, as the noise from this strike would likely elicit temporary avoidance from the area during subsequent strikes. Additionally, assuming noise from pile-driving is 162 dB at 100 feet, fish would have to be within approximately 1.2 feet of the strike point to experience noise levels exceeding 200 dB.

There is a potential for noise to adversely affect any red drum occurring within 1.2 feet of the pile driving activities associated with construction of the Project. It is likely that red drum would avoid the area in the vicinity of the pile-driving activities during construction activity, thus minimizing the possibility of adverse impacts. The noise generated during construction will be temporary and localized to a relatively small area of the bay. Operational noise levels will be below the threshold of adverse impacts, and similar to noises currently existing within the bay. Based upon available data, noise associated with construction and operation of the Project is not expected to have any appreciable impacts to EFH or the red drum population.

2.7 DUST

Ocean ecosystems rely on dust deposition to introduce minerals, particularly iron, into an environment where naturally occurring sources are limited. However, high levels of dust deposition can negatively impact coastal ecosystems. Increased turbidity diffuses sunlight and limits growth of submerged aquatic vegetation, which in turns impacts the animals that dwell or forage there. It can also impede absorption of dissolved oxygen in fish. High levels of dust can also cause nitrogen fixation, increase CO_2 uptake, and lead to huge shifts in phytoplankton productivity, namely a rapid increase in diatom abundance. This hyper productivity of diatoms skews the ratio of surface water nutrients, and can severely impact sensitive species (Bopp *et al.* 2003, Griffin and Kellogg 2004, Moore *et al.* 2006). Large increases of nutrients such as phosphorous and nitrogen may lead to algal blooms, which monopolize sunlight and nutrients, and eventually kill large numbers of fish and invertebrates. Airborne dust particles may also bond with toxic substances or carry microorganisms and transport them into the marine environment, potentially causing contamination or introducing pathogens (Griffin and Kellogg 2004).

VA will use dust control measures during construction of the Project to minimize generation of fugitive dust. These measures will be outlined in accordance with a construction stormwater permit that will be obtained prior to construction of the Project. Any dust generated from construction activities will be temporary, minimized using best management practices (BMPs) as required in the construction stormwater permit, and is expected to be negligible.

2.8 WATER AND WASTEWATER

VA is currently evaluating water sourcing and wastewater options for the proposed Project. The proposed Project will require machinery cooling water and process water. The current water sourcing concepts include purchase of water from the San Patricio County Municipal Water District (SPMWD) or a seawater intake in Corpus Christi Bay. The current wastewater discharge concept is an approximately 300 meter discharge pipeline extending into Corpus Christi Bay.

2.8.1 *Water Sourcing and Water Rights*

The procurement of water for machinery cooling and process water needs has the potential to affect resources in the Action Area. In the event that water is purchased from SPMWD, no impacts from water sourcing or additional permitting are anticipated. However, in the event that a seawater intake is necessary for the project, water rights permitting and 316(b) permitting may be required, as impacts to aquatic organisms would occur. Concepts for potential water sourcing using a seawater intake include:

1. A seawater cooling tower loop with process heat exchangers and a reverse osmosis (RO) water treatment system for process usage, or
2. A desalination system using a large RO treatment unit with separate "contaminated" and "clean" cooling and process water systems.

ERM understands that if water is not purchased from SPMWD, VA intends to utilize the surface waters of Corpus Christi Bay to obtain water necessary to support industrial processes at the proposed La Quinta site. Surface waters are owned by the state and subject to state permitting requirements administered by the Texas Commission on Environmental Quality (TCEQ), Texas Water Development Board (TWDB) and local water/river authorities.

The proposed Project is located in the Nueces River basin in San Patricio County. The freshwater rights in this area are 95% owned by the City of Corpus Christi and are contained in the Lakes of Corpus Christi, Choke Canyon and Lake Texana. The Mary Rhodes Pipeline, 54 inches, runs from Lake Texana to the San Patricio Municipal Water District and to the City of Corpus Christi. Water from Texana is blended with the other lake water, and pumped to cities and industry by the SPMWD.

Impacts related to the diversion of surface water from Corpus Christi Bay would be minimal compared to diversion of freshwater from the Nueces River Basin that would otherwise flow to Corpus Christi Bay. Recently published status reports on the Corpus Christi Bay complex indicate that freshwater inflow is a high priority concern, as these inflows have been heavily reduced due to anthropogenic use and modification (Johns, 2004). Estuarine species such as crabs, oysters, and shrimp are dependent on the pulses of freshwater from streams that feed Corpus Christi Bay, and could be adversely impacted by any reduction in freshwater inflow. In the event that the Project utilizes the saline bay waters for industrial cooling and process water, the potential impacts from freshwater diversion would be avoided.

However, a seawater intake has the potential to impact aquatic fauna that occur within the zone of hydraulic influence around the intake structure. Impacts are classified as impingement and entrainment. Impingement refers to fish and other organisms becoming trapped against intake screens when water is drawn into the cooling water intake structure (CWIS), often resulting in injury or mortality. Entrainment occurs when small organisms such as fish eggs and larvae are drawn through the intake screens and into the cooling water system, where they are exposed to high pressure, chemicals, and temperatures that often result in mortality. To minimize impacts to aquatic organisms the intake would be designed using the best technology available and permitted pursuant to the rules described in Section 316(b) of the Clean Water Act. The primary components of the rule are as follows:

1. The (cooling) water intake structure (CWIS) design and operation will fall under the authority of section 316(b) of the Clean Water Act (40 CFR 122.21(r)). New facilities are subject to the Phase I rules of this regulation. The rule applicability includes those facilities that have a design intake flow of greater than 2 MGD (315.7 m^3/h) and that use at least 25% of the water withdrawn for exclusively for cooling purposes.
2. The Phase I rule provides (2) tracks for the applicant to demonstrate compliance with the 316(b) rules. VA will likely follow the Track I CWIS Design Requirements that include:
    a. Through-screen intake velocity must be less than or equal to 0.5 feet per second; (40 CFR 125.84(c)(1))
    b. Location- and capacity-based limits on proportional intake flow must be met (for estuaries or tidal rivers, intake flow must be less than or equal to 1 percent of the tidal excursion volume; for oceans, there are no proportional flow requirements); (40 CFR 125.84(c)(2)) and
    c. Design and construction technologies for minimizing impingement mortality must be selected if certain conditions exist where the cooling water intake structure is located 125.84(c)(3); and design and construction technologies for minimizing entrainment must be selected and implemented. (40 CFR 125.84(c)(4)
3. The specific Track I requirements consist of the following items to be provided with the permit application:
    a. Characterization of the source water physical data.
    b. Characterization of the cooling water intake structure (CWIS) design.
    c. Characterization of the source water biology.
    d. Characterization of the proposed CWIS operation.

In the event that a seawater intake is selected, VA will conduct studies to characterize the physical and biological baseline conditions of Corpus Christi Bay, and will design the CWIS to minimize impingement and entrainment using the best technology available. Any impacts to aquatic organisms will be within the limits outlined by the 316(b) rule and permitted by a National Pollutant Discharge Elimination System (NPDES) individual permit issued by the TCEQ under the Texas Pollutant Discharge Elimination System (TPDES).

2.8.2 *Wastewater Discharge*

In addition to water intake, the discharge of wastewater and stormwater from the Project has the potential to impact resources within the Action Area. The wastewater produced from operation of the Project will be ultimately discharged to Corpus Christi Bay. Current wastewater discharge concepts include either an outfall to La Quinta Ditch located east of the Project and approximately ½-mile north of its confluence with the bay, or a discharge pipe leading south of the Project to an outfall directly into Corpus Christi Bay.

The effluent discharge will consist of some combination of cooling tower blowdown, water treatment (RO) blowdowns / reject, and treated process wastewater. This wastewater will likely contain a variety of constituents of concern and characteristics that can adversely affect water quality. Based on estimated flow volumes, the combined process wastewater and RO reject will likely have a salinity that is between 1.3 to 2.6 times higher than that of Corpus Christi Bay. Additionally, the discharge temperature will likely be greater than that of Corpus Christi Bay. Constituents of concern and other measurable parameters that may be present and monitored in the wastewater stream include:

- Total suspended solids
- Ammonia-N
- Cyanide
- Phenols
- Chlorides
- Magnesium
- Sulfates
- Boron
- Potassium
- Sodium
- Strontium
- Copper
- Lead
- Silver
- Zinc
- Nickel
- Chromium
- Mercury
- Flouride
- Nitrate
- Molybdenum
- Hydrazine
- Phosphorous
- Adsorbable Organohalogens

The constituents of the wastewater discharge have the potential to contribute to eutrophication (nutrient loading) of Corpus Christi Bay. Nutrient loading of estuaries has been linked to phytoplankton blooms, which subsequently decay, often resulting in hypoxic or toxic conditions that are harmful to aquatic organisms. However, nutrient concentrations of Corpus Christi Bay are low due to no direct river inflow source, negligible agriculture, and relatively little anthropogenic influence. Additionally, the northern portion of the bay has relatively high levels of dissolved oxygen (Applebaum et al, 2005). Impacts to aquatic resources resulting from the constituents of the wastewater stream are not anticipated due to the treatment of the wastewater, the large mixing area of the bay, and the stable water quality in the area of the discharge.

The wastewater discharge will likely have 1.3 to 2.6 times the salinity of Corpus Christi Bay. This hypersaline discharge has the potential to affect aquatic resources within the discharge area. The average annual salinity of Corpus Christi Bay is approximately 32 practical salinity units (psu), but ranges between approximately 25 and 38 psu. Practical salinity units are a measure of conductivity at a constant pressure and temperature that is nearly equivalent to the more commonly used parts per thousand (ppt). If the hypersaline discharge is in sufficient quantity to alter the salinity of the bay, it has the potential to contribute to salinity stratification, which has been shown to lead to hypoxic zones in the southeastern portion of the bay (Applebaum et al, 2005). However, the levels of dissolved oxygen are relatively high in the northern portion of the bay where the discharge would occur, and ship traffic associated with the La Quinta Channel would likely promote mixing of the water column.

The wastewater discharged from the Project will likely be heated above the ambient temperature of Corpus Christi Bay. Thermal discharges are permitted by Section 316(a) of the Clean Water Act, provided that they are protective of the aquatic resources of the waterbody. If the discharge temperature is greater than the 95°F water quality standard set by TCEQ for the bay, a 316(a) study and discharge plume modeling will be performed to assess the potential for any thermal impacts and determine if the proposed effluent is protective of the fishery and aquatic resources of the bay.

The water discharge will be permitted via an individual NPDES (TPDES) permit administered by TCEQ. The discharge of the treated process wastewater will meet federal categorical discharge requirements (40 CFR 420 – direct-reduced iron) for new sources outlined in the New Source Performance Standards (NSPS), which are currently 0.00465 lb TSS / 1000 lb product. The discharge will also comply with the current NPDES (TPDES) discharge limits for specific pollutants. These measures should minimize any potential impacts to water quality and aquatic resources resulting from wastewater discharges associated with the proposed Project.

The development of the Project has the potential to increase stormwater flow into La Quinta Ditch, and ultimately Corpus Christi Bay. This increased freshwater influx to the bay is not expected to have any adverse impacts to EFH. In fact, the additional freshwater may result in benefits to EFH occurring in the bay and/or buffer potential impacts related to the proposed hypersaline wastewater discharge. In addition, the hydrodynamics within La Quinta Ditch are being evaluated and surface water modeling studies are being performed. The results of this modeling will soon be available. An increased tidal exchange within the La Quinta Ditch has been recently reported by nearby industries, which would further support buffering of water quality impacts. ERM is securing data to support this information.

3.0 IDENTIFICATION OF THE ACTION AREA

3.1 ACTION AREA DEFINED

The Action Area is defined in 50 CFR 402.02 as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action". For the purposes of this document, the Action Area was determined and delineated by identifying the maximum area that could potentially be impacted by construction and operation of the Project.

Potential impacts from the Project include physical disturbances associated with construction, noise, light, dust, erosion, sedimentation, air emissions, surface water intake, and wastewater discharges to surface water. Of the potential impacts identified, air emissions were determined to impact the largest area on and surrounding the Project site. Accordingly, the boundaries of the Action Area were determined based upon air emission dispersion modeling results.

Air dispersion modeling indicated that an Action Area consisting of the Project site and a buffer extending 1.5 miles from the Project site boundary would encompass any potential impacts to threatened and endangered species and designated critical habitat due to the construction and operation of the Project.

FIGURE 3-1: Action Area Map

3.2 ACTION AREA DELINEATION METHODOLOGY AND RESULTS

The boundary of the Action Area was delineated by applying a conservative buffer to extend beyond the area delineated using EPA "significant impact levels" (SILs). The significant impact levels are determined by performing a detailed air dispersion modeling analysis using the US EPA and TCEQ guidelines appropriate to the source and emissions. A detailed modeling protocol is included with the TCEQ Prevention of Significant Deterioration Pre-construction Air Permit Application.

ERM used the most up-to-date air models provided by the US EPA and most recent guidance provided by the US EPA and the TCEQ to perform the modeling analysis. The analysis takes into account local terrain, actual meteorological data (provided by TCEQ), project plant design including stack and building parameters, and worst-case maximum emission rates from the individual sources proposed by this application.

3.2.1 Significant Impact Level Dispersion Modeling

Using the state of the art air dispersion modeling techniques, the maximum predicted concentration due to the proposed project for each pollutant and averaging period are included below in comparison to the Significant Impact Level (SIL).

TABLE 3-1: Summary of Criteria Pollutant Air Dispersion Modeling

Pollutant	*Standard*	*Averaging Period*	*Max Off-site Concentration ($\mu g/m^3$)*	*SIL ($\mu g/m^3$)*	*Less than SIL?*
NO_2	NAAQS	1-hour	6.5	7.5	Yes
		Annual	0.5	1	Yes
CO	NAAQS	1-hour	207	2000	Yes
		8-hour	99	500	Yes
PM_{10}	NAAQS	24-hour	2.9	5	Yes
		Annual	0.5	1	Yes
$PM_{2.5}$	NAAQS	24-hour	1.2	1.2	Yes
		Annual	0.26	0.3	Yes
SO2	NAAQS	1-hour	0.3	7.8	Yes
		3-hour	0.27	25	Yes
		24-hour	0.12	5	Yes
		Annual	0.03	1	Yes

The SIL is a level set by the EPA, below which, modeled source impacts would be considered insignificant. If a maximum concentration value is less than the SIL, the modeled source impacts are considered insignificant and are not considered to cause or contribute to a violation of a NAAQS or PSD Increment for that pollutant and averaging period. All maximum concentration values are less than the respective SIL. These pollutant impacts are considered insignificant based on stringent limits set to protect the most sensitive human populations.

Consequently, these impacts are not expected to impact federally-protected species.

The dispersion model predicts concentrations at specific downwind receptor locations for pollutant averaging periods. Since all pollutants and averaging periods were below the respective SIL at all locations outside of the subject site, the action area was based on a conservative distance of 1.5 miles out from the proposed property boundary.

The action area was used to analyze the potential impacts to protected species and/or their habitat by the proposed project. The results of the analysis of potential impacts to protected species are presented in sections below.

3.2.2 Other Contaminants

In addition to the emission rates calculated for PSD criteria pollutants; emission rates for other pollutants were calculated that may be emitted by the project. This analysis was performed in accordance with TCEQ guidelines on the modeling of non-criteria pollutants. The predicted increases in pollutant concentrations were compared to the TCEQ ESLs. ESLs are not ambient air standards, but instead are screening concentrations used by TCEQ to assess the potential of the emissions to impact public health and welfare. ESLs are set by TCEQ at a level well below which adverse health effects on humans have been observed to occur. In addition to human health effects, ESLs are based on the potential for odors to be a nuisance and effects on vegetation. Therefore, if predicted concentrations of a constituent do not exceed an ESL, adverse health or welfare effects are not expected. In the first level of analysis conducted for permitting of new emissions, the predicted increase in concentration of a pollutant is compared to 10% of the ESL. If the predicted concentration increase is less than this level, no further analysis is required, and it is concluded that the emissions of that pollutant from the project pose no significant additional impact on public health and welfare.

A comparison of the modeled concentrations of the project's non-criteria pollutant emissions to TCEQ established ESLs is shown in Table 3-2 below. Based on these results, the maximum predicted concentrations of all modeled pollutants is well below the respective ESL and also well below the first screening level of 10% of the ESL. Accordingly, no adverse welfare impacts are expected to occur within the action area as the result of the additional emissions of these pollutants.

TABLE 3-2: Comparison of Pollutant Air Dispersion Modeling with TCEQ ESL

Pollutant	*CAS*	*Max Concentration ($\mu g/m^3$)*	*ESL ($\mu g/m^3$)*	*% ESL consumption*
Formaldehyde	50-00-0	0.002	15	0.001
n-Hexane	110-54-3	0.04	5300	0.0008
CO	124-38-9	207	asphyxiant	n/a

Pollutant	*CAS*	*Max Concentration ($\mu g/m^3$)*	*ESL ($\mu g/m^3$)*	*% ESL consumption*
Methane	74-82-8	3.8	asphyxiant	n/a
Nitrous oxide	10024-97-2	0.11	4500	0.002

4.0 ESSENTIAL FISH HABITAT IN THE VICINITY OF THE PROJECT

According to GMFMC data, there are seven FMPs in the Gulf of Mexico, five of which are described as including all estuaries in the Gulf of Mexico, and thus applicable to Corpus Christi Bay. These include the Red Drum FMP, Reef Fish FMP, Coastal Migratory Pelagics FMP, Shrimp FMP, and Stone Crab FMP. Additionally, the NMFS maintains an FMP for Atlantic Highly Migratory Species (HMS) that contains shark species that may occur in Corpus Christi Bay.

The GMFMC lists several types of essential fish habitat that may occur in estuarine and nearshore areas. These habitats include submerged aquatic vegetation (SAV), emergent intertidal wetlands (marshes and mangroves), soft bottom (mud, sand, or clay), live hard bottoms, manmade structures, and oyster reefs (GMFMC, 2004). EFH that occurs in offshore areas includes coral reefs, live hard bottoms, continental slope, vents, pelagic *Sargassum* communities, currents, manmade structures, and ecosystem engineers.

4.1 SPECIES OF PARTICULAR CONCERN

The following describes six managed species considered to have the highest potential to occur in EFH within the Action Area. The descriptions include the habitats, life history stages, and relative abundance of each species. Unless otherwise noted, these descriptions are based on information provided by the GMFMC (1998 and 2004).

4.1.1 Brown Shrimp

Brown shrimp eggs are demersal (live and feed on or near the bottom of seas or lakes) and occur offshore. The larvae occur offshore and migrate to estuaries as postlarvae. Postlarvae migrate through passes on flood tides, primarily at night between February and April. While in estuaries, brown shrimp postlarvae and juveniles are associated with shallow, vegetated habitats as well as silty sand and mud bottoms. Postlarvae and juveniles have been found in water with salinity ranging from zero to 70 parts per thousand (ppt). The density of postlarvae and juveniles is highest in marsh edge habitat and submerged vegetation, followed by tidal creeks, inner marsh, shallow open water and oyster reefs. In unvegetated areas muddy substrates are preferred. Juveniles and subadults can be found from estuarine channels out to the continental shelf, but prefer shallow estuarine areas; particularly the plant-water interfaces with soft, muddy substrates. Subadults migrate from estuaries at night on ebb tide on new and full moons. Offshore abundance correlates positively with turbidity and negatively with hypoxia. Adults occur in neritic gulf waters (i.e. marine waters extending from mean low tide to the edge of the continental shelf) and are associated with silt, muddy sand, and sand substrates.

Brown shrimp abundance in Corpus Christi Bay has been increasing overall since 1977. Brown shrimp are seasonally most abundant between April and July (Withers *et al.* 2003).

4.1.2 *Gray Snapper*

The gray snapper inhabits waters to depths of 180 meters. Spawning occurs offshore around reefs and shoals from June to August. Eggs are pelagic and occur in offshore shelf waters and near coral reefs from June through September. Planktonic larvae peak in abundance from June to August in offshore shelf waters and near coral reefs. Postlarvae move into estuarine habitat and are found especially over dense grass beds of *Halodule* and *Syringodium*. Juveniles inhabit marine, estuarine, and riverine habitats, and are often found in estuaries, channels, bayous, ponds, grassbeds, marshes, mangrove swamps, and freshwater creeks. They appear to prefer *Thalassia* grass flats, marl bottoms, seagrass meadows, and mangrove roots. Adults are demersal and mid-water dwellers, occurring in marine, estuarine, and riverine habitats.

Gray snappers are opportunistic carnivores. As juveniles they feed on estuarine-dependent prey such as small shrimp, copepods, amphipods, and larval fish. As adults they feed primarily on fish and secondarily on crustaceans, and as they grow they eat proportionately more fish.

4.1.3 *Pink Shrimp*

Pink shrimp eggs and early larval stages occur in marine waters. Eggs are demersal, and larvae are planktonic until the postlarval stage when they become demersal. Postlarvae and juveniles occur in estuarine waters of salinity ranging from zero to 30 ppt. The transition to estuaries occurs in spring and fall at night, primarily on flood tides, through passes or open shoreline. Juveniles are common in estuarine areas with seagrass where they burrow into the substrate during the day and emerge at night. Postlarvae, juveniles, and subadults may prefer coarse sand, shell, and mud mixtures. Pink shrimp are most dense in or near seagrass and infrequent to completely absent in mangroves and marshes. Adults inhabit offshore marine waters with highest densities from depths of 9 to 44 meters. Preferred substrate for adults is coarse sand and shell with a mixture of less than 1% organic material.

Pink shrimp are the least abundant Penaeid shrimp species in Corpus Christi Bay, with numbers peaking in April and November (Withers *et al.* 2003).

4.1.4 *Red Drum*

Red drum utilize a variety of habitats; ranging from depths of 40 meters offshore to very shallow estuarine waters. They are found over a variety of substrates including sand, mud, and oyster reefs. Red drum can tolerate salinities ranging from freshwater to highly saline. Juvenile red drum have been found in similar abundances from 13 to 40 ppt. Adults appear to exhibit the same tolerance but are more likely to be found in marine waters (Davis, 1990). Spawning occurs in deeper water near the mouth of bays and inlets, and on the Gulf side of barrier islands. The eggs hatch in the Gulf and larvae are transported into the estuary where fish mature before migrating back to the Gulf. Adult red drum use estuaries, but appear to spend more time offshore as they age, and schools of large red drum are common in deep Gulf waters. Estuarine wetlands are particularly important to larval, juvenile, and subadult red drum. Juveniles are most abundant around the perimeters of marshes and prefer quiet, shallow, protected waters with grassy or slightly muddy bottoms. Subadults and adults prefer shallow bay bottoms or oyster reef substrates. The U.S. Fish and Wildlife Service determined that shallow water (1.5-2.5 meters deep) with 50-75 percent submerged vegetation growing on mud bottoms and fringed with emergent vegetation provides optimum red drum habitat.

Estuaries are important habitat for the prey species of red drum. Larval red drum feed on mysids, amphipods, and shrimp whereas juveniles and adults feed on crustaceans and fish. As they grow, red drums eat proportionately more crabs with fish diminishing in importance as food.

4.1.5 Spanish Mackerel

Spanish mackerel are pelagic, and can be found at depths up to 75 meters throughout the Gulf of Mexico. Spanish mackerel juveniles tolerate a wide range of salinities, from 10 to 34 ppt (Godcharles and Murphy, 1986), while adults are found in marine salinities near 35 ppt (Hoese, 1965). Spawning occurs offshore from May to October. Larvae are found offshore over the continental shelf in marine waters over depths from 9 to 84 meters, but most commonly in depths less than 50 meters. Juveniles are found offshore and in beach surf, and sometimes in estuarine habitat. Juveniles appear to prefer marine salinity and generally are not estuarine dependent. Juveniles prefer clean sand substrate, but preferences of the other life stages are unknown. Adults are usually found in neritic waters and along coastal areas. Spanish mackerel, like other coastal pelagic species, feed throughout the water column on a variety of fish.

4.1.6 White Shrimp

White shrimp eggs are demersal and larval stages are planktonic. Both occur in nearshore marine waters. Postlarvae migrate through passes from May to November, with peaks in June and September. Migration is in the upper two meters of the water column at night and at mid depths during the day. Postlarvae become benthic upon reaching estuaries, where they seek shallow water with muddy-sand bottoms high in organic detritus or abundant marsh where they develop into juveniles. Postlarvae and juveniles inhabit mostly mud or peat bottoms with large quantities of decaying organic matter or vegetative cover. Densities are highest in marsh edge and submerged aquatic vegetation, followed by marsh channels and ponds, inner marsh, and oyster reefs. Juveniles prefer lower salinity waters (less than 10 ppt), and therefore can be found in tidal rivers and tributaries. Juveniles move from estuaries to coastal areas as they approach adulthood. Migration occurs in late August and September and appears to be related to size and environmental signals (e.g., a drop in temperature). Adult white shrimp are demersal and inhabit nearshore Gulf waters to depths less than 30 meters with soft mud or silt bottoms.

White shrimp abundance in Corpus Christi Bay has remained relatively stable since 1977. White shrimp are seasonally most abundant between June and November (Withers *et al.* 2003).

4.2 HABITAT AREAS OF PARTICULAR CONCERN

Habitat areas of particular concern (HAPC), are EFH areas that are especially important ecologically or particularly vulnerable to degradation. Each HAPC site is discrete, and meets one or more HAPC criteria:

1. Importance of ecological function provided by the habitat;
2. Extent to which the area or habitat is sensitive to human induced degradation;
3. Whether and to what extent development activities are stressing the habitat; and
4. Rarity of the habitat type.

There are no designated HAPCs within the Action Area (NOAA 2006).

Although there are no designated HAPCs within the Action Area, the SAV, mangrove, and emergent marsh areas within the Action Area are considered important essential fish habitat areas.

5.0 ENVIRONMENTAL BASELINE CONDITIONS AND EFFECTS ANALYSIS

The following sections discuss the methods and results of desktop review and field surveys performed to determine the EFH habitat and species present within the Action Area as well as the potential effects on these receptors from the proposed Project. This information is drawn from the GMFMC amendments to EFH requirements in the Gulf of Mexico FMPs and serves to provide applicable environmental information about the area in which the Project is proposed.

The Action Area encompasses approximately 3.5 square miles of northern Corpus Christi Bay. The Corpus Christi Bay system includes Redfish, Corpus Christi, Nueces, and Oso Bays and contains 106,921 acres of water area at mean low tide. The bay system has an average daily freshwater inflow of 378,000 acre-feet/year.

The estuary is separated from the Gulf by Mustang Island, and water transfer is through Aransas Pass via the Corpus Christi Ship Channel. Major channels include the Aransas Channel and Intracoastal Waterway, dredged to 3.7 meters (12 feet), and the Corpus Christi Ship Channel leading to Aransas Pass, dredged to 13.7 meters (45 feet).

The depth of the bay ranges from 0.5 to 3 meters, and bottom sediments consist of mud, sand and silt. The Corpus Christ Bay System contains shoal grass (*Halodule wrightii*), turtle grass (*Thalassia testudinum*), manatee grass (*Syringodium filiforme*), clover grass (*Halophila sp.*), and widgeon grass (*Ruppia maritima*), with shoal grass being dominant in Corpus Christi Bay.

5.1 METHODS

5.1.1 Desktop and Literature Review

The NOAA-NMFS EFH Mapper and GMFMC databases and fishery management plans were reviewed to determine which, if any, essential fish habitat may have the potential to occur on or near the Project site. Applicable state and federal agency correspondence associated with the existing USACE permit for the POCCA terminal was also reviewed. No occurrences of threatened or endangered species at the Project site or objections to construction were mentioned. Review of Chenier LNG permitting documents was undertaken to determine and assess cumulative impacts to the marine environment.

5.1.2 Habitat Assessment

A habitat assessment was conducted through a desktop review of existing habitat conditions within Corpus Christi Bay, a visual assessment of the Action Area via satellite imagery, limited field reconnaissance, and a review of existing permits and resource reports regarding the area.

5.2 *RESULTS*

The following sections provide the results of the background information, field observations, and analysis performed to evaluate the potential for the proposed action to affect the EFH occurring within the Action Area.

5.2.1 *Background Research*

In addition to the NOAA-NMFS and GMFMC data, a literature review was conducted to determine potential habitats within the Action Area and potential effects from construction and operation of the proposed project. USACE Permit #23269 for the POCCA La Quinta container terminal project was also reviewed, as it includes information on the consultations with other federal and state agencies regarding the Project site. The USFWS submitted a letter on January 20, 2004 stating that the USFWS has no objection to the authorization of construction of the terminal components, provided their suggested mitigation plans were addressed. The NMFS submitted an email on March 23, 2004 stating that the NMFS did not object to issuance of the permit, as any adverse effects on marine and anadromous fishery resources would be minimal. The TPWD submitted a letter dated January 16, 2004 stating that their staff had participated in several interagency meetings regarding the terminal, and that agency recommendations incorporated into the terminal plans had minimized impacts to a large degree. The letter stated that TPWD had no objection to the proposed terminal, but also recommended additional mitigation measures. The POCCA agreed to the additional mitigation measures, the permit was approved on August 27, 2004, and was extended and amended in 2011. The TCEQ submitted a letter dated August 23, 2004 stating their reasonable assurance that the project will not violate any water quality standards.

5.2.2 *Habitat at the Project Site and in the Action Area*

Regional description

The Corpus Christi Bay system includes Redfish, Corpus Christi, Nueces, and Oso Bays and contains 106,921 acres of water area. The bay receives freshwater influx from the Nueces River, and water exchange with the Gulf of Mexico occurs through Aransas Pass via the Corpus Christi channel. Major channels in the Bay system include the Intracoastal Waterway and the Aransas Channel dredged to 12 feet, and the Corpus Christi and La Quinta Channels, dredged to 45 feet. The average depth of Corpus Christi Bay is 3-8 feet, and salinity averages between 26-37 ppt depending on the time and year and climatic conditions. The substrate of the bay consists of mud, sand, and silt, and includes approximately 840 acres of oyster reef, 24,984 acres of emergent vegetation, and 2,359 acres of submerged vegetation. Shoal grass (*Halodule wrightii)* is the most common submerged grass in Corpus Christi Bay (GMFMC 1998).

Action Area

The Action Area encompasses approximately 3.5 square miles of the northern portion of Corpus Christi Bay and shoreline. Marine aquatic habitat within the Action Area includes estuarine emergent marsh (coastal marsh), submerged aquatic vegetation, shallow open water with a silty, mud substrate, the dredged La Quinta Channel, and the shallow aquatic habitat associated with the spoil island across the channel. The bay bottom within the Action Area is primarily comprised of a mud (silt and clay) substrate.

The existing turning basin for the La Quinta Channel is currently located approximately 2/3-mile southeast of the Project boundary. The channel is currently being extended west through the Action Area to facilitate industrial traffic access to the proposed POCCA terminal. Although channel habitats generally exhibit less species richness and diversity for fishes than shallow nearshore habitat, the channel extension may serve as habitat for larger pelagic fish species that would not otherwise utilize the area.

The current dredging activities and proposed POCCA construction include a beneficial use area immediately south of the channel and west of the spoil island. This area will be filled with dredge spoils to create shallow water habitat that will promote the growth of additional submerged and emergent aquatic vegetation. The spoil island located adjacent to the La Quinta Channel appears to exhibit emergent marsh, sand flats, high marsh, and pond habitats from interpretation of aerial imagery. These areas of the spoil island provide potential foraging and nesting habitat for birds. The area of submerged and emergent aquatic vegetation borders the perimeter of the spoil island, and measures approximately 64 acres within the Action Area.

Project Site

The Project site includes four aquatic/intertidal habitat types including tidal flats, coastal marsh, submerged aquatic vegetation, and open bay. Tidal flats are bare non-vegetated areas between high and low water tides. These areas, when periodically inundated, are inhabited by a variety of benthic invertebrates and small fish. Tidal flats also provide excellent foraging habitat for shorebirds and small mammals. During the October 2012 site visit numerous bird species were observed in the tidal flats including, but not limited to, long-billed curlews (*Numenius americanus*), great blue herons (*Ardea Herodias*), brown pelicans (*Pelecanus occidentalis*), and egrets (*Egretta sp.*).

The intertidal portion of the coastal marsh at the site is comprised primarily of smooth cordgrass (*Spartina alterniflora*), black mangrove (*Avicennia germinans*), saltgrass (*Distichlis spicata*), saltwort (*Batis maritima*), and glasswort (*Salicornia sp.*). The intertidal area provides habitat for many estuarine species, but was dominated by the fiddler crab (*Uca rapax*) at the site. The supratidal brackish marsh areas included saltgrass, marsh-hay cordgrass (*Spartina patens*), and sea oxe-eye (*Borrichia frutescens*). The supratidal brackish marsh areas receive freshwater input from approximately ten ephemeral drainages that convey water south from the cultivated cropland habitat.

Submerged aquatic vegetation occurs in shallow areas within the Action Area and provides important nursery and foraging habitat for a diverse assemblage of fish and invertebrate species. SAV was not surveyed during field reconnaissance, but a draft resource report submitted to the Federal Energy Regulatory Commission (FERC) by Corpus Christi Liquefaction, LLC in April 2012 identified at least 9.68 acres of seagrass as occurring within the Action Area (CCL, 2012). Species identified included shoal grass, manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*), clover grass (*Halophila engelmanni*), and widgeon grass (*Ruppia maritima*).

Open bay bottoms are the dominant habitat type in the portion of Corpus Christi Bay within the Action Area. These open bay areas are characterized by a silty, muddy substrate and water depth ranging from 3-8 feet in depth. Open bay habitat supports a variety of organisms including phytoplankton, zooplankton, benthic invertebrates, and fishes.

According to the USACE issued permit #22639, the construction of the Project would cause unavoidable impacts to 2.41 acres of low density seagrass, 27.143 acres of unvegetated bay bottom, 1.964 acres of smooth cordgrass marsh, 0.126 acre of brackish supratidal wetland, 0.543 acre of high marsh, and 1.380 acres of bare supratidal beach.

5.2.3 *Managed Species and EFH Habitat within the Action Area*

Several of the Project site habitats described in Section 5.2.2 are comparable to the EFH areas described by the GMFMC. These habitats have the potential to support several managed species listed in GMFMC FMPs. The NMFS EFH Mapper identified 59 species with potential EFH within the Action Area.

Table 5-1 below summarizes the managed species for each FMP identified by the NMFS EFH Mapper as occurring within the Action Area, including the number of species within each FMP, as well as potential essential fish habitats occupied by each species or family. It should be noted that the mapper does not identify any EFH for stone crabs in the Gulf of Mexico, despite it being listed as a managed species by the GMFMC. Detailed lists of EFH species for each FMP identified by NOAA and GMFMC are provided in Appendix A.

TABLE 5-1: Managed Species and EFH Potentially Occurring in the Action Area

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*Essential Fish Habitat in the Action Area*
Red drum (1)	Sciaenidae	*Sciaenops ocellatus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water
Reef Fish (43)	Snappers (14)	Lutjanidae	SAV; Mangroves; Emergent marsh; Soft bottom; Open water
	Groupers (18)	Serranidae	SAV; Mangroves; Sand/shell; Soft bottom; Open water
	Tilefishes (5)	Malacanthidae	Open water
	Jacks (4)	Carangidae	Open water
	Gray triggerfish	*Balistes capriscus*	Mangroves; Sand/shell substrate
	Hogfish	*Lachnolaimus maximus*	Submerged aquatic vegetation
Coastal Migratory Pelagics (3)	King mackerel	*Scomberomerus cavalla*	Open water
	Spanish mackerel	*Scomberomerus maculatus*	Open water
	Cobia	*Rachycentron canadum*	Open water
Shrimp (4)	Brown shrimp	*Penaeus aztecus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water
	White shrimp	*Penaeus setiferus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water
	Pink shrimp	*Penaeus duorarum*	SAV; Sand/shell; Open water
	Royal red shrimp	*Pleoticus robustus*	Sand/shell; Soft bottoms
HMS (8)	Lemon shark	*Negaprion brevirostris*	Shallow coastal areas; mangroves
	Bull shark	*Carcharhinus leucas*	Shallow areas in estuaries
	Finetooth shark	*Carcharhinus isodon*	Shallow coastal areas
	Spinner shark	*Carcharhinus brevipinna*	Shallow coastal areas
	Scalloped hammerhead shark	*Sphyrna lewini*	Beaches and shallow coastal areas
	Bonnethead shark	*Sphyrna tiburo*	Shallow coastal waters with sandy or mud bottoms
	Blacktip shark	*Carcharhinus limbatus*	Shallow coastal waters
	Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Shallow coastal waters with sand, seagrass, and mud

Source: NMFS, GMFMC, 2012

5.2.4 *Potential Impacts to EFH Listed Species*

The direct impacts to EFH within the Action Area include the loss of low density seagrass, coastal marsh, and tidal flats within the footprint of the dock for construction of the container terminal and VA Project. Additionally, the substrate and water column will be disturbed in the process of converting shallow open bay to deep water as part of the La Quinta Channel extension. The total acreage of lost wetland and submerged land is 35.57 acres.

Construction impacts to EFH may be associated with disturbance of the substrate, increased sediment loads and turbidity, noise from pile-driving activity, loss of benthic food items, the temporary disturbance and displacement of fish, and the temporary degradation of water quality. Potential operational impacts on marine waters include the periodic dredging of the marine basin and subsequent temporary increases in turbidity, impingement and entrainment impacts in the vicinity of a seawater intake, propeller wash and ballast water from ship traffic, deposition from air emissions and the discharge of heated hypersaline wastewater.

Operational discharge of heated, hypersaline water into Corpus Christi Bay has the potential to impact EFH habitat and species, particularly those species with low salinity tolerances. Hypersaline effluent has been shown to increase turbidity, decreasing the light that reaches photosynthetic organisms, settles to the sea bottom causing anoxic conditions, and causes a drop in osmotic pressure which can negatively impact plankton (Gacia *et al*. 2007). Susceptibility to increased salinity varies between species and life forms. Generally, larvae are more sensitive than fully developed adults (Einav and Lokiec 2003).

Discharge of thermal effluent may increase water temperature, and potentially lead to thermal stratification of warmer waters on the surface of the Bay. Changes in water temperature also affect sediment transport capacity and dissolved oxygen concentrations. Effluent discharge to the bay has the potential to cause scouring and changes in local hydrodynamics. The range of the effect of the discharge will vary based on bathymetry and hydrologic conditions. To minimize these impacts, the velocity of the jet discharge of Project effluent should be moderated as it enters the La Quinta Ditch or Corpus Christi Bay. Impacts will vary based upon the chosen discharge location and design specifications, but will comply with permitted effluent and thermal load limits designed to protect water quality and therefore are not expected to have significant impacts.

The discharge of constituents of concern has the potential to impact aquatic resources within the Action Area. The constituents of concern may be toxic to vegetation and wildlife if they are present in high concentrations within the discharge. The discharge could also contribute to nutrient loading of Corpus Christi Bay, which could potentially lead to harmful algal blooms in the bay. However, the discharge will comply with the current NPDES (TPDES) discharge limits for specific pollutants that are designed to protect aquatic resources.

Potential indirect impacts to the EFH habitat or species resulting from the proposed Project include increased stormwater runoff, erosion, human presence, dust generation, emissions deposition, or noise and light during operations. Any alterations to the marine environment from these potential indirect impacts are expected to be negligible and unlikely to adversely affect any EFH species.

5.2.5 *Potential for Occurrence and Recommended Determination of Effect for Species of Concern*

5.2.5.1 Brown Shrimp

According to the NMFS EFH mapper, all life stages of brown shrimp may occur within the Action Area (NMFS 2012). Suitable habitat for brown shrimp within the Action Area includes shallow open water, silty sand and mud substrate, and the marsh edge habitat. Juvenile brown shrimp particularly prefer the plant-water interface of coastal marshes with a muddy substrate.

Direct impacts to brown shrimp include the disruption of substrate through dredging and the loss of coastal marsh to the construction of the container dock. This permanent loss of habitat represents a very small percentage of the total available habitat utilized by brown shrimp in Corpus Christi Bay. Brown shrimp can tolerate a variety of temperatures, from 4 to 36 ºC, and salinities, from 0.2-70 ppt (Withers *et al* 2003). Therefore, it is not expected that the localized impacts of thermal and brine effluent will impact brown shrimp.

Because an area of coastal marsh will be lost to the footprint of the Project, and an area of shallow open water will be converted to a marine basin (depth 45 feet), it is expected that the Project *may affect, but is not likely to adversely affect* brown shrimp. Adverse effects are considered unlikely due to the abundance of suitable habitat in Corpus Christi Bay, the physical tolerance of the species, and the creation of the beneficial use site that will mitigate for the loss of habitat.

5.2.5.2 Gray Snapper

According to the NMFS EFH Mapper, all life stages of gray snapper may occur within the Action Area (NMFS 2012). Gray snapper postlarvae may potentially inhabit dense seagrass beds, juveniles may utilize estuarine channels and marshes, and adults may occur in estuarine and marine open waters. Gray snapper are known to occasionally occur in Corpus Christi Bay, but are not considered abundant.

Direct impacts to potential gray snapper EFH include the disruption of substrate through dredging and the loss of coastal marsh and mangrove habitat to the construction of the container dock. This permanent loss of habitat represents a very small percentage of the total available habitat utilized by gray snapper in Corpus Christi Bay. Gray snapper can tolerate a variety of temperatures, from 18.3 to 27.2 ºC (Bortone and Williams, 1986), and salinities, from 0-60 ppt

(Serrano *et al*, 2011). Therefore, it is not expected that the localized impacts of thermal and brine effluent will impact gray snapper.

Because an area of coastal marsh will be lost to the footprint of the Project, and shallow open water will be converted to marine basin (depth 45 feet), it is expected that the Project *may affect, but is not likely to adversely affect* gray snapper. Adverse effects are considered unlikely due to abundance of suitable habitat in Corpus Christi Bay, the physical tolerance of the species, and the creation of the beneficial use site that will mitigate for the loss of habitat.

5.2.5.3 Pink Shrimp

According to the NMFS EFH Mapper, all life stages of pink shrimp may occur within the Action Area (NMFS 2012). This species may burrow in substrate associated with the patchy seagrass within the Action Area.

Direct impacts to pink shrimp include the disruption of substrate due to dredging and the loss of seagrass habitat. This permanent loss of habitat represents a very small percentage of the total available habitat utilized by pink shrimp in Corpus Christi Bay. Pink shrimp can tolerate temperatures ranging from 4 to 38 ^{o}C, and salinities ranging from <1-47 ppt (Withers *et al* 2003); therefore, it is not expected that the localized impacts of thermal and brine effluent will impact pink shrimp.

Due to the potential for seagrass to be lost to the footprint of the Project, it is expected that the Project *may affect, but is not likely to adversely affect* pink shrimp. Adverse effects are considered unlikely due to the abundance of suitable habitat in Corpus Christi Bay, and the creation of the beneficial use site that will mitigate for the loss of habitat.

5.2.5.4 Red Drum

According to the NMFS EFH Mapper, all life stages of red drum may occur within the Action Area (NMFS 2012). EFH for red drum within the Action Area includes shallow water with submerged aquatic vegetation, soft bottom mud substrate, and emergent coastal marsh.

Direct impacts to red drum EFH include the disruption of substrate due to dredging and the loss of SAV and emergent marsh habitat from the footprint of the Project. This permanent loss of habitat represents a very small percentage of the total available habitat utilized by red drum in Corpus Christi Bay. Red drum can tolerate highly saline water (GMFMC 1998), and temperatures ranging from 2.8 to 35.7 ^{o}C (Procarione and King, 1993); therefore, the potential local increase in salinity through brine effluent is not anticipated to impact red drum.

Because a small amount of coastal marsh and submerged aquatic vegetation will be lost to the footprint of the Project, and shallow open water will be converted to marine basin (depth 45 feet), it is expected that the Project *may affect, but is not* *likely to adversely affect* red drum. Adverse effects are considered unlikely due to abundance of suitable habitat in Corpus Christi Bay, the physical tolerance of the species, and the creation of the beneficial use site that will mitigate for the loss of habitat.

5.2.5.5 *Spanish Mackerel*

According to the NMFS EFH Mapper, all life stages of Spanish mackerel may occur within the Action Area (NMFS 2012). Corpus Christi Bay includes EFH for Spanish mackerel in the open water. These mackerel are not estuarine dependent; although they may pass through the Action Area, they are unlikely to utilize it for any extended periods of time.

Direct impacts to Spanish mackerel EFH include temporary siltation of the water column due to construction of the dock and routine dredging. These activities may temporarily displace transiting Spanish mackerel, but no long-term habitat degradation will occur.

Due to the potential for siltation of the water column, a determination of *may affect, but not likely to adversely affect* is recommended for the Spanish mackerel. Adverse effects are considered unlikely due to the limited, temporary occurrence of this species within the Action Area.

5.2.5.6 *White Shrimp*

According to the NMFS EFH Mapper, all life stages of white shrimp may occur within the Action Area (NMFS 2012). EFH for juvenile white shrimp occurs within the Action Area in submerged aquatic vegetation and shallow waters with mud, sand, and silty substrate. Adults inhabit nearshore gulf waters less than 30 meters deep and therefore have the potential to occur in the Action Area.

Direct impacts to the white shrimp include the disruption of the substrate through dredging and the loss of seagrass and substrate to the construction of the container dock. This permanent loss of habitat represents a very small percent of the total available habitat utilized by white shrimp in Corpus Christi Bay. White shrimp can tolerate a variety of temperatures, from 4 to 36°C, and salinities, from 0.1-48 ppt (Withers *et al* 2003). Therefore, it is not expected that the localized impacts of thermal and brine effluent will impact white shrimp.

Due to the area of substrate and submerged vegetation that will be lost to the footprint of the Project, it is expected that the proposed Project *may affect, but is not likely to adversely affect* white shrimp. Adverse effects are considered unlikely due to the abundance of suitable habitat in Corpus Christi Bay, the tolerance of the species, and the creation of the beneficial use site that will mitigate for the loss of habitat.

Determinations of effect for the remainder of the species are presented in Section 6.1.

5.3 *INTERDEPENDENT AND INTERRELATED ACTIONS*

There are other interdependent and interrelated actions associated with the proposed Project, both within the Action Area and in the surrounding vicinity. These additional actions have the potential to result in cumulative impacts to ecological receptors in the vicinity of the proposed Project. The interrelated actions include adjacent projects currently under development, proposed projects that are yet to be constructed, and ancillary infrastructure development, summarized in Table 5-1below. For more detailed project descriptions, please see the Biological Assessment document that accompanies the GHG application for the proposed Project.

TABLE 5-1: Current and Proposed Projects

Project	*Description*	*Estimated Construction Date*	*Location Relative to VA Project*
VA Project	Construct an HBI/DRI plant within the rail loop of the proposed La Quinta terminal	2014	N/A
Port of Corpus Christi - La Quinta Trade Gateway Terminal	Construct a container terminal with a 3800-ft, three-berth docking area with nine cranes, 180 acres container storage yard, rail loop, and over 400 acres for additional site development.	2013	The VA Project is located within the boundaries of the proposed project.
Port of Corpus Christi - Naval Station Ingleside Redevelopment	483 acre former naval base with an additional 433 undeveloped acres adjacent to base for redevelopment	Base closed in April 2010, redevelopment is currently on hold until a developer is found to purchase the site.	Approximately 5 miles southeast of the VA site, south of Ingleside and on the northern shore of Corpus Christi Bay.
USACE La Quinta Channel Extension	Extend the La Quinta Channel 1.5 miles to serve the proposed POCCA La Quinta terminal	Construction began in September 2011, expected to be completed in May 2013	Immediately south of the POCCA La Quinta terminal.
Copano Pipelines/South	4.5-mile long, 16-inch diameter	USACE permit SWG-2011-	Approximately 9 miles west and southwest of

Project	*Description*	*Estimated Construction Date*	*Location Relative to VA Project*
Texas Oil Pipeline	crossing Nueces Bay and Corpus Christi Ship Channel	00563 issued in March 2012 with special conditions. No construction information available.	the VA site traversing north to south across Nueces Bay.
Revolution Energy Harbor Wind Project	6 wind turbines; potential to expand in future	Construction of six turbines completed March 2012; no timetable for future expansion	Located along the north side of the Corpus Christi Inner Harbor along Nueces Bay approximately 10 miles southwest of the VA site
Offshore Wind Power Systems of Texas, LLC Foundation Test Site	"Titan 200" jack-up wind turbine platform test site	USACE issued permit for test site in 2011.	Located offshore approximately 25 miles east of the VA site
TPCO America Corporation Minimill	Seamless steel pipe manufacturing facility	Construction started August 2011 with estimated completion in March 2013	Located approximately 1.5 miles north of the VA site immediately east of the intersection of SH 35 and SH 361 near Gregory
Cheniere CCL Project	Natural gas liquefaction and export plant and import facilities with regasification capabilities	Construction estimated to commence in late 2013	Located immediately east of the VA site on adjacent property across La Quinta Road.
Las Brisas Energy Center	1,320-MW petroleum coke-fired electric generation facility	Currently in contested permitting process; initiation of construction date unknown; Construction to last 4-5 years	Located approximately 13 miles southwest of the VA site on the south side of the Corpus Christi Inner Harbor

Available data on the identified projects indicates that only the La Quinta Trade Gateway, Cheniere CCL Project, and the Las Brisas Energy Center have the potential to be constructed during the same time as the VA Project. The TPCO and Copano Pipeline Projects would likely complete construction prior to initiation of construction of the VA project. Although limited information regarding the expansion of the wind power sites and re-development of Naval Station Ingleside does not indicate development plans at this time, this could change prior to construction of the VA site, and concurrent construction may then be a possibility.

The majority of the impacts of the proposed VA Project and those of other projects in the area would be temporary, occurring primarily during the construction phase. Because the construction time periods and physical impact areas for most of these projects are not expected to overlap, cumulative impacts to environmental resources during construction of the projects would be insignificant. Due to the implementation of specialized construction techniques and carefully developed resource protection and mitigation plans designed to minimize and control environmental impacts from these projects, cumulative construction effects to EFH are anticipated to be negligible. Each project would also be required to secure applicable permits each of which may impose conditions designed to further minimize or avoid impacts.

Cumulative operational impacts from the proposed actions within the vicinity of the Project may include impacts related to water intake and discharge, ship traffic, stormwater runoff, erosion, human presence, dust generation, emissions deposition, or noise and light during operations. A large portion of Corpus Christi Bay and adjacent bay systems outside the Action Area currently experience similar impacts and have continued to support EFH and associated species. Any cumulative effects from these potential operational impacts are expected to be negligible and unlikely to adversely affect any EFH species.

6.0 CONCLUSIONS

A literature review was conducted to determine if the construction and operation of the proposed Project will have any adverse effect on the EFH, or the NMFS-listed managed species in Corpus Christi Bay within the Project site and Action Area.

A total of 35.5 acres of wetland and submerged land will be lost to the footprint of the Project within the Action Area. This includes 2.4 acres of seagrass and 1.96 acres of smooth cordgrass marsh, both of which are habitats important to a number of EFH species. These impacts to EFH will be permanent and mitigated by the construction and revegetation of an approximately 200 acre beneficial use area to include almost 26 acres of submerged aquatic vegetation (seagrass) and cordgrass.

Temporary impacts to EFH are anticipated during construction and intermittent dredging associated with the Project. These effects include the disruption of the substrate, temporary impairment of water quality due to turbidity, and the increase of suspended solids.

Potential permanent operational impacts to EFH associated with project include periodic dredging of the marine basin and subsequent temporary increases in turbidity, impingement and entrainment impacts in the vicinity of a seawater intake, propeller wash and ballast water from ship traffic, deposition from air emissions and the discharge of heated hypersaline wastewater.

6.1 DETERMINATION OF EFFECTS SUMMARY

A species-specific analysis of potential impacts resulted in a determination of *may affect, but is not likely to adversely affect* for each of the 59 EFH species analyzed in this report. A summary of the EFH species and recommended determination of effects is present below in Table 6-1.

TABLE 6-1: *Determination of Effects on EFH from the Proposed Project*

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
Red drum (1)	Sciaenidae	*Sciaenops ocellatus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
Reef Fish (43)	Snappers (14)	Lutjanidae	SAV; Mangroves; Emergent marsh; Soft bottom; Open water	May affect, but is not likely to adversely affect

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
	Groupers (18)	Serranidae	SAV; Mangroves; Sand/shell; Soft bottom; Open water	May affect, but is not likely to adversely affect
	Tilefishes (5)	Malacanthidae	Open water	May affect, but is not likely to adversely affect
	Jacks (4)	Carangidae	Open water	May affect, but is not likely to adversely affect
	Gray triggerfish	*Balistes capriscus*	Mangroves; Sand/shell substrate	May affect, but is not likely to adversely affect
	Hogfish	*Lachnolaimus maximus*	Submerged aquatic vegetation	May affect, but is not likely to adversely affect
Coastal Migratory Pelagics (3)	King mackerel	*Scomberomerus cavalla*	Open water	May affect, but is not likely to adversely affect
	Spanish mackerel	*Scomberomerus maculatus*	Open water	May affect, but is not likely to adversely affect
	Cobia	*Rachycentron canadum*	Open water	May affect, but is not likely to adversely affect
Shrimp (4)	Brown shrimp	*Penaeus aztecus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
	White shrimp	*Penaeus setiferus*	SAV; Soft bottoms; Sand/shell; Emergent marsh; Open water	May affect, but is not likely to adversely affect
	Pink shrimp	*Penaeus duorarum*	SAV; Sand/shell; Open water	May affect, but is not likely to adversely affect
	Royal red shrimp	*Pleoticus robustus*	Sand/shell; Soft bottoms	May affect, but is not likely to adversely affect
HMS	Lemon shark	*Negaprion brevirostris*	Shallow coastal areas; mangroves	.May affect, but is not likely to adversely affect
	Bull shark	*Carcharhinus leucas*	Shallow areas in estuaries	May affect, but is not likely to adversely affect
	Finetooth shark	*Carcharhinus isodon*	Shallow coastal areas	May affect, but is not likely to adversely affect

FMP	*Family or Species Common Name*	*Family or Species Scientific Name*	*EFH Occurring in the Action Area*	*Determination of Effect*
	Spinner shark	*Carcharhinus brevipinna*	Shallow coastal areas	May affect, but is not likely to adversely affect
	Scalloped hammerhead shark	*Sphyrna lewini*	Beaches and shallow coastal areas	May affect, but is not likely to adversely affect
	Bonnethead shark	*Sphyrna tiburo*	Shallow coastal waters with sandy or mud bottoms	May affect, but is not likely to adversely affect
	Blacktip shark	*Carcharhinus limbatus*	Shallow coastal waters	May affect, but is not likely to adversely affect
	Atlantic sharpnose shark	*Rhizoprionodon terraenovae*	Shallow coastal waters with sand, seagrass, and mud	May affect, but is not likely to adversely affect

6.2 CONSERVATION AND MITIGATION MEASURES

The loss of potential EFH (e.g., submerged vegetation, coastal marsh, and tidal flats) associated with the proposed Project will be mitigated in accordance with the POCCA permits issued for the container dock and ship terminal (USACE permit # 23269). Per the permit's mitigation plan, the dredged material from the extension of La Quinta Channel and turning basin will be utilized to create a 200 acre beneficial use area on the seaward side of the channel. This new habitat will be west of the existing spoil island and consist of an armored levee and fill, creating vegetated and unvegetated emergent, fringe, and shallow water habitat. Two mitigation sites are anticipated, one on the northwestern side of the new spoil island and one on the northeastern side. The western mitigation site is to be planted with 19.2 acres of seagrass and 6.6 acres of cordgrass. Post-planting monitoring will be undertaken at intervals of 6 months, 1, 2, and 3 years to determine the success of mitigation. Construction of the mitigation site shall begin within one year of the dredging activities.

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Lists of EFH and Species Managed by NOAA and GMFMC
Appendix A

January 31, 2012
Project No. 0172451

Environmental Resources Management
15810 Park Ten Place, Suite 300
Houston, Texas 77084-5140
(281) 600-1000

EFH Data Notice: Essential Fish Habitat (EFH) is defined by textual descriptions contained in the fishery management plans developed by the regional Fishery Management Councils. In most cases mapping data can not fully represent the complexity of the habitats that make up EFH. This report should be used for general interest queries only and should not be interpreted as a definitive evaluation of EFH at this location. A location-specific evaluation of EFH for any official purposes must be performed by a regional expert. Please refer to the following links for the appropriate regional resources.

NMFS Southeast Regional Office
NMFS Atlantic Highly Migratory Species Management Division

Query Results

Degrees, Minutes, Seconds: Latitude = 27º52'45" N, Longitude = 98º43'33" W
Decimal Degrees: Latitude = 27.88, Longitude = -97.27

The query location intersects with spatial data representing EFH and/or HAPCs for the following species/management units.

EFH

Show	Link	Data Caveats	Species/Management Unit	Lifestage (s) Found at Location	Management Council	FMP
			Lemon Shark	Adult Neonate	Secretarial	HMS
			Bull Shark	Neonate Juvenile	Secretarial	HMS
			Finetooth Shark	Neonate	Secretarial	HMS
			Spinner Shark	Neonate Juvenile	Secretarial	HMS
			Red Drum	ALL	Gulf of Mexico	Red Drum
			Scalloped Hammerhead Shark	Neonate Juvenile	Secretarial	HMS
			Bonnethead Shark	Juvenile Neonate Adult	Secretarial	HMS
			Blacktip Shark	Neonate Juvenile Adult	Secretarial	HMS
			Atlantic Sharpnose	Neonate		

			Shark	Juvenile Adult	Secretarial	HMS
			Shrimp (4 Species) Brown shrimp (*Penaeus aztecus*) White shrimp (*Penaeus setiferus*) Pink shrimp (*Penaeus duorarum*) Royal red shrimp (*Pleoticus robustus*)	ALL	Gulf of Mexico	Shrimp
			Coastal Migratory Pelagics	ALL	Gulf of Mexico	Coastal Migratory Pelagics
			Reef Fish (43 Species) **Balistidae - Triggerfishes** Gray triggerfish (*Balistes capriscus*) **Carangidae - Jacks** Greater amberjack (*Seriola dumerili*) Lesser amberjack (*Seriola fasciata*) Almaco jack (*Seriola rivoliana*) Banded rudderfish (*Seriola zonata*) **Labridae - Wrasses** Hogfish (*Lachnolaimus maximus*) **Lutjanidae - Snappers** Queen snapper (*Etelis oculatus*) Mutton snapper (*Lutjanus analis*) Schoolmaster (*Lutjanus apodus*) Blackfin snapper (*Lutjanus buccanella*) Red snapper (*Lutjanus campechanus*) Cubera snapper (*Lutjanus cyanopterus*) Gray (mangrove) snapper (*Lutjanus*			

			griseus) Dog snapper (*Lutjanus jocu*) Mahogany snapper (*Lutjanus mahogoni*) Lane snapper (*Lutjanus synagris*) Silk snapper (*Lutjanus vivanus*) Yellowtail snapper (*Ocyurus chrysurus*) Wenchman (*Pristipomoides aquilonaris*) Vermilion snapper (*Rhomboplites aurorubens*) **Malacanthidae - Tilefishes** Goldface tilefish (*Caulolatilus chrysops*) Blackline tilefish (*Caulolatilus cyanops*) Anchor tilefish (*Caulolatilus intermedius*) Blueline tilefish (*Caulolatilus microps*) (Golden) Tilefish (*Lopholatilus chamaeleonticeps*) **Serranidae - Groupers** Dwarf sand perch (*Diplectrum bivittatum*) Sand perch (*Diplectrum formosum*) Rock hind (*Epinephelus adscensionis*) Speckled hind (*Epinephelus drummondhayi*) Yellowedge grouper (*Epinephelus flavolimbatus*) Red hind (*Epinephelus	ALL	Gulf of Mexico	Reef Fish

			guttatus) Goliath grouper (*Epinephelus itajara*) Red grouper (*Epinephelus morio*) Misty grouper (*Epinephelus mystacinus*) Warsaw grouper (*Epinephelus nigritus*) Snowy grouper (*Epinephelus niveatus*) Nassau grouper (*Epinephelus striatus*) Marbled grouper (*Epinephelus inermis*) Black grouper (*Mycteroperca bonaci*) Yellowmouth grouper (*Mycteroperca interstitialis*) Gag (*Mycteroperca microlepis*) Scamp (*Mycteroperca phenax*) Yellowfin grouper (*Mycteroperca venenosa*)			

HAPCs

No Habitat Areas of Particular Concern (HAPC) were identified at the report location.

EFH Areas Protected from Fishing

No EFH Areas Protected from Fishing (EFHA) were identified at the report location.

Spatial data does not currently exist for all the managed species in this area. The following is a list of species or management units for which there is no spatial data. ****For links to all EFH text descriptions see the complete data inventory: open data inventory -->**
Gulf of Mexico Dolphin Wahoo EFH, Dolphin

SPECIES LISTED IN THE FISHERY MANAGEMENT PLANS OF THE GULF OF MEXICO FISHERY MANAGEMENT COUNCIL

Common and scientific names of finfishes are from the most recent list of names of fishes published by the American Fisheries Society (Nelson et al. 2004).

Coastal Migratory Pelagics FMP (Gulf and South Atlantic Councils joint plan)

Species in the Management Unit

king mackerel	***Scomberomorus cavalla***
Spanish mackerel	***Scomberomorus maculatus***
cobia	***Rachycentron canadum***

Species in the Fishery but Not in the Management Unit

cero	***Scomberomorus regalis***
little tunny	***Euthynnus alletteratus***
dolphin	***Coryphaena hippurus***
bluefish	***Pomatomus saltatrix*** **(Gulf of Mexico only)**

Red Drum FMP

Species in the Management Unit

red drum	***Sciaenops ocellatus***

Reef Fish FMP

Species in the Management Unit

Snappers - Lutjanidae Family

queen snapper	***Etelis oculatus***
mutton snapper	***Lutjanus analis***
blackfin snapper	***Lutjanus buccanella***
red snapper	***Lutjanus campechanus***
cubera snapper	***Lutjanus cyanopterus***
gray (mangrove) snapper	***Lutjanus griseus***
lane snapper	***Lutjanus synagris***
silk snapper	***Lutjanus vivanus***
yellowtail snapper	***Ocyurus chrysurus***
wenchman	***Pristipomoides aquilonaris***
vermilion snapper	***Rhomboplites aurorubens***

Groupers - Serranidae Family

speckled hind	***Epinephelus drummondhayi***
yellowedge grouper	***Epinephelus flavolimbatus****
goliath grouper	***Epinephelus itajara***
red grouper	***Epinephelus morio***
warsaw grouper	***Epinephelus nigritus****
snowy grouper	***Epinephelus niveatus****
black grouper	***Mycteroperca bonaci***

yellowmouth grouper	***Mycteroperca interstitialis***
gag	***Mycteroperca microlepis***
scamp	***Mycteroperca phenax***
yellowfin grouper	***Mycteroperca venenosa***

* Some recent publications use the genus name *Hyporthodus* rather than *Epinephelus* for yellowedge, warsaw and snowy grouper based on a revision recommended by Craig and Hastings (2007). However, it is the Council's policy to use the names listed by the American Fisheries Society in the reference above.

Tilefishes - Malacanthidae (Branchiostegidae) Family

goldface tilefish	***Caulolatilus chrysops***
blueline tilefish	***Caulolatilus microps***
tilefish	***Lopholatilus chamaeleonticeps***

Jacks - Carangidae Family

greater amberjack	***Seriola dumerili***
lesser amberjack	***Seriola fasciata***
almaco jack	***Seriola rivoliana***
banded rudderfish	***Seriola zonata***

Triggerfishes - Balistidae Family

gray triggerfish	***Balistes capriscus***

Wrasses - Labridae Family

hogfish	***Lachnolaimus maximus***

Common and scientific names of shrimps and lobsters are from the most recent list of names of crustaceans published by the American Fisheries Society (McLaughlin et al. 2005).

Shrimp FMP

Species in the Management Unit

brown shrimp	***Penaeus aztecus***
white shrimp	***Penaeus setiferus***
pink shrimp	***Penaeus duorarum***
royal red shrimp	***Pleoticus robustus***

Spiny Lobster FMP (Gulf and South Atlantic Councils joint plan)

Species in the Management Unit

Caribbean spiny lobster (spiny lobster)	***Panulirus argus***

Common and scientific names of corals are from the most recent list of names of cnidaria and ctenophora published by the American Fisheries Society (Cairns et al. 2002) or from Felder and Camp (2009).

Coral and Coral Reefs FMP

<u>Species in the Management Unit</u>

corals of the class Hydrozoa (stinging and hydrocorals)

corals of the class Anthozoa (stony corals)

Note: The FMP does not list individual species comprising the management unit. The following species are referred to in the FMP as being in the class Hydrozoa and Anthozoa occurring in Gulf of Mexico and/or South Atlantic waters:

Class Hydrozoa

Order Milleporina (fire, stinging corals)

Family Milleporidae

branching fire coral	***Millepora alcicornis***
blade fire coral	***Millepora complanata***
box fire coral	***Millepora squarrosa***

Order Stylasterina (hydrocorals)

	Stylaster duchassaingi
	Stylaster punctata
	Distichopora foliacea
	Pliobothrus symmetricus

Subclass Zoantharia

Order Scleractinia (stony corals)

Family Astrocoeniidae

blushing star coral	***Stephanocoenia michelini***

Family Acroporidae

staghorn coral	***Acropora cervicornis***
elkhorn coral	***Acropora palmata***
fused staghorn	***Acropora prolifera***

Family Agariciidae

lettuce coral	***Agaricia agaricites***
thin leaf lettuce coral	***Agaricia tenifolia***
Lamarck's sheet coral	***Agaricia lamarcki***
fragile saucer coral	***Agaricia fragilis***
saucer coral	***Helioseris cucullata***

Family Faviidae

golfball coral	***Favia fragum***
knob coral	***Favia gravida***
grooved brain coral	***Diploria labyrinthiformis***
knobby brain coral	***Diploria clivosa***
symmetrical brain coral	***Diploria strigosa***

rose coral	***Manicina aerolata aerolata***
	Colpophyllia amaranthus
boulder brain coral	***Colpophyllia natans***
	Colpophyllia breviserialis
tube coral	***Cladocora arbuscula***
thin tube coral	***Cladocora debilis***
great start coral	***Montastrea cavernosa***
boulder star coral	***Montastrea annularis***
mountainous star coral	***Montastrea faveolata***
boulder star coral	***Montastrea franksi***
knobby star coral	***Solenastrea hyades***
smooth star coral	***Solenastrea bournoni***
Family Pocillopridae	
striate finger coral	***Madracis myriaster***
ten-ray star coral	***Madracis decactis***
eight-ray finger coral	***Madracis formosa***
yellow pencil coral	***Madracis mirabilis***
pointed pencil coral	***Madracis asperula***
	Madracis brueggemanni
Family Portidae	
blue crust coral	***Porites branneri***
finger coral	***Porites porites***
mustard hill coral	***Porites astreoides*** (green and brown color morph)
Family Rhizangiidae	
northern star coral	***Astrangia poculata***
	Astrangia danae
dwarf cup coral	***Astrangia solitaria***
hidden cup coral	***Phyllangia americana***
Family Siderastreidae	
lesser starlet coral	***Siderastrea radians***
massive starlet coral	***Siderastrea siderea***
Family Fungiidae	
	Fungiacyathus pusillus
	Fungiacyathus symmetricus
	Fungiacyathus crispus
Family Oculinidae	
zigzag coral	***Madrepora oculata***
Pourtales fan coral	***Madrepora carolina***
compact ivory bush coral	***Oculina arbuscula***
fused ivory tree coral	***Oculina varicosa***
delicate ivory bush coral	***Oculina tenella***
diffuse ivory coral	***Oculina diffusa***
robust ivory tree coral	***Oculina robusta***

Family Meandrinidae

maze coral	***Meandrina meandrites***
pancake star coral	***Dichocoenia stellaris***
ellipitical star coral	***Dichocoenia stokesi***
pillar coral	***Dendrogyra cylindrus***

Family Mussidae

large flower coral	***Mussa angulosa***
Atlantic mushroom coral	***Scolymia lacera***
artichoke coral	***Scolymia cubensis***
lesser cactus coral	***Isophyllia multiflora***
sinuous cactus coral	***Isophyllia sinuosa***
rough star coral	***Isophyllastrea rigida***
ridged cactus coral	***Mycetophyllia lamarkiana***
lowridge cactus coral	***Mycetophyllia danaana***
rough cactus coral	***Mycetophyllia ferox***
knobby cactus coral	***Mycetophyllia aliciae***

Family Anthemiphylliidae

	Anthemiphllia patera patera

Family Caryophyllidae

	Caryophyllia berteriana
	Caryophyllia horologium
	Caryophyllia polygona
	Caryophyllia cornuformis
	Caryophyllia ambrosia caribbeana
	Caryophyllia parvula
	Concentrotheca laevigate
	Layrinthocyathus facetus
	Layrinthocyathus langi
	Cyathoceras squiresi
	Layrinthocyathus facetus
	Layrinthocyathus langi
	Oxysmilia rotundifolia
	Trochocyathus rawsonii
	Tethocyathus cylindraceus
	Tethocyathus variabilis
papillose cup coral	***Paracyathus pulchullas***
	Deltocyathus moseley
	Deltocyathus calcar
	Deltocyathus italicus
	Deltocyathus eccentricus
	Deltocyathus pourtalesi
smooth flower coral	***Eusmilia fastigiata***
	Pourtalosmilia conferta

speckled cup coral	***Rhizosmilia maculata***
	Stephanocyathus diadema
	Stephanocyathus paliferus
	Stephanocyathus laevifundus
	Stephanocyathus coronatus
	Peponcyathus folliculus
	Peponcyathus stimpsonii
	Desmophyllum cristagalli
	Thalamophyllia gombergi
	Lophelia prolifera
	Anomocora fecunda
	Coenosmilia arbuscula
	Dasmosmilia variegata
	Solenosmilia variabilis
	Asterosmila prolifera
	Asterosmila marchadi
two-tone cup coral	***Phacelocyathus flos***
Family Flabellidae	
	Flabellum moseleyi
	Flabellum fragile
	Javania cailleti
	Polymyces fragilis
	Gardineria paradoxa
Family Guyniidae	
	Guynia annulata
	Schizocyathus fissilis
	Stenocyathus vermiformis
	Pourtalocyathus hispidus
Family Dendrophylliidae	
porus cup coral	***Balanophyllia floridana***
	Balanophyllia palifera
	Dendrophyllia cornucopia
	Dendrophyllia gaditana
	Dendrophyllia alternata
	Enallopsammia profunda
	Enallopsammia rostrata
	Thecopsammia socialis
	Bathypsammia tintinnabulum
	Bathypsammia fallosocialis
	Rhizopsammia manuelensis
	Trochopsammia infundibulum
(invasive species) orange cup coral	***Tubastrea coccinea***

Order Antipatharia (black corals)

whip coral	***Cirrhipathes desbonni***
wire coral	***Cirrhipathes leutkeni***
black coral	***Cirrhipathes sp.***
feather black coral	***Antipathes pennacea***
hair net black coral	***Antipathes lenta***
bushy black coral	***Antipathes sp.***

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