Appendix B – Environmental Resources

Matagorda Ship Channel, Port Lavaca, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

July 2019

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List of Acronyms

AAHU Average Annualized Habitat Unit

AQCR Air Quality Control Region

CAMS Continuous Ambient Monitoring Station

CBRA Coastal Barrier Resources Act

CERCLA Comprehensive Environmental Response, Compensation, and Liability Act

CFR Code of Federal Regulations

EFH Essential Fish Habitat

EPA Environmental Protection Agency

ESA Endangered Species Act

FPPA Farmland Protection Policy Act

FR Federal Register

GCD General Conformity Determination

GIWW Gulf Intracoastal Waterway

GLO General Land Office

GMFMC Gulf of Mexico Fisheries Management Council

HSI Habitat Suitability Index

LCRA-SAWS Lower Colorado River Authority – San Antonio Water System

MLT Mean Low Tide

MSC Matagorda Ship Channel

NAAQS National Ambient Air Quality Standards

NCDC National Climatic Data Center

NFWL National Fish and Wildlife Laboratory

NMFS National Marine Fisheries Service

NOAA National Oceanic and Atmospheric Administration

NRCS Natural Resources Conservation Service

NRDA Natural Resource Damage Assessment

NWI National Wetland Inventory

NWR National Wildlife Refuge

PED Pre-Construction, Engineering, and Design

PL Public Law

SAV Submerged Aquatic Vegetation

STSSN Sea Turtle Stranding and Salvage Network

TAC Texas Administrative Code

TCEQ Texas Commission on Environmental Quality

TCOON Texas Coastal Ocean Observation Network

TCWC Texas Colonial Waterbird Census

TDSHS Texas Department of State Health Services

TPWD Texas Parks and Wildlife Department

USACE United States Army Corps of Engineers

USC United States Code

USDA United States Department of Agriculture

USFWS United States Fish and Wildlife Service

USGS United States Geologic Survey

WMA Wildlife Management Area

1. INTRODUCTION

The Matagorda Ship Channel (MSC) extends from the Port of Port Lavaca-Point Comfort Turning Basin in Lavaca Bay through the Matagorda Bay and extends into the Gulf of Mexico via the Matagorda Peninsula. The current length of the ship channel is approximately 26 miles (Figure 1.1). The in-bay channel is authorized to a current depth of -38 feet Mean Low Low Water (MLLW) with a bottom width of 200 feet. The Entrance Channel is maintained at -40 feet MLLW.

The MSC Project would widen the in-bay channel to 300 feet and deepen the channel to -47 feet MLLW. The Entrance Channel would be widened to 600 feet and deepened to -49 feet MLLW.

An Environmental Impact Statement (EIS) is being prepared for the MSC Project due to the significand and adverse impacts to oyster reefs. The sections below detail the existing conditions and effects of the alternatives, including No-Action, on the environment in the MSC Project study area.

2. EXISTING CONDITIONS/AFFECTED ENVIRONMENT

2.1 Climate

The Matagorda Bay region climate is classified as humid subtropical and is primarily affected by the intensity and direction of the winds (NCDC, 2016a). Southeasterly winds dominate from March to November with a typical range of 8 to 12 mph. Throughout the rest of the year the region is dominated by northerly winds ranging from 10 to 11 mph. The average annual wind speed is approximately 10 miles per hour (NCDC, 2016b).

The monthly mean temperatures in Point Comfort range from a low of 54.4° F in January to a high of 84.6° F in August. Sea breezes from the Gulf of Mexico help to ease the effect of the high temperatures as a result of the dominant maritime tropical air mass (NCDC, 2016b). Winters have considerable day-to-day variation between modified continental polar and maritime polar air masses and the tropical air mass providing for more moderate conditions (URS, 2006).

The Matagorda Bay region can expect precipitation throughout the year with no consistent seasonal pattern in rainfall totals apparent. No consistent trend is shown with regards to mean monthly precipitation values. Mean monthly precipitation ranges from a low of 2.3 inches in April to a high 4.8 inches in November. Annual rainfall averages 42.4 inches per year (NCDC, 2016b).

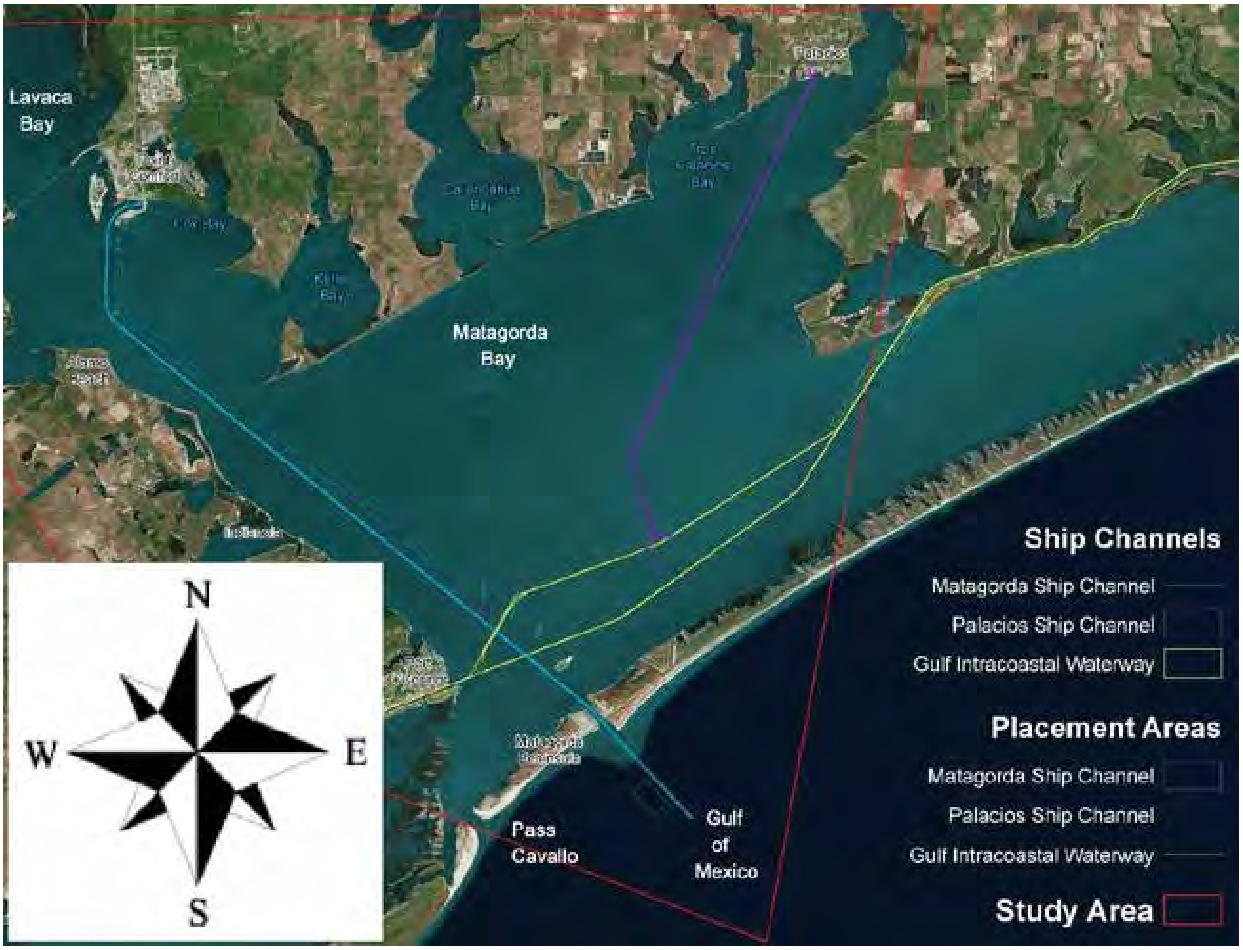
As a humid subtropical climate regime the humidity is typically above 50 percent, with an average annual humidity fluctuating between 66 percent in the afternoon and 90 percent in the morning (NCDC, 2016b). The highest percentages of sunlight occur in the summer months, with an overall average of sunlight present for 59 percent of all possible daylight hours. (NCDC, 2016a).

2.2 Physical Resources

2.2.1 Regional Geological and Geomorphic Setting

The project area is situated near the seaward margin of the West Gulf Coastal Plain Physiographic Province. Several geologic processes have created a series of marine embayments and barrier islands, which are characteristic of the regional geology. These processes include longshore drift, beach swash, wind deflation and deposition, tidal currents and waves, delta outbuilding, and river point bar and flood deposits (Lankford and Rehkemper, 1969).

Figure 1.1. Map of the Matagorda Ship Channel Project Study Area.



The coastal plain along the Gulf is located within a major center of sediment deposition originating from the middle to late Jurassic period known as the Gulf Coast geosyncline. Jurassic to Pleistocene-aged sedimentary deposits thicken to more than 30,000 ft. closer to the Gulf. Due to the isolation of the regional seas and the restrictions of water flow during part of the Mesozoic Era (late Triassic to Jurassic) evaporate sediments, dominated by salt, were deposited (Wermund et al., 1989). The region was then overlain primarily by prograding sands and muds. Salt domes, interspersed throughout the lays have migrated upwards to within a few thousand feet of the land surface.

The Pleistocene-aged Beaumont Formation, estimated to be less than 1,000 ft. thick, underlies the geology of the region. This formation is composed primarily of clay, silt, sand and gravel. Overlying this formation is a layer characterized by Quarternary-aged (Recent and Holocene) Alluvium. These formations consist mainly of stream channel, point bar, natural levee, marsh, and backswamp deposits associated with former and current river channels and bayous. The Alluvium outcrops, which parallel the Texas coastline, are approximately 70 to 90 miles wide (Barnes, 1975).

Dredging and material disposal within the intracoastal waterways, canals, and access channels has resulted in extensive channelization in the area (McGowen et al., 1976). An offshore dredged material disposal area is located immediately south of the Entrance Channel segment. Dredging and disposal typically results in material that is less coherent and more permeable. Subaqueous dredged material usually consists of mixed mud, sand, silt, shell, and reworked dredged material. Reworked dredged material is commonly sandy and moderately sorted with high to very high permeability and low water-holding capacity.

Bays and estuaries in the region have been partially filled with sediment originating from wave erosion of valley walls, transportation by rivers and small, and movement through tidal inlets into the bay-estuary system. Barrier island development was the result longshore transport of riverborne sediment from the Colorado-Brazos delta area to the northwest. The Matagorda Peninsula, which separated the Matagorda Bay from the Gulf, resulted from spit accretion (McGowen et al., 1976). The sediments within the fluviate-deltaic system consist primarily of sand, silt, and mud. An area of prodelta muds exist beyond the Colorado-Brazos delta front. Muddy sand distribution is related to hurricane washovers, dredging activities, and reworking of relict sediments, and is not controlled by depth (McGowen and Morton, 1979).

Offshore of Matagorda Bay, the width of the shoreface, the seaward extension of the barrier-strandplain system, averages about 1.0 to 1.1 miles. The sediment of the shoreface transitions from primarily sand (the beach), to mud and muddy sand at the 30 ft. depth, and to predominantly mud where it merges with the continental shelf beyond the 30 ft. depth (McGowen et al., 1976). The sand-mud interface is approximately 1.8 to 2.6 miles offshore from the Matagorda Peninsula. The inner continental shelf experiences extensive bioturbation by burrowing organisms. This area also undergoes periods of considerable erosion and resedimentation during the hurricane season. (McGowen et al., 1976).

Coastal zone faults were formed primarily through natural geologic processes, including deposition and differentiation, compaction of sediment, upward movement of salt deposits to diapirs, Gulfward creep of coastal landmass, and warping of landmass due to regional tectonics. Both growth and salt dome faults that occur in the region. Growth faults are formed by subsurface slumping, creep, and consolidation of sediments during deposition. These faults typically parallel the Gulf Coast and are confined to Cenozoic-aged sediments. The growth faults along the Gulf Coast can exceed 6 miles in length. Salt dome faults form around the top of salt domes and occur in radial and crestal graben type patterns. They reveal linear surface traces that can be curved with numerous intersections. These faults can be numerous, but are typically shorter (<3 miles long) than growth faults.

Subsidence manifests as the sudden sinking (e.g. sink holes) or gradual downward settling of land. This can be caused by surface faults and intensified and/or accelerated by subsurface mining or the pumping of oil and/or groundwater. The localized subsidence has been shown to be lessened once groundwater, oil and gas pumping has decreased or ended altogether. Extensive groundwater withdrawal is not a major problem in the Port Lavaca area (McGowen et al., 1976). However, land subsidence on the order of 0.8 to 0.9 ft. in the Jackson County vicinity has been attributed to the extraction of oil and gas in the Port Lavaca (Holzer and Gabrysch, 1982; Verbeck and Clanton, 1981).

2.2.2 Physical Oceanography

Matagorda Bay is a broad, shallow estuary, separated from the Gulf by the Matagorda Peninsula and a barrier island complex. The bay is interspersed with multiple dredged navigation channels, the largest of which are the MSC and GIWW. Freshwater sources for the estuary include the Lavaca-Navidad River system and several smaller rivers and creeks. Matagorda Bay is connected to the Gulf primarily through Pass Cavallo, the MSC landcut, and the Colorado River Mouth Complex.

U.S. Geological Survey (USGS) mapping shows the surface topography of the study area to be flat to gently rolling and sloping to the southwest (USGS, 1951, 1989a, 1989b, 1995). A bayhead delta is formed by the draining of the Lavaca-Navidad River to the north of the study area into Lavaca Bay. The bayside of the barrier islands and peninsulas, and parts of the mainland shoreline contain fringing marshes (McGowen et al., 1976). Along the bay shorelines are bluff banks, ranging from 5 to 10 ft. in elevation that form by wave erosion from prevailing southeasterly winds. The study area has been experiencing shoreline erosion, primarily from wind waves, as described by McGowen and Brewton (1975). The authors suggested approximately 8,450 acres of land of bay and Gulf shorelines were lost to natural erosion between 1856 and 1957 compared to approximately 615 acres by natural accretion.

The Lavaca delta is characterized by a variety of marsh types, salt, intermediate and freshwater (McGowen et al., 1976). Marsh areas expand in conjunction with delta growth. Woody vegetation is sparse at most places, but oak clusters and other vegetation can be found in the more sandy areas and in the riparian uplands. Broad areas of coastal prairies, pastureland, and farmland occur inland from the Gulf.

2.2.2.1 Tides

Tide date along the Texas coastline is provided by NOAA's Center for Operational Oceanographic Products and Services (Table 2.1). The datum for this product is MLLW. There are two gages in the interior of the bay and one in the Entrance Channel. The gage at the Entrance Channel is in deeper water due to the scouring by laterally compressed inflow at the channel's opening. The two interior gages experience decreased tidal range due to timing lags as the tide travels up through the bay. The mean diurnal tide can be significantly altered by area winds. Strong north winds from winter cold fronts can lower water surfaces by up to 2 ft. below MLT. Tropical storms can increase water levels up to 15 ft.

2.2.2.2 Currents and Circulation

The study area contains one major estuarine system (Matagorda Bay) and three rivers (Lavaca River, Colorado River, and Tres Palacios River). The GIWW flows through the study area creating a complex movement of water. The study area also encompasses a portion of the northern Gulf of Mexico.

Table 2.1: Diurnal tide ranges within the study area.

Area	Tidal Range
Matagorda Bay Entrance Channel	1.25
Port O'Connor, Texas	0.80
Port Lavaca, Texas	0.92

The MSC extends about four miles into the Gulf and is confined to the inner continental shelf area. The shelf slopes at a rate of approximately 36 ft. /mile from 0 to 18 ft., about 17 ft. /mile from 18 to 30 ft., and about 5 ft. /mile from 30 to 48 ft. (McGowen et al., 1976). The entrance channel is a high-energy environment flanked by two man-made rock jetties. The barrier islands and peninsula help make the Matagorda Bay system a relatively low-energy environment.

The study area has been modified by human activity by channel dredging and dredged material placement areas. The USACE currently maintains water depths in the bay and offshore segments of the MSC to depths of -38 and -40 ft. MLLW, respectively. The MSC is approximately 300 ft. in width for the entrance channel (offshore) and 200 ft. in width within the bay. Increased flow through the jetties at the MSC entrance channel has scoured the water bottoms to over 100 ft. inside the bottleneck at the bay and on both sides of the bottleneck as it opens to the wider part of the jetties, and at the Gulfward end of the north and south jetties (USACE, 2000). The tidal channels, passes, and dredged channels within the bay are deeper than average depth of the bay as a whole. The mean water depth of Matagorda Bay is approximately 12 ft., while that of the adjacent bays is 6 to 7 ft. on average (USACE, 1989).

2.2.2.2.1 GIWW

The GIWW runs through the entire study area and provides a protected navigational shipping route along most of the Texas Gulf Coast. Salinity varies and depends on the source of the predominant inflow. Those areas open to the Gulf of Mexico typically have higher salinities, while areas closed to the Gulf of Mexico tend to have lower salinity due to a higher influx of freshwater. Dredged material has been placed along the banks of the GIWW.

2.2.2.2.2 Colorado River

The Colorado River originates near Dawson County, New Mexico and travels approximately 600 miles to its mouth on Matagorda Bay. The Colorado River basin covers approximately 39,900 square miles.

2.2.2.2.3 Lavaca River

The Lavaca River begins in Gonzalez County, Texas and flows southeast approximately 115 miles before ending in Lavaca Bay. The river basin covers approximately 2,280 square miles. The Lavaca River is a fine-grained meanderbelt system characterized by frequent cutoff and abandoned channel courses, relatively high mud load, and narrow to broad floodplains. Natural ponds, lakes holding ponds, and artificial reservoirs are present on the floodplains.

2.2.2.3 Salinity

The salinity regimes within the Matagorda Bay system from 1952 to 1980 were studied by Ward and Armstrong (1980). Their study showed the mean salinity in the bay area ranged between 8-31 parts per thousand (ppt). Areas of lower salinity were located near the mouths of the rivers (freshwater inflows) and higher salinities were found in areas more tidally influenced (saltwater inflows). Lavaca Bay, influenced by the Lavaca River, was consistently the freshest bay area, while the open water areas of Matagorda Bay and the western half of eastern Matagorda Bay were the most saline.

Vertical stratification was generally absent due to the average shallow depth and mixing strongly induced by winds, except for the MSC (Ward and Armstrong, 1980). Stratification in the MSC was normally associated with differences in freshwater inflow, with stronger stratification resulting from higher freshwater inflow. Vertical stratification, though infrequent outside of the MSC, did occur in the areas where saltwater inflow was high, such as the MSC landcut. A seasonal pattern of salinity variation was related to seasonal inflows of freshwater. High freshwater inflows in the spring resulted in lower salinities. The gradual decrease in inflows from late fall and winter resulted in increases in salinity until a maximum in March is observed. The areas of the bay system more directly impacted by inflows showed more pronounced seasonal variation in salinity. Ward and Armstrong (1980) noted a significant increase in salinities after October 1963, which corresponds to the MSC landcut through Matagorda Peninsula, with an increase that ranged from 2 to 5 ppt in adjacent areas.

The Texas Water Development Board has been using datasondes to collect water quality data, including salinity, in Matagorda and Lavaca bays since fall 1986. The data for three years (1988, 2010, and 2011) with complete monthly data available were downloaded for comparison. In 1988 both the station at the mouth of the entrance channel and at Point Comfort were similar in salinity ranges. The station at the mouth of the entrance channel ranged from 24.8-33.6, while the station at Point Comfort ranged from 23.4-33.1. 2010 appears to be an anomalous year with very low salinities at the Point Comfort station, ranging from 4.1-22.9, while the station at the mouth of the entrance channel ranged from 23.6-31.9. In 2011 the salinities at the different stations were again closer to each other. The station at the mouth of the entrance channel ranged from 26.7-36.9, while the station at Point Comfort ranged from 21.0-37.6.

2.2.3 Water and Sediment Quality

The TCEQ has designated water quality segments for the Matagorda Bay system. Segment 2451_02 encompasses all of Matagorda Bay and segment 2542_01 encompasses Tres Palacios Bay, the northern portion of the channel. The designated uses for the waters of the system are contact recreation (activities involving a significant risk of ingesting water) and support of aquatic life (TCEQ, 2000). All Matagorda Bay segments are assigned an Exceptional (E) Aquatic Life Use Subcategory and Oyster Waters (O) (waters producing edible oysters). The Aquatic Life Use Subcategory establishes a numerical criteria that is dependent on desired use, sensitivities of aquatic communities, and chemical and physical characteristics. The categories include limited, intermediate, high, and exceptional aquatic life and oyster waters. Under TCEQ procedures, the E/O designation translates to a DO criteria for saltwater of an average of 5 milligram per liter (mg/L) and a minimum of 4 mg/L. The O designation criterion for bay and gulf waters is a fecal coliform (FC) median concentration not to exceed 14 cfu/dL (colony forming units per deciliter, or 100 mL, with no more than 10 percent of all samples exceeding 43 cfu/dL).

In addition to the averages of the periodic longer-term monitoring, the TCEQ conducts water quality assessments with a special set of procedures every 2 years to determine whether the uses are being attained (TCEQ, 2004). Lavaca Bay/Chocolate Bayou and Keller Bay are both listed by TCEQ as impaired for oyster use.

2.2.4 Hydrology

The Matagorda Bay system consists of the Lavaca-Guadalupe and Coastal Colorado-Lavaca Basins. Freshwater inflows primarily come from the Colorado River, Tres Palacios Creek, and the Lavaca River. Tidal exchange with the Gulf through the MSC, Pass Cavallo, and the mouth of the Colorado River through to the GIWW and to Matagorda Bay, to a limited degree.

The average tidal range at Port O'Connor is 0.8 ft. (TCOON, 2017). Based on an average bay depth of approximately 5 ft., roughly 16 percent of the bay volume is exchanged on each tidal cycle. The general movement of water is from the freshwater inflows in the north to the Gulf, considering average wind, freshwater inflow, and tidal influence conditions (Mueller and Matthews, 1987). Circulation patterns are complex and vary greatly from month to month. One of the main drivers of circulation in the bay is the MSC. Frontal passages can also effect circulation through changes in water levels, exchanges between the bays and the Gulf, and forcing water from one bay to another.

2.2.5 Soils (Prime and Other Important Unique Farmland)

The Farmland Protection Policy Act of 1981 (FPPA, 7 CFR 658) requires that Federal agencies consider alternatives to projects that would result in conversion of agricultural land. The 1985 Farm Bill revised the FPPA (P.L. 97-98, Sec. 1539-1549; 7 USC 4201, et seq.) to provide for limited enforcement of the requirements of the FPPA. According to 658.2a (FPPA Rule, 7 CFR 658), if a site is not designated as prime, unique, statewide, or local farmland, then the FPPA does not apply. Prime farmland is defined by the FPPA as land that is best suited for producing food, feed, forage, fiber, and oilseed crops and is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are appropriate for producing a sustained high yield of crops in an economic manner.

The U.S. Department of Agriculture (USDA) NRCS maintains a national database of prime and other important farmlands that is organized by county. The three counties in the study area are Calhoun, Jackson, and Matagorda. The Calhoun County Soil Survey (NRCS, 2017) lists seven mapping units as prime farmland, one prime farmland, if drained, and no other types of important farmland (Table 2.2). The Matagorda County Soil Survey (NRCS, 2017) lists 17 mapping units as prime farmland, one prime farmland, if drained, and no other types of important farmland (Table 2.3).

2.2.6 Energy and Mineral Resources

The project area has numerous natural resources, including oil and gas, sulfur, salt, shell, clay, sand, magnesium, and bromine. The most significant of these is oil and gas. Oil, natural gas, and natural gas liquids are important drivers of the local economy of the area and used in refineries and as a raw material in many petrochemical processes.

Sulfur generally occurs in the cap rock of salt domes, but it can also be extracted from sour gas. Sulfur is primarily used in the manufacture of a variety of other industrial products, such as sulfuric acid. The abundance of salt domes in the area provides for an abundant supply of high-grade sodium chloride. Salt is another important resource in Texas, with the bulk of Texas salt production occurring in the Texas coastal zone. The nearest brine production site at the Bryan Mound facility, 3.8 miles east of Port Lavaca.

Sand deposits in the area have the potential for industry or specialty uses, such as foundry sands, glass sands, and chemical silica. Common clays are used in the manufacture of brick and tile. While gypsum does occur in the cap rock deposits of certain salt domes in the area it is not easily mined and, therefore, significant production is unlikely.

Table 2.2: Prime and Other Important Farmland, Calhoun County, Texas

Map Unit Name	Classification*
Dacosta-Contee complex, 0 to 1 percent slopes	PF
Dacosta-Contee complex, 1 to 3 percent slopes	PF
Edna very fine sandy loam	PF
Laewest clay, 0 to 1 percent slopes	PF
Dacosta clay loam, 0 to 1 percent slopes	PF
Dacosta clay loam, low	PF
Contee-Dacosta complex	PF
Edna very fine sandy loam, low	PF, if drained

*NRCS (2017); PF=Prime Farmland

2.2.7 Hazard, Toxic, and Radioactive Waste Concerns

The region is home to multiple port facilities and a large ALCOA refining/smelting facility. The ALCOA facility in Point Comfort was established in 1948 and has been used as an aluminum smelting facility and a refinery for chlorine-alkali processor. Mercury is one of the byproducts of work undertaken at the ALCOA facility. The mercury was discharged into Lavaca Bay and subsequent high levels of mercury in the Bay led to fishing restrictions in 1988. The site was listed on the National Priorities List for the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) in 1994. A Natural Resources Damage Assessment (NRDA) was performed at the site and restoration and remediation work was undertaken to compensate for environmental damages (GLO et al., 2001).

A Formosa facility at Point Comfort was listed among the Resource Conservation and Recovery Act (RCRA) list of sites. A RCRA Facility Investigation (RFI) was deemed to be necessary in 1990 and the work plan was approved in 1992. The subsequent groundwater monitoring determined the migration of contaminated groundwater is under control.

TCEQ GIS database shows 23 petroleum storage tanks in the area (1 in Point Comfort and 22 in Port Lavaca).

Table 2.3: Prime and Other Important Farmland, Matagorda County, Texas

Map Unit Name	Classification*
Asa silt loam, rarely flooded	PF
Asa silty clay, rarely flooded	PF
Brazoria clay, rarely flooded	PF
Clemville silty clay loam, rarely flooded	PF
Dacosta sandy clay loam, 0 to 1 percent slopes	PF
Faddin loam, 0 to 1 percent slopes	PF
Fulshear fine sandy loam, 2 to 5 percent slopes	PF
Katy fine sandy loam, 0 to 2 percent slopes	PF
Laewest clay, 0 to 1 percent slopes	PF
Laewest clay, 1 to 3 percent slopes	PF
Laewest silty clay, 0 to 1 percent slopes, overwashed	PF
Norwood silty clay loam, rarely flooded	PF
Pledger clay, rarely flooded	PF
Pledger clay, occasionally flooded	PF
Texana fine sandy loam, 0 to 1 percent slopes	PF
Texana fine sandy loam, 1 to 3 percent slopes	PF
Bacliff clay, 0 to 1 percent slopes	PF, if drained

*NRCS (2017); PF=Prime Farmland

2.2.8 Air Quality

The Clean Air Act Amendments of 1970 and 1990 (42 USC 7409) mandated the U.S. Environmental Protection Agency (EPA) to establish National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment. Two types of national air quality standards were established:

- Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly.
- Secondary standards set limits to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

NAAQS for six criteria pollutants have been established by the EPA office of Air Quality Planning and Standards: carbon monoxide (CO); lead (Pb); nitrogen dioxide (NO_2); ozone (O_3); particulate matter with particle diameters of 10 micrometers or less (PM_{10}) and 2.5 micrometers or less ($PM_{2.5}$); and sulfur dioxide (SO_2) (40 CFR Part 50). The General Air Quality Rules (30 Texas Administrative Code [TAC] Chapter 101) of the Texas Commission on Environmental Quality (TCEQ) enforces federal NAAQS. The TCEQ has also set standards for net ground-level concentrations of sulfur compounds. Air quality is generally considered acceptable if pollutant levels are less than or equal to established standards on a continuous basis, as represented in Table 2.4.

The Clean Air Act also required the EPA to assign an attainment designation to each area of the US regarding compliance with the NAAQS. EPA categorizes the level of compliance or noncompliance as follows:

- Attainment – an area that currently meets all the NAAQS;
- Maintenance – an area that currently meets the NAAQS, but have previously been out of compliance for at least one criteria pollutant;
- Nonattainment – an area that currently does not meet the NAAQS for at least one criteria pollutant; and
- Unclassifiable – an area that cannot be classified on the basis of available information as meeting or not meeting the NAAQS for a criteria pollutant.

The Matagorda region is in the Corpus Christi – Victoria Air Quality Control Region (AQCR) consisting of Aransas, Bee, Brooks, Calhoun, De Witt, Duval, Goliad, Gonzales, Jackson, Jim Wells, Kenedy, Kleberg, Lavaca, Live Oak, McMullen, Nueces, Refugio, San Patricio, and Victoria Counties. This AQCR meets all of the EPA NAAQS and is in compliance with the Clean Air Act.

The TCEQ is tasked with monitoring air quality within the state and making that information available to the public. The University of Texas Center for Energy and Environmental Resources TEXASQII Air Quality Study Project has monitoring stations throughout the state that provide real time monitoring data. The monitoring station in Port O'Connor (CAMS C657) has been providing data on the concentrations of O_3 and $PM_{2.5}$ in the air, as well as air temperature and wind velocity since October 2005 (TCEQ, 2017). The O_3 and particulate matter (PM) monitors collect and report data on a continuous basis.

Nitrogen oxide (NO_x) emissions are mostly attributed to fuel combustion equipment at industrial facilities. The majority of SO_2 emissions in the project area can be attributed to marine vessels, with the amount of emissions in direct proportion to the sulfur concentration in the diesel fuel and the size of the engines. The major non-point sources that affects air quality in the surrounding area are dust from agricultural activities, vehicle emissions, commercial, industrial, and manufacturing activities.

Matagorda Bay activities that contribute air contaminants include air emissions derived from waterborne traffic, including ships, barges, tugs, dredged, and other recreational and noncommercial vessels. Port activities, including the loading and unloading of bulk cargo vessels and tankers, also contribute to air emissions effecting air quality.

2.2.9 Noise

Noise is defined as unwanted sound that disrupts or interferes with normal activities or that diminishes the quality of the environment. Noise is typically linked to human activity and an additional layer along with the natural acoustic setting of an area. Exposure to high levels of noise over an extended period can lead to hearing loss, but most environmental noise only rises to the level of an annoyance. Each individual will respond to noise events differently based on the level of existing background sounds, the character of the noise, the time of day, the setting, and their own sensitivity.

The human ear senses sounds when a source emits oscillations (sound waves) through an elastic medium, such as air or water. Sound is characterized by the frequency and amplitude of the sound waves. The frequency is measured in hertz (Hz) and is commonly referred to as pitch. The loudness of a sound is related to the amplitude of the sound waves. The pressure levels exerted by the sound's amplitude is measured on the decibel (dB) scale. The decibel scale is logarithmic, beginning at 0 (the approximate threshold level where sound can be heard by humans). Normal speech is comes in at approximately 60 dBs. At approximately 120 dBs sound begins to create discomfort of pain inside the ear (EPA, 1976).

The human ear is more attuned to mid-range frequencies than low or extremely high frequencies. As such, sound waves of the same amplitude (pressure), but different frequencies, are not perceived by the human ear as being at the same level of loudness. In order to compensate for this, sound measurements are adjusted through the use of an "A-weighting." This adjustment puts the measurement on a scale similar to human perception. All regulatory agencies require that measurement be taken using the A-weighted sound level (dBA).

Sound measured using dBA provides the level of sound at a given moment, but the level of noise within a community is constantly in flux. This fluctuation is due to the presence of numerous sources within a community at a given time that emit sounds of a varying time scale. As a result of this a descriptor called the equivalent sound level (L_{eq}) is necessary. L_{eq} provides a way to describe the average sound level, in dB, for any given time period.

Sensitive receptors are facilities or areas where excessive noise may disrupt normal activity, cause annoyance, or loss of business. These can include residential areas, religious, educational, recreational, and medical facilities, which are more sensitive to increased noise levels than areas of commercial and industrial land use. Sensitive receptors are located in the City of Port Lavaca and the communities of Port O'Connor, Magnolia Beach, Indianola, Alamo Beach, and Point Comfort. The existing noise environment of these communities is primarily affected by waterborne transportation activities (ship traffic, barges, commercial and recreation vessels, and maintenance dredging of the channel). Measured ambient noise levels at sensitive receptors in communities with a similar degree of activity range between 60.9 and 65.1 L_{dn} (HFP Acoustical Consultants, Inc., 2002).

2.3 Ecological and Biological Resources

2.3.1 Ecoregion

The study area lies within the Western Gulf Coastal Plain ecoregion, which extends along the Texas Gulf Coast form the Sabine River south to the Rio Grande (Griffith 2004). The prominent features of this coastal ecosystem include fresh, intermediate, brackish, and saline marshes; bays and lagoons with seagrass beds, tidal flats, and oyster reef complexes; barrier islands; riparian forests; and dense brush habitats. Wetlands provide multiple environmental functions, including flood storage, water quality maintenance, and fish and wildlife habitat. In addition the study area is part of the Central Flyway migration route, which is an important wintering and migration stopover habitat for migratory birds, as well as waterfowl, shorebirds, and wading birds. National wildlife refuges (NWRs) and wildlife management areas (WMAs) along the coast also provide critical staging areas for waterfowl migrating to and from Mexico (TPWD 2017; USFWS 2017a).

Table 2.4: EPA National Ambient Air Quality Standards[1] and TCEQ Ground Level Concentration Standards[2].

Air Pollutant	Time Averaging Period	NAAQS Primary*	NAAQS Secondary	TCEQ Standards
Carbon Monoxide (CO)	1-hour[3]	35 ppm (40mg/m^3)	None	__
Lead (Pb)	8-hour[3]	9 ppm (10 mg/m^3)	None	__
Nitrogen Dioxide (NO_2)	Quarterly Average	1.5 μg/m^3	1.5 μg/m^3	__
Ozone (O_3)	8-hour[4]	0.053 ppm (100 μg/m^3)	0.053 ppm (100 μg/m^3)	__
Particulate Matter – Respirable (PM_{10})	24-hour[5]	150 μg/m^3	150 μg/m^3	__
Particulate Matter – Respirable ($PM_{2.5}$)	24-hour[6]	35 μg/m^3	35 μg/m^3	__
	Annual[7] Arithmetic Mean	15 μg/m^3	15 μg/m^3	__
Sulfur Oxides (measured as SO_2)	30-minute	__	__	0.4 ppm (1,021 μg/m^3
	3-hour[3]	__	0.5 ppm (1300 μg/m^3)	__
	24-hour[3]	0.14 ppm	__	__
	Annual Arithmetic Mean	0.03 ppm	__	__

*parts per million = ppm; milligrams per cubic millimeter = mg/m^3; micrograms per cubic meter = μg/m^3
[1]NAAQS as codified in 40 CFR Part 50.
[2]TCEQ Standards as codified in 30 TAC §111.155 and § 112.3.
[3]Not to be exceeded more than once per year.
[4]To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08ppm.
[5]Not to be exceeded more than once per year on average over 3 years.
[6]To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 μg/m^3.
[7]To attain this standard, the 3-year average of the weighted annual mean $PM_{2.5}$ concentrations from single or multiple community-oriented monitors must not exceed 15 μg/m^3.

2.3.2 Wetlands

Terrestrial lands bordering aquatic areas along the coast are known as coastal wetlands (saline to freshwater) when the water table is at or near the surface of the land. These areas may be covered by shallow water and emergent vegetation may or may not be present. The wetlands provide essential habitat for fish, shellfish and other wildlife. Coastal wetlands help to filter runoff and provide a buffer to coastal areas limiting storm and wave damage. Factors influencing the condition and distribution of wetlands include water depth, frequency of inundation, salinity, and erosive/accretive forces.

The estuarine system extends from the open waters of the estuary, inland to freshwater areas (salinity <0.5 during average annual low flow) (Cowardin et al., 1979). The estuarine system includes a number of distinct wetland communities. Estuarine tidal flats are comprised of coastal wetlands periodically flooded by tidal waters and have less than 30 percent vegetation cover, by area. Tidal flats can include sandbars, mud flats, and salt flats. Salt flats may be sparsely vegetated by glasswort (*Salicornia* spp.), saltwort (*Batis maritima*), and shoregrass (*Monanthochloe littoralis*). The salt flats serve provide feeding grounds for coastal shorebirds, including the threatened piping plover, fish and invertebrates.

The extent of barrier island tidal flats in the study region have decreased in areal coverage since the 1950s (White et al., 2002). Some of the loss may be due to "an accelerated rate of relative sea-level rise from the 1960s through the late 1970s." These tidal flats have converted to estuarine marsh, seagrass, or remained as unvegetated open water.

The estuarine wetlands comprise the majority of the wetlands in the Matagorda Bay system. The estuarine marshes in the study area can be broken down into three geographic settings:

- Interior marshes. These are most prevalent in lower energy environments, such as inlets and interior bays (e.g., Powderhorn Lake, Keller Bay). The surrounding pasture, range, and croplands, primarily rice fields, drain into these interior marshes. The seasonalities of agricultural practices, inundation and draining, have a large effect on the hydrology of the marshes within these watersheds.
- Pass Cavallo/Port O'Connor area. This is a flood-tidal-delta complex that contains the majority of the estuarine marsh and SAV in the project area (White et al., 2002).
- Matagorda Peninsula (barrier island) bayside marshes. These are shoreline (saline/brackish) marshes on the leeward side of the barrier islands.

Low marshes are those areas that are regularly flooded, and high marshes are those areas found at slightly higher elevations and experience less frequent flooding. In the Matagorda Bay area, low salt marsh is typically dominated by smooth cordgrass (*Spartina alterniflora*) and common species such as saltgrass, saltwort, glasswort, and saltmarsh aster (*Symphyotrichum tenufolium*) (LCRA-SAWS, 2006; White et al., 2002). High salt marshes do not include smooth cordgrass, but may include other species plus more halophytic species, such as shoregrass, annual seepweed (*Sueda linearis*), sea ox-eye daisy (*Borrichia frutescens*), and sea-purslane (*Sesuvium portulacastrum*).

Low brackish marshes are found at similar elevations at the low salt marshes, but are located in less saline waters. These marshes are generally dominated by salt-marsh bulrush (*Bolboschoenus robustus*). Other species include marshhay cordgrass, black needlerush (*Juncus rosemarianus*), and glasswort. As the low brackish marshes grade into high brackish marshes, salt-marsh bulrush and black needlerush drop out and marshhay cordgrass becomes dominant. High brackish marsh species also include saltgrass, marsh fimbray (*Fimbrystylis* *castanea*), asters (*Symphotrichum* spp.), Gulf cordgrass (*Spartina spartinae*), and Carolina wolfberry (*Lycium carolinianum*).

In the Matagorda Bay area, the tidal inundation of sea water and inflow of fresh water leads to a mixture of the saline and brackish marshes. Smooth cordgrass is typically found along the open-water areas in what may be a fringe only a few feet wide. A rapid transition from low saline marsh to low brackish marsh can occur within a band a few feet wide (LCRA-SAWS, 2006).

The areal coverage of estuarine marsh on, and near, the barrier islands has increased since the 1950s in West Matagorda Peninsula due to washover fans deposited by Hurricane Carla in 1961 and from accretion into Pass Cavallo due to longshore drift. Relative sea level change has also played an important role in the decline of interior marshes and increased shoreline erosion within the bay (White et al., 2002).

The Matagorda Bay area also includes low and high scrub-shrub estuarine wetlands (LCRA-SAWS, 2006, White et al., 2002). The low wetlands on Matagorda Island are dominated by black mangrove (*Avicennia germinans*) and they also occur scattered throughout estuarine marshes in the Pass Cavallo-Port O'Connor area. Common woody species in the high (irregularly flooded) scrub-shrub wetland include sumpweed (*Iva frutescens*) and eastern false-willow (*Baccharis halimifolia*). Marshhay cordgrass, southern reed (*Phragmites australis*), and Gulf cordgrass are common herbaceous species in this community.

Fresh/intermediate marsh can be found on the mainland, on the barrier islands, and along shorelines in upstream drainages areas and in depressional areas or swales (LCRA-SAWS, 2006; NWI, 1980-1995; White et al., 2002). Common species in low fresh-intermediate marshes include coastal cattail (*Typha domingensis*), California bulrush (*Schoenoplectus californicus*), southern reed, swamp smartweed (*Polygonum hydropiperoides*), Gulfcoast spikesedge (*Eleocharis cellulosa*), large spike spikerush (*Eleocharis palustris*), green flat-sedge (*Cyperus virens*), sand spikerush (*Eleocharis montevidensis*), longlobe arrowhead (*Sagittaria longiloba*), giant cut-grass (*Zizaniopsis milacea*), seashore paspalum (*Paspalum vaginatum*), three-square bulrush (*Schoenoplectus pungens*), and coastal water-hyssop (*Bacopa monnieri*). High marsh, also known as "wet meadow," supports many of the same species, but will not include species such as cattails, California bulrush, or southern reed. Awl-leaf aster (*Symphyrotichum sublatum*), deep-rooted sedge (*Cyperus enterianus*), green flat-sedge, and caric-sedge (*Carex* spp.) are also common in the wet meadows.

The fresh/intermediate scrub-shrub wetlands are found in the same general areas as the fresh/intermediate marshes. Common scrub-shrub species include buttonbush (*Cephalanthus occidentalis*), Chinese tallow tree, and coastal cattail (White et al., 2002; LCRA-SAWS, 2006, NWI, 1980-1995).

2.3.3 Aquatic Resources

The Matagorda Bay System is the third largest estuary on the Texas coast (Armstrong et al., 1987; EPA, 1999). The substrate is composed of unvegetated bottom regions, oyster reefs, and patches of SAVs. The open-water habitats support communities of benthic organisms, plankton, nekton, and numerous fish species.

Phytoplankton are the primary producers in the open-bay and are fed upon by zooplankton, fishes, and benthic organisms. The phytoplankton of Lavaca Bay is dominated by diatom species and achieve their highest level of abundance in the winter, and the lowest abundance numbers in the summer. Zooplankton are animals that cannot swim against the current. Their abundances are determined largely by phytoplankton abundance and tend to increase after increases in phytoplankton. In Lavaca Bay they are most abundant during the spring, and at their lowest levels in the fall. The zooplankton community is dominated by the copepod *Acartia tonsa* and barnacle nauplii. Zooplankton form the basis of the food chain for larval and juvenile fish. Zooplankton are found in limited numbers in regions of high turbidity, as these are areas of reduced sunlight penetration, and thus lower levels of phytoplankton densities. The zooplankton species are also susceptible to the currents, which can carry them out to sea and away from concentrated food masses (Armstrong et al., 1987). It is expected that plankton assemblages in Matagorda Bay would be similar to those of Lavaca Bay.

Nekton assemblages (organisms that swim freely in the water column) consist mainly of secondary consumers feeding on zooplankton or juvenile and smaller nekton species. The Matagorda Bay system supports a diverse nekton population including fish, shrimp, and crabs. The community composition of nekton changes throughout the year as some spend their entire life in the bay (residents) and other species may only spend a portion of their life cycle in the estuary (migrants) (Armstrong et al., 1987).

The dominant nekton species inhabiting the Matagorda Bay estuary are bay anchovy (*Anchoa mitchilli*), Atlantic croaker (*Micropogonias undulatus*), white shrimp (*Litopenaeus setiferus*), brown shrimp (*Farfantepenaeus aztecus*),and spot (*Leiostomus xanthurus*) (Brown et al., 2013). These species are found throughout the Texas coast. Seasonal differences occur in abundance and biomass depending on the timing of Gulfward migrations. Anchovy are at their most abundant in the early part of the year (January – April), while croaker are more abundant in the spring and summer, followed by spot in the summer and fall. Brown shrimp reach their peak in abundance typically in May, with white shrimp abundance at their maximum in late summer and fall (Brown et al., 2013).

Matagorda Bay has one of the lowest percentages of the total finfish harvest of all the Texas bay systems, contributing less than 5 percent of the coastwide landings from 1997 to 2001. Commercially caught species include black drum (*Pogonias cromis*), flounder (*Paralichthys lethostigma*), striped mullet (*Mugil cephalus*), and sheepshead (*Archosargus probatocephalus*) (Culbertson et al., 2004).

The main commercially harvested shellfish species in Matagorda Bay are brown, white shrimp and blue crabs. A commercial fishery for eastern oysters (*Crassostrea virginica*) does exist in Matagorda Bay, however the harvest makes up only about five percent of all oysters landed in Texas (Culbertson et al., 2004).

After mating female blue crabs will migrate to areas of the estuary with higher salinities to lay their eggs. The eggs are attached to the underside of their abdomen and are brood there for about two weeks. Females will move Gulfward and hatch the eggs offshore. Blue crab larvae will pass through several planktonic larval stages before they are able to move back into the estuary with the surface plankton (Britton and Morton, 1989).

Brown and white shrimp have similar life cycles. Adults spawn in the Gulf. Eggs hatch within 24 hours of being released by the females and remain in the Gulf where they cycle through various larval stages for several weeks. Postlarval shrimp are planktonic and are carried into estuarine and fresh water shallows to mature. The shrimp grow and mature in the shallow nursery areas and then migrate to deeper estuarine waters, finally completing the life cycle by migrating offshore in the Gulf to spawn. Peak spawning season for brown shrimp occurs from September to May, and for white shrimp, March to September (Britton and Morton, 1989).

Black drum spawn in the open-bay and nearshore Gulf waters from January to mid-April. The species exhibits broadcast fertilization. The larvae and juveniles move into areas of fresher water until they reach about four inches in size and migrate back into the open-bay. They remain in the bay until reaching sexual maturity (Patillo et al., 1997).

Adult southern flounder spawn in the offshore waters of the Gulf during the late fall and early winter through broadcast fertilization. Adults return to the estuaries after spawning. The larvae will remain in the offshore plankton for four to eight weeks before they are carried into the estuaries. As juveniles the southern flounders will migrate to fresher water areas and remain there until reaching sexual maturity after about two years. Once reaching sexual maturity they migrate back to the Gulf to spawn (Daniels, 2000; Patillo et al., 1997).

Atlantic croaker spawn in the nearshore Gulf areas from September through May utilizing broadcast fertilization. The early planktonic larval stages remain offshore in plankton until they are carried by the currents inshore to estuarine areas. Juvenile Atlantic croaker migrate to fresher water regions to mature before migrating back offshore to spawn (Patillo et al., 1997).

Sheepshead spawn offshore in the spring (March and April) through broadcast fertilization. The planktonic larvae are carried into the estuary and spend the next 30 to 40 days growing into the juvenile form. The juveniles settle into in the seagrass beds to further mature before moving to nearshore reefs. Sheepshead reach sexual maturity by age two (Patillo et al., 1997).

Striped mullet spawn offshore from October to March through broadcast fertilization. The eggs and planktonic larvae remain offshore and develop into prejuveniles before entering the bays and estuaries to mature. Sexual maturity occurs at three years of age. Adults can be found in the near inshore waters throughout their life (Patillo et al., 1997).

Sand seatrout spawn in the Gulf in late fall or winter through broadcast fertilization. The planktonic larvae are carried into the estuary by the currents and migrate to the fresher water areas of the estuary, settling in shallower waters to mature. Adult sand seatrout reach sexual maturity at twelve months before returning to the Gulf to spawn (Patillo et al., 1997).

The open-bay bottom is an important component of the aquatic environment as it is comprised of flat areas of mud and sand that contribute large quantities of nutrients and food. The distribution of the benthic macroinvertebrates within the bay is influenced by both bathymetry and sediment type (Calnan et al., 1989). Benthic macroinvertebrates found in the sediments of the Matagorda Bay are primarily polychaetes, bivalves, gastropods, and crustaceans (Calnan et al., 1989). The dominant bivalves include the dwarf surf clam (*Mulinia lateralis*), the concentric nut clam (*Nuculana concentrica*), and the scorched mussel (*Brachidontes exustus*); the dominant gastropods are the Eastern white slipper shell (*Crepidula plana*), the channeled barrel-bubble (*Acteocina canaliculata*), and the beautiful little caecum (*Caecum pulchellum*); the dominant polychaetes are *Mediomastus californiensis* and *Spiophanes bombyx*; and the dominant crustaceans are *Pseudohaustorius* spp. and *Ampelisca abdita* (Calnan et al., 1989).

The Matagorda Bay system is home to numerous Eastern oyster reefs. The reefs form in areas of hard substrate and beneficial currents. Most of these reefs are in subtidal or intertidal areas near passes, cuts, or the edge of marshes. Oysters are filter feeders and can filter water up to 1,500 times their body volume in an hour. This mass filtration of water helps to improve water clarity and, in turn, phytoplankton abundance (Lester and Gonzalez, 2001; Powell et al., 1992). Another important role oysters play is as an indicator species of pollutants and contamination. Because they are sessile they tend to bioaccumulate whatever pollutant is present in the water column of the bay (Lester and Gonzalez, 2001).

Eastern oysters are stimulated to spawn by rising water temperatures and other chemical cues in the spring. Oysters are broadcast spawners and release their eggs and sperm into the open water. Larval oysters spend the next two to three weeks as plankton in the water column before they settle as spat onto a hard substrate and mature into the adult form (Britton and Morton, 1989).

Oysters can survive in salinities ranging from 5 to 40+, but are most productive within a salinity range of 10 to 25, in part due to the limitations this range puts on and predators. At salinities below 5 oysters can survive by remaining tightly closed, and will remain in that state until salinities increase or they use up all their metabolic reserves, at which point they would die. On the other end of the salinity range predators, such as oyster drills, welks, and crabs thrive and can wipe out large percentages of oyster abundance (Cake, 1983). However, it is not predators that are the primary factor in decreasing habitat suitability. The presence of Dermo (*Perkinsus marinus*) can kill more than 50 percent of a reef's population in the Gulf. Dermo is the most common and deadly oyster pathogen in the bays bordering the Gulf. The prevalence of Dermo within Matagorda Bay oysters was studied by Ray and Soniat (2008). Samples from Indian Point indicate oyster mortalities there can likely be attributed to Dermo. Infection of Dermo has also been found at Gallinipper Point (adults and juveniles), Indian Point (juveniles), and Sammy's Reef (adults).

Oyster reefs provide good habitat for a wide range of aquatic organisms, including mollusks, barnacles, crabs, gastropods, amphipods, polychaetes, and isopods (Sheridan et al., 1989). With such a rich biodiversity the reefs also attract a large number of predator species, including black drum, blue crab, and oyster drill (*Thais haemastoma*) (Lester and Gonzalez, 2001; Sheridan et al., 1989). Shore birds will also utilize oyster reefs that are expose at low tides as resting places (Armstrong et al., 1987).

While oyster reefs are prominent in parts of Lavaca Bay and Matagorda Bay, the full extent of oyster reef distribution has not been mapped. Oysters are commercially harvested from the Matagorda Bay system. The Texas Department of State Health Services (TDSHS) has classified shellfish-harvesting areas in Lavaca, Matagorda, Carancahua, and Tres Palacios bays. Shellfish-harvesting areas are classified as approved (an area where harvesting is allowed), conditionally approved (status changes based upon meteorological or hydrological conditions), or restricted (no harvesting allowed). Much of the Matagorda Bay estuary is approved or conditionally approved; however there are some restricted areas within the bay system. Most of the restricted areas are located in the upper portion of Lavaca, Keller, Carancahua, and Tres Palacios bays (TDSHS, 2017).

Estuarine SAV includes the true seagrasses such as shoalgrasses (*Halodule wrightii*), turtlegrass (*Thalassia testudinum*), manateegrass (*Syringodium filiforme*), and clovergrass (*Halophila engelmannia*), but also includes widgeongrass (*Ruppia maritima*), not considered a true seagrass because it also grows in freshwater environments. Widgeongrass also differs from the other species in that it is an annual rather than perennial. Widgeongrass populations can be very transient, changing from year to year (i.e., a large distribution may disappear or appear from year to year).

The presence of estuarine SAV beds are highly dependent on water clarity and thus tend to occur in shallow areas (generally <6 ft. water depth). Seagrass communities are highly productive ecosystems and provide refuge for shrimp, fish, crabs, and their prey species. Seagrass beds can maintain faunal abundances 2-25 times greater than adjacent unvegetated areas (TPWD, 1999). Shoalgrass, widgeongrass, and turtlegrass have been documented in the Matagorda Bay system (Adair et al., 1994; LCRA-SAWS, 2006; TPWD, 1999; White et al., 2002). Shoalgrass and widgeongrass have been mapped in Keller Bay and Carancahua Bay (Salt Lake and Redfish

Lake) (Adair et al., 1994; GLO, 2003). Shoalgrass was mapped along the southern shoreline of Keller Bay, in Boggy Bayou north of Port O'Connor, near the bayside marshes of the barrier island (Matagorda Peninsula) north of the MSC cut (GLO, 2003), and associated with the marshes west of Pass Cavallo where turtlegrass was also noted (GLO, 2003; White et al., 2002). The Seagrass Conservation Plan of Texas (TPWD, 1999) lists shoalgrass, widgeongrass, and clovergrass in the Matagorda Bay system.

Fresh-intermediate SAV may be present in the upstream parts of drainages, in depressional areas or swales within uplands, and in ditches and abandoned channels. There may also be small patches that occur in areas of palustrine marsh. Species may include widgeongrass, Sago pondweed (*Potamogeton pectinatus*), cabomba (*Cabomba caroliniana*), mermaid weed (*Proserpinica palustris*), water hyacinth (*Eichornia crassipes*), water lettuce (*Pistia stratiotes*), frogbit (*Linobium spongia*), or alligator-weed (*Alternanthera philoxeroides*) (LCRA-SAWS, 2006; NWI, 1980-1995; White et al., 2002).

2.3.4 Wildlife Resources

Matagorda Bay is located along the Central Flyway for waterfowl and is one of the most significant waterbird wintering regions in North America. The Matagorda Island National Wildlife Refuge and State Natural Area is home to numerous species of resident and migrant birds. Some common species that occur within the project area include little blue heron (*Egretta caerulea*), sanderlings (*Calidris alba*), least sandpiper (*Calidris minutilla*), great blue heron, white ibis (*Eudocimus albus*), roseate spoonbill (*Platalea ajaja*), royal tern (*Sterna maxima*), sandwich tern (*Sterna sandvicensis*), laughing gull (*Larus altrcilla*), and ring-billed gull (*Larus delawarensis*). Other bird species that are associated with the prairies and marshes region include a variety of raptors, songbirds, and migratory waterfowl.

The Texas Colonial Waterbird Census (TCWC) database has documented nesting habitat in the project area for multiple species of colonial waterbirds (USFWS, 2017b). The annual census, conducted in May and June, began in 1973 and includes location data for colonies along the Texas coast, along with an estimated number of breeding pairs per colony. The census data are collected by volunteers from State and Federal agencies, as well as nonprofit organizations. The database is maintained by the USFWS Clear Lake Ecological Services Field Office.

The project area is within the TPWD's Coastal Survey Zone, which includes the Gulf Prairies and Marshes region. The TPWD Midwinter Waterfowl Survey (2016) documented 5,992,094 birds in 2016, representing at least 26 species. The Coastal Zone accounted for 23 percent (1,380,528 birds, at least 18 species) of this total. Waterfowl species expected to migrate through the project area include the blue-winged teal (*Anas discors*), mallard (*Anas platyrhynchos*), gadwall (*Anas strepera*), green-winged teal (*Anas crecca*), Canada goose (*Branta canadensis*), and wood duck (*Aix sponsa*).

2.3.5 Protected Resources

2.3.5.1 Threatened and Endangered Species

The Endangered Species Act (16 USC 1531 et seq) of 1973 (ESA), as amended, was enacted to provide a program for the preservation of threatened and endangered species and to provide protection for the ecosystems upon which the species depend for their survival. All Federal agencies are required to implement protection programs for these designated species and to use their authorities to further the purpose of the Act. The USFWS and the NMFS are the primary agencies responsible for implementing the ESA. The USFWS is responsible for the flora and fauna, including freshwater species, while the NMFS is responsible for nonbird marine species.

USFWS and NMFS have identified twelve federally listed threatened and endangered species and four candidate species as potentially occurring in the project area (Calhoun and Matagorda counties, TX). The ESA defines a threatened species as "a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range" and an endangered species as "a species that is in danger of extinction throughout all or a significant portion of its range" (50 CFR 424.02). A candidate species is one for which sufficient information exists regarding the biology and threats to propose it as a threatened or endangered species. Candidate species are not protected under the ESA, but will be provided the full protection of the ESA if listed after the Section 7 consultation is completed.

When a species is listed as threatened or endangered, the ESA requires the designation of critical habitat unless designation would not be prudent or the critical habitat is not determinable. Critical habitat is defined as: "(1) the specific areas within a geographical area currently occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (i) essential to the conservation of the species and (ii) that may require special management consideration or protection, and (2) specific areas outside the geographical area occupied by a species at the time is listed upon a determination by the Secretary [Secretary of the Interior of Secretary of Commerce] that such areas are essential for conservation of the species" (50 CFR 424.02). Federal agencies are required to consult with USFWS or NMFS about the effect of actions they authorize, fund, or carry out, on designated critical habitat. Critical habitat has been designated in the vicinity of the project area for the Piping plover (*Charadrius melodus*) and the Whooping crane (*Grus americana*).

There are no federally listed threatened or endangered plant species in the project area.

Threatened and endangered species considered in this analysis were identified from county species list provided by USFWS. Information regarding the potential occurrence of a species in this area was obtained from the literature. It should be noted that inclusion on the list does not imply that a species is known to occur in the project area, but only acknowledges the potential for occurrence.

Piping plovers breed in the northern Great Plains of the U.S. and Canada, along beaches of the Great Lakes, and along the Atlantic coast. Following the breeding season, this species migrates to the southern U.S. Atlantic coastline, the Gulf coastline, and to scattered Caribbean islands. Thus, piping plovers are potential winter residents (November – March), and spring and fall migrants in the project area. This species can be found along Texas beaches, tidal flats, mud/sand flats, dunes, and offshore islands. This species has been observed in the project area. Critical habitats have been designated along the Texas coast, including portions of the Matagorda/Lavaca bay system.

The entire breeding population of the whooping crane migrates from Canada's Northwest Territories to a narrow section of the Texas coast on the Aransas National Wildlife Refuge located south of the project area. Thus, individuals are likely to fly through/over the project area en route to their primary wintering destination. In Texas, the principal winter habitats include brackish bays, marshes, and sand flats. Whooping cranes are also known to forage in nearby upland areas.

Critical habitats have been designated for the Whooping crane in Calhoun County, but are restricted to the Aransas National Wildlife Refuge and adjacent areas. The whooping crane has not been recorded in the project area, but cranes overwintering in the Aransas National Wildlife Refuge could move through or utilize habitats in Matagorda and Lavaca bays.

The Least tern (*Sterna antellarum*) was listed as an endangered species under the ESA in 1985. Their range has been defined as the Mississippi River and its tributaries north of Baton Rouge, LA and all drainages in Texas more than 50 miles inland from the coast (50 FR 21784-21792). They are colonial nesters, with colony size ranging from a few birds to more than 1200 (Jones, 2012). Least terns migrate in the fall along the major river basins to the Mississippi River and on to the Gulf of Mexico. Their winter habitat is not well described, other than where they have been seen to congregate on marine coasts, bays, estuaries, and river mouths (Thompson et al., 1997). Least terns only need to be considered under the ESA if the project is wind related along their migration route.

The Red knot (*Calidris canutus rufa*) was listed as a threatened species under ESA in 2014 (79 FR 73705-73748). The species is known to migrate long distances from their nesting habitat in the mid to high-arctic latitudes to their nonbreeding winter habitats in the coastal United States and South America. The *rufa* subspecies stops in the Gulf of Mexico on its migration northward (Gonzalez et al., 2006).

The Northern Aplomado falcon (*Falco femoralis septentrionalis*) was determined to be an endangered species in 1983 (51 FR 6686-6690). The species was once found from the Yucatan, along the Gulf Coast of Mexico and into the Trans-Pecos region of Texas, southern New Mexico, and southeastern Arizona (USFWS, 1990). Their decline has largely been caused by the encroachment of agriculture into their grassland habitat (Hector, 1987). There is little known about the migration of this species, though they are believed to overwinter in the US (Hector, 1981 and 1987).

The Gulf coast jaguarundi (*Herpailurus yaguarondi cacomitli*) is a secretive, small, slender-bodied cat that inhabits dense thornscrub and brushland (Schmidly, 2004). The jaguarondi has a neotropical distribution and historically occurred in southeast Arizona, southern Texas, and Central and South America (Davis and Schmidly, 1994). Today, the jaguarondi has a similar distribution, but with significantly reduced numbers. In Texas, its distribution includes Cameron, Hidalgo, Starr, and Willacy counties where it is extremely rare. The jaguarondi has not been reported in Texas since a roadkill specimen was found outside Brownsville in April 1986 (USFWS, 2013b).

The West Indian manatee (*Trichechus manatus*) is a federally listed endangered aquatic mammal that inhabits brackish water bays, large rivers, and saltwater (Davis and Schmidly, 1994). They feed upon submergent, emergent, and floating vegetation with the diet varying according to plant availability (O'Shea and Ludlow, 1992). The manatee is more common in the warmer waters off of coastal Mexico, the West Indies, and Caribbean to northern South America (NatureServe, 2000). In the U.S., populations are primarily found in Florida, but occasional vagrants migrate along the coast into Texas. Although extremely rare in Texas, recent records include specimens from Cameron, Galveston, Matagorda, and Willacy counties (USFWS, 1995).

The Kemp's ridley sea turtle (*Lepidochelys kempii*) inhabits shallow coastal and estuarine water, usually over sand or mud bottoms. Adults are primarily restricted to the Gulf, although juveniles may range throughout the Atlantic Ocean since they have been observed as far north as Nova Scotia (Musick, 1979). Almost the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles south of the Rio Grande. Sporadic nesting has been reported from Mustang Island, Texas, southward to Isla Aquada, Campeche. Kemp's ridley occurs in Texas in small numbers and in many cases may well be in transit between crustacean-rich feeding areas in the northern Gulf and breeding grounds in Mexico. It has nested sporadically in Texas in the last 50 years.

The Hawksbill sea turtle (*Eretmochelys imbricata*) is a circumtropical species, occurring in the tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans (Witzell, 1983). This species is probably the most tropical of all marine turtles, although it does occur in many temperate regions. The Hawksbill sea turtle is widely distributed in the Caribbean Sea and

Western Atlantic Ocean, with representatives of at least some life-history stages regularly occurring in southern Florida and the northern Gulf (especially Texas), south to Brazil (NMFS, 2017a). The hawksbill generally inhabits coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, where it occurs at depths of less than 70 ft. Like some other sea turtle species, hatchlings are sometimes found floating in masses of marine algae (i.e. sargassum rafts) in the open ocean (NFWL, 1980). In the continental U.S., the hawksbill largely occurs in Florida where it is sporadic at best. In 1998 the first hawksbill nest recorded on the Texas coast was found at Padre Island National Seashore. Texas is the only state outside of Florida where hawksbills are encountered with any regularity. Most of these sightings involve posthatchlings and juveniles, and are primarily associated with stone jetties. These small turtles are believed to originate from nesting beaches in Mexico (NMFS, 2017a). This species may potentially occur in the study area.

The Leatherback sea turtle (*Dermochelys coriacea*) is probably the most wide-ranging of all sea turtle species. The species occurs in the Atlantic, Pacific, and Indian Oceans; as far north as British Columbia, Newfoundland, Great Britain, and Norway; as far south as Australia, Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (NFWL, 1980). The leatherback is mainly pelagic, inhabiting the open ocean, and seldom approaches land except for nesting (Eckert, 1992) or when following concentrations of jellyfish, when it can be found in inshore waters, bays, and estuaries. It dives almost continuously, often to great depths. Leatherbacks nest primarily in tropical regions and only sporadically in some of the Atlantic and Gulf states of the continental U.S., with one nesting reported as far north as North Carolina (Schwartz, 1976). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS, 2017b). Apart from occasional feeding aggregations such as the large one of 100 animals reported by Leary (1957) off Port Aransas in December 1956, or possible concentrations in the Brownsville Eddy in winter (Hildebrand, 1983), leatherbacks are rare along the Texas coast, tending to keep to deeper offshore waters where their primary food source, jellyfish, occurs (NMFS and USFWS, 1992). No leatherback sea turtles have been taken by dredging activities in Texas (USACE, 2017); however, a leatherback was caught by a trawler in a shipping channel approximately 1.5 miles north of Aransas Pass (NMFS, 2003). This species is unlikely to occur in the study area.

The Green sea turtle (*Chelonia mydas*) is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, the species occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Major nesting activity occurs on Ascension Island, Aves Island (Venezuela), Costa Rica, and Suriname. Relatively small numbers nest in Florida, with even smaller numbers in Georgia, North Carolina, and Texas (Hirth, 1997; NMFS and USFWS, 1991). The green sea turtle in Texas inhabits shallow bays and estuaries where its principal foods, various SAVs, grow (Bartlett and Bartlett, 1999). While green sea turtle prefer to inhabit bays with seagrass meadows, they may also be found in unvegetated bays. The green sea turtles in these Texas bays are largely juveniles. Adults, juveniles, and even hatchlings are occasionally caught on trotlines of by offshore shrimpers or are washed ashore in a moribund condition (Shaver, 2000; STSSN, 2017).

Green sea turtles nests are rare in Texas. Since long migrations of green sea turtles from the nesting beaches to distant feeding grounds are well documented (Green, 1984; Meylan, 1982), the adults occurring in Texas may be either at their feeding grounds of in the process of migration to or from their nesting beaches. The juveniles frequenting the seagrass beds of the bay areas may remain there until they move to other feeding grounds, or, perhaps, once having attained sexual maturity, return to their natal beaches outside of Texas to nest.

The Loggerhead sea turtle (*Caretta caretta*) is widely distributed in tropical and subtropical seas, being found in the Atlantic Ocean from Nova Scotia to Argentina, the Gulf, Indian, and Pacific oceans (although it is rare in the eastern and central Pacific), and the Mediterranean Sea (Iverson, 1986; Rebel, 1974; Ross, 1982). In the continental U.S., loggerheads nest along the Atlantic coast from Florida to as far north as New Jersey (Musick, 1979) and sporadically along the Gulf Coast, including Texas. Like the worldwide population, the population of loggerheads in Texas has declined. The loggerhead is the most abundant turtle in Texas marine waters, preferring shallow inner continental shelf waters and occurring only very infrequently in the bays. It is often seen around offshore oil rig platforms, reefs, and jetties. Loggerheads are probably present year-round but are most noticeable in the spring when one of their food items, the Portuguese man-o-war, is abundant. Loggerheads constitute a major portion of the dead or moribund turtles washed ashore (stranded) on the Texas coast each year (STSSN, 2017). A large proportion of these deaths is the result of accidental capture by shrimp trawlers, where caught turtles drown and their bodies are dumped overboard. Critical habitat for the species was designated in 2014 (63 FR 46693). The designated critical habitat in the study area encompasses a large area in the Gulf for feeding habitat.

2.3.5.2 Essential Fish Habitat

Congress enacted amendments to the Magnuson-Stevens Act (PL 94-265) in 1996 that established procedures for identifying Essential Fish Habitat (EFH) and required interagency coordination to further the conservation of federally managed fisheries. Rules published by NMFS (50 CFR Sections 600.805-600.930) specify that any Federal agency that authorized, funds, or undertakes, or proposes to authorize, fund, or undertake an activity that could adversely affect EFH is subject to the consultation provisions of the above-mentioned act and identifies consultation requirements.

EFH is defined as “those water and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity.” EFH is separated into estuarine and marine components. The estuarine component is defined as “all estuarine waters and substrates (mud, sand, shell, rock, and associated biological communities); sub-tidal vegetation (seagrass and algae); and adjacent inter-tidal vegetation (marshes and mangroves).” The marine component is defined as “all marine waters and substrates (mud, sand, shell, rock, and associated biological communities) from the shoreline to the seaward limit of the Exclusive Economic Zone” (GMFMC, 2004). Adverse effect to EFH is defined as, “any impact, which reduces quality and/or quantity of EFH…” and may include direct, indirect, site-specific, or habitat impacts, including individual, cumulative, or synergistic consequences of actions.

NMFS and the Gulf of Mexico Fisheries Management Council (GMFMC) have identified the project area as EFH for brown shrimp, pink shrimp, red drum (*Sciaenops ocellatus*), gray triggerfish (*Balistes capricus*), greater amberjack (*Seriola dumerili*), lesser amberjack (*Seriola fasciata*), cobia (*Rachycentron canadum*), dolphin (*Coryphaena hippurus*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), bluefish (*Pomatomus saltatrix*), little tunny (*Euthynnus alletteratus*), Atlantic bluefin tuna (*Thunnus thynnus*), lane snapper (*Lutjanus synagris*), red snapper (*L. campechanus*), bonnethead shark (*Sphyrna tiburo*), blacktip shark (*Carcharhinus leucas*), and Atlantic sharpnose shark (*Rhizoprionodon terranovae*). The categories of EFH that occur within the project area include estuarine water column, estuarine sand and mud bottoms (unvegetated estuarine benthic habitats), estuarine shell substrate (oyster reefs and shell substrate), estuarine emergent wetlands, and seagrasses. Additionally, portions of the project located in marine waters include the marine water column, unconsolidated marine water bottoms, and natural structural features.

3. EXPECTED FUTURE WITHOUT PROJECT CONDITIONS

3.1 Air Quality

The future without project conditions (also known as the No-Action Alternative) does not include an increase in construction or dredging operations, and thus there is no expected increase in air contaminant emission sources. Air contaminants are likely to increase due to an increase in shipping traffic resulting from growth in existing businesses and new businesses.

Ongoing existing maintenance dredging activities will continue to contribute to air emission contaminants through the fuel combustion/exhaust of marine vessels, as will construction equipment on-shore, and local commuter vehicles. Maintenance dredging schedules are not expected to change from current timelines and no increase in emissions is expected from this activity.

3.2 Noise

The No-Action Alternative does not include widening or deepening of the existing ship channel. However, the existing maintenance dredging and operations of the channel will continue. A hopper dredge is typically used for a portion of the maintenance dredging operations. This type of dredge houses its equipment below deck and is likely to operate at noise levels similar to that of a large tug boat. Table 3.1 lists noise levels typical of equipment utilized in maintenance dredging operations.

Permanent noise impacts are not expected under the No-Action Alternative. Dredging operations occur in the channel, which is a significant distance from the shoreline and sensitive receivers. The nearest receiver, at Magnolia Beach, is approximately 3,000 feet from the channel. This distance will reduce the amount of noise output from the channel that is received at the shoreline. The existing noise levels in the project area range from 52.4 to 65.1 dBA (L_{dn}). The No-Action Alternative is not likely to result in short-term or permanent noise impacts.

Table 3.1: Typical noise levels associated with equipment regularly used in maintenance dredging operations.

Equipment	Noise Level (dBA)
Cutterhead Dredge (at 160 ft.)	79[1]
Hopper Dredge (at 50 ft.)	87[2]
Large Tug Boat (at 50 ft.)	87[3]
Small Tug Boat	72[3]
Bulldozer (at 50 ft.)	82[4]
Bucket Crane (at 50 ft.)	82[4]

[1] Geier and Geier Consulting, 1997
[2] Assumed to be the same as a large tug boat.
[3] Epsilon Associates, 2006
[4] Federal Highway Administration, 2006

3.3 Physiography, Topography, and Bathymetry

No impact to the physiography, topography, or bathymetry would occur to the project area as a result of the No-Action Alternative. Maintenance dredging and placement in PAs would continue under the No-Action plan.

The current level of wave energy and shoreline erosion would continue under the No-Action Alternative. The majority of waves in the region are wind waves, with only a small portion of the waves being caused by ship traffic. There is no expected increase in wave energy or shoreline erosion resulting from ship traffic under the No-Action Alternative.

3.4 Geology

The No-Action Alternative would not cause any changes in the geology of the project area.

3.5 Energy and Mineral Resources

The No-Action Alternative would not cause any changes to the energy or mineral resources of the project area. As maintenance dredging continues under normal scheduled operations more sand and sediment will become available that could be used beneficially to counter natural shoreline erosion.

3.6 Soils

Placement of dredged material in the upland Placement Areas is the main driver of impacts to soils in the project area. The placement of maintenance material will continue under the No-Action Alternative, but is not expected to occur at an elevated rate or increase the impacts to soils. Commercial and residential development is another driver of impacts to local soils and is not expected to increase under the No-Action Alternative.

3.7 Groundwater Hydrology

The No-Action Alternative would not impact groundwater hydrology within the project area and trends related to the hydrology would continue along historical trends.

3.8 Hazardous Material

The No-Action Alternative is not expected to have any impacts on hazardous materials in the project area. Maintenance dredging and placement will continue under the No-Action Alternative. Increased ship traffic resulting from growth in existing and/or new businesses may slightly increase the possibility of spills resulting from accidents, but is not expected to differ from historical rates.

3.9 Water and Sediment Quality

3.9.1 Water Exchange and Inflows

No changes to the ship channel depth or width would occur under the No-Action Alternative and water movements will continue to follow historical trends.

3.9.2 Salinity

No changes to the ship channel depth or width would occur under the No-Action Alternative and changes in salinity will continue to follow historical trends.

3.9.3 Water Quality

The effects on dissolved oxygen (DO) concentrations from the No-Action Alternative are not entirely clear. There are conflicting study results on whether or not the placement of maintenance material impacts DO (Brown and Clark, 1968; Hopkins, 1972; May, 1973; Pearce, 1972; Wakeman, 1974; Windom, 1972). Temporary decreases in DO were found by May (1973) at the interface of the water and sediment at areas of mud flow, possibly due to the anaerobic nature of maintenance material.

The amount of turbidity resulting from dredging activities will be unchanged under the No-Action Alternative.

3.9.4 Sediment Quality

No changes to the quality of sediments are expected under the No-Action Alternative. Natural recovery through sedimentation will continue to areas with high levels of mercury concentrations in the area of the ALCOA (Point Comfort)/Lavaca Bay Superfund Site, as stated in the ROD for the ALCOA Superfund Site.

3.10 Wetlands and Submerged Aquatic Vegetation

The submerged aquatic vegetation (SAV) community in the project area will be unaffected under the No-Action Alternative, except for the beds in Keller bay, which may be impacted if the southern shoreline is breached by erosion or tropical storm/hurricane washover. If the shoreline is breached approximately 250 acres of SAV could be permanently lost.

Estuarine tidal flats may decline due to relative sea level rise under the No-Action Alternative. However, new tidal flats may be created by washover from tropical storms/hurricanes.

Estuarine (saline and brackish) marshes may decline due to relative sea level rise under the No-Action Alternative. However, new marshes may be created by washover from tropical storms/hurricanes. New marshes may also be created in Pass Cavallo due to longshore drift.

Estuarine scrub-shrub wetland would not be impacted under the No-Action Alternative. Black mangrove populations in Pass Cavallo and Port O'Connor would likely adjust to new elevations caused by longshore drift.

Fresh-intermediate wetlands and SAVs would not be impacted under the No-Action Alternative.

3.11 Wildlife

No direct impacts to wildlife would occur as a result of the No-Action Alternative. Continued commercial and residential development may result in loss of habitat for wildlife. Ongoing maintenance dredging and placement operations may result in increased turbidity in the bay and a resulting impact to aquatic species used as prey by coastal birds and other terrestrial wildlife species.

3.12 Aquatic Resources

3.12.1 Recreational and Commercial Fisheries

The No-Action Alternative will not impact recreational or commercial fisheries. However, the ongoing maintenance dredging and open-water placement may indirectly impact fishery species due to increased turbidity. No decrease in abundance is expected and any impacts would be temporary.

3.12.2 Open-Bay Bottom

The No-Action Alternative will not impact open-bay bottom habitats. Ongoing maintenance dredging and open-water placement may indirectly impact benthic and demersal species due to increased turbidity and burying of the benthos. No decrease in abundance is expected and any impacts would be temporary.

3.12.3 Oyster Reef

The No-Action Alternative will not impact oyster reefs. However, the ongoing maintenance dredging and open-water placement may indirectly impact oyster reef beds due to increased turbidity.

3.12.4 Essential Fish Habitat

The No-Action Alternative will not impact essential fish habitat (EFH). However, the ongoing maintenance dredging and open-water placement may indirectly EFH due to increased turbidity. Any indirect effects are expected to be temporary.

3.13 Threatened and Endangered Species

Ongoing maintenance dredging may impact some species of sea turtles. Hopper dredging may result in the mortality of Kemp's ridley sea turtles, however no Kemp's ridleys have been reported taken during dredging maintenance operations of the MSC since before October 2008 (USACE, 2018). Sea turtle avoidance measures would include an avoidance plan for hopper dredge impacts to sea turtles. This avoidance plan includes reasonable and prudent measures that have largely been incorporated in USACE regulatory and civil works projects throughout the Gulf for more than a decade. These measures include use of temporary dredging windows, when possible; intake and overflow screening; use of sea turtle deflector dragheads; observer reporting requirements; and sea turtle relocation/abundance trawling.

4. FUTURE WITH PROJECT CONDITIONS

Two alternatives were analyzed, with varying depths included as scales of each alternative. The impacts of each alternative would be similar, except with respect to duration of construction. The placement areas outlined in the DMMP (Appendix E) would not be changed as they are large enough to accommodate larger quantities than anticipated from the recommended plan. The alternative and scales that were not selected would not change the expected impacts from the implementation of the recommended plan. The impacts discussed below are in reference to the recommended plan, but would be indicative of impacts associated with the alternative and scales that were eliminated from consideration for the Matagorda Ship Channel Project.

The different depths considered under Alternative A would each have similar environmental impacts. The relative differences would be proportional to the depths in that the shallowest proposed channel would have the least amount of impacts, while the deepest proposed channel would have the largest amount of impacts (Table 4.1). The impacts discussed throughout the chapter are associated to each depth scale, unless specifically mentioned, and are expected to be proportional to each depth scale of the Alternative in intensity. Each foot of additional depth of dredging increases the impact to bay bottom by 19 acres.

Table 4.1. The depth scales and widths associated with Alternative A for the MSC Project. The highlighted row is the Recommended Plan.

Channel Depth (MLLW)	Bottom Width (ft)	Top Width (ft)	Dredge Quantities (mcy)
-41	350	596	8
-43	350	608	13
-45	350	620	17
-47	350	632	21
-49	350	644	27
-51	350	656	32

4.1 Air Quality

4.1.1 Construction Dredging Equipment

Diesel fired-engines will be used during dredging operations, to transport materials to their designated locations, and for support of associated dredging equipment. This equipment will include primarily dredges, booster pumps, barges, tug boats, transport and supply boats, survey boats, and crew boats. Emission sources related to the dredging operations can be found in Table 4.2.

4.1.2 Construction Volumes and Timeline

The total volume of new work dredged material for the recommended plan has been estimated to be 21 mcy. The emission rates used for this report assume a conservative maximum length of operations for a project life of approximately two years, with construction beginning in fall 2020 and ending in fall 2022.

4.1.3 Construction Dredging Emissions

Emission rates for dredging and support equipment is directly related to the horsepower rating of the engines, load factors, duration of use, and amount of material to be dredged. Emission rates for employee commuter vehicles is directly related to the total miles traveled per vehicle. Diesel fuel combustion in the internal combustion engines of the vehicles during dredging operations will result in emissions of CO, NO_x, PM, SO_2, and VOC.

4.1.4 Project Construction Emissions Inventory

Temporary increases in air pollution would result from the equipment associated with construction of the recommended plan. These air contaminant emissions would result from the use of marine vessels and land-based mobile sources during the construction activities, including:

- Dredge and Support Equipment—dredging vessels and supporting equipment and vessels such as tugboats;
- Non-Road Construction Equipment—land-based equipment such as bulldozers and graders;
- On-Road and Employee Vehicles—land-based equipment such as cars and trucks; and
- Maintenance Dredging—dredging vessels for maintenance such as tugboats.

Air contaminant emissions associated with these construction activities would be primarily combustion products from fuel burned in equipment used for Project dredging, support vessels, and dredged material placement equipment. Equipment such as excavators, backhoes, and front-end loaders also would be required. The marine vessel emission sources would be primarily diesel-powered engines. The off-road and on-road equipment may be assumed to be a mix of gasoline and diesel-powered vehicles. These construction activities would be considered one-time activities, i.e., the construction activities would not continue past the date of completion. For purposes of estimating emissions, the construction activities will be projected to occur from the year 2020 to the year 2022. It will be assumed 136 that the proposed construction dredging may continue up to 20 hours per day, seven days per week (with some scheduled down time). The dredges would operate in continuous 10-hour shifts, during which supporting equipment would be used to transport the crew to and from the dredges for each shift. It is expected that the same boat that brings one work crew to the dredge would return to shore with the exiting crew. Light plants would be used in the late afternoon and evening time frames to provide additional lighting for the crew and to serve as safety beacons to surrounding waterborne traffic.

Onshore construction equipment related to the dredged material placement areas would include cranes, trucks, dozers, front-end loaders, backhoes, compactors, graders, and dump trucks. Sulfur dioxide emissions from onshore construction equipment will be estimated based on an assumed 0.0015 percent by weight fuel sulfur content, in accordance with EPA reduced fuel sulfur standards.

Commuter vehicles will be used to transport the crew and staff from the shore to land-side locations and back to the shore. Crew and staff sizes will be determined based on estimates from previous dredging projects. Employee commuter vehicles would include a mix of light-duty gas vehicles and light-duty gas trucks. It is assumed that vans will transport the dredge crew inland twice per month; passenger cars will be assumed to transport management staff and support crew 30 days per month; and trucks will be assumed to transport management staff 15 days per month. An average commute of 25 miles each way per day of work will be assumed for each vehicle.

Fugitive dust that may be generated by the physical disturbance of soils caused by earth-moving and equipment/vehicle traffic at the land-based Project construction sites would be minimal as the dredged material (sand, silt, and clay) is assumed to be moist; and therefore, quantitative estimates are not necessary. However, dust-reduction measures, such as the use of a water truck at the site, may be employed, if required.

In general, air contaminant emission rates for the non-road/off-road emission sources will be estimated using the following equation:

Emission Rate = (engine horsepower) x (load factor) x (hours per year

of operation) x (emission factor, grams per horsepower-hour)

Air contaminant emission rates for the on-road emission sources will be estimated using the following equation:

Emission Rate = (number of vehicles) x (vehicle miles traveled per vehicle

per year) x (emission factor, grams per vehicle mile traveled)

The calculated emissions will be converted to tons per year using the appropriate conversion factors.

At present there is no indication that the project will lead to loss of EPA NAAQS attainment status. The estimation of no status change is based on emissions output from previous channel widening and deepening projects in Texas. Modeling will be performed to verify that the project will not cause the region to lose its emissions attainment status and will remain in compliance with the Clean Air Act.

4.1.4.1 Dredge and Support Equipment

Dredge and support equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = HP x LF x Hr x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

HP = Horsepower (hp)

LF = Load Factor (unitless)

Hr = Annual Operating Hours (hr)

EF = Emission Factor (g/hphr)

Dredge and support equipment list, monthly operating hours per equipment type and activity, hp, and engine tier will be provided by the USACE for the Preferred Alternative. Load factors will be taken from Table 3-3 in *Current Methodologies for Preparing Mobile Source Port-Related Emission* Inventories (EPA 2009). Emission factors for the dredging and support vessels were developed from Table 3-8 in *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). The emission factors in the table are presented in units of g/kW-hr. These were converted to units of g/hp-hr using a conversion factor of 1.341022 kWh/g/hp-hr. Greenhouse gas (GHG) emissions will be estimated for CO2, methane (CH4), and nitrous oxide (N2O) and converted to carbon dioxide equivalents (CO2e) using Global Warming Potentials (GWP). Hazardous air pollutants (HAPs) emission factors for engines less than 600 hp will be based on AP-42, *Compilation of Emission Factors* (herein AP-42), Tables 3.3-1 and 3.3-2 (EPA 1996). HAP emission factors for engines greater than 600 hp were taken from AP-42, *Compilation of Emission Factors*, Tables 3.4-3 and 3.4-4. HAP emissions represent a sum of the following pollutants: Benzene, Toluene, Xylenes, Formaldehyde, Acetaldehyde, Acrolein, Napthalene, Diesel Particulate Matter, and Polycyclic Aromatic Hydrocarbons. HAP emissions for dredging and support vessels with engines greater than 600 hp do not include 1,3-Butadiene because emission factors will be not available from AP-42 for this pollutant.

4.1.4.2 Non-road Construction Equipment

Non-road construction equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = HP x LF x Hr x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

HP = Horsepower (hp)

LF = Load Factor (unitless)

Hr = Annual Operating Hours (hr)

EF = Emission Factor (g/hphr)

A non-road construction equipment list, monthly operating hours per equipment type and activity, and hp will be provided by the USACE for the Preferred Alternative. Load factors were taken from EPA's Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling (EPA 2004). Emission factors were developed using the EPA Motor Vehicle Emissions Simulator (MOVES) model, version 2014a, using the NONROAD modeling functioning through MOVES. The MOVES model will be used to produce emission factors in units of g/hp-hr for peak winter (January, 7:00 a.m. to 8:00 a.m.) and peak summer (July, 5:00 p.m. to 6:00 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2020 through 2022, 2020 emission factors were used. Typically, a single year is used to calculate construction emission factors because the same construction fleet tends to be used throughout the full construction schedule.

GHG emissions were estimated for CO2, CH4, and N2O and converted to CO2e using GWP. The NONROAD model within MOVES does not include emission factors for N2O or total HAPs. N2O emission factors will be developed by multiplying the CO2 emission factor by a ratio, 0.0000697. HAP emission factors for non-road vehicles will be taken from AP-42, Tables 3.3-1 and 3.3-2 (EPA 1996). The sum of the following pollutant emission factors will be used: Benzene, Toluene, Xylenes, 1,3-Butadiene, Formaldehyde, Acetaldehyde, Acrolein, Napthalene, Polycyclic Aromatic Hydrocarbons, and Diesel PM10.

Table 4.2: Proposed project construction emission sources.

Construction Emission Sources	Quantity	Horsepower Rating
Dredging Equipment*		
30-inch Hydraulic Dredge	2	13,200
Hopper Dredge	1	18,000
Clamshell Dredge	1	2,340
Dredging Support Equipment*		
Booster Pump Barge	2	5,400
Dredge Tender Barge	4	150
Tug for Supply Barge	2	1,000
Tug Boat	2	850
Tug Boat for Dump Scow	1	3,500
Work Boat	2	350
Survey Boat	2	350
Crew Boat	2	350
Generator	2	7
Welding Machine	2	10
Air Compressor	2	55
Placement Area Construction Equipment*		
Cat D6 LPG Dozers	3	225
Hydraulic Excavator	3	250
200-ton Crane – Dragline	2	550
Spill Barge/Crane	2	416
Cat 325 Marsh Buggy	2	250
Generator	2	7
Mules	2	50
Air Compressor	2	55
Dump Truck – 20 yard	4	430
Light Plant	4	300
Commuter Vehicles		
Van	5	n/a
Cars	8	n/a
Trucks	17	n/a

*All equipment information is based on experience from past projects.

4.1.4.3 On-road and Employee Vehicles

On-road and employee vehicle emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tons/year = VMT x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

VMT = Annual Vehicle Miles Traveled (miles)

EF = Emission Factor (g/VMT)

Annual VMT were calculated by multiplying the number of vehicles per day, the 227 daily travel distance per vehicle, and the number of travel days per year. The number of vehicles per day and number of travel days per year were provided by the USACE. The daily travel distance were assumed to be 25 miles each way per day of work, on average. Emission factors were developed in the MOVES model, version 2014a.

The MOVES model were used to produce emission factors in units of g/VMT for peak winter (January, 7:00 a.m. to 8:00 a.m.) and peak summer (July, 5:00 p.m. to 6:00 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2020 through 2022, 2020 emission factors were used. Typically, a single year is used to calculate construction emission factors because the same construction fleet tends to be used throughout the full construction schedule. The total number of miles traveled were estimated from the number of miles per trip multiplied by the total number of days of travel to and from the worksite times the number of vehicles.

MOVES 2014a on-road model CO2e emission factors were used for estimating emissions of GHGs. The HAP emission factors for on-road vehicles will be a sum of the following pollutant emission factors: Benzene, 1,3-Butadiene, Formaldehyde, Acrolein, Napthalene, and Polycyclic Organic Matter.

4.1.4.4 Maintenance Dredging

Maintenance dredging equipment emissions were calculated the same way as the dredge and support equipment emissions will be calculated.

4.2 Noise

Dredging operations would generate noise from multiple sources of equipment, though dredges would be the primary contributor to the noise environment. Smaller vessels would not be expected to contribute appreciably to the noise associated with dredging operations. Table 4.3 provides a summary of dredging-related noise levels by equipment type.

No permanent noise sources will be installed as part of the project. However, short term noise levels could be elevated at the sensitive receptors in Magnolia Beach and Alamo Beach. The proposed project's dredging noise levels at sensitive receivers would be less than the existing ambient conditions beyond 4,100 ft. from the channel. In other words, short term noise levels from the project would be similar to those from ongoing maintenance dredging operations within the channel.

4.3 Physiography, Topography, and Bathymetry

The total estimated amount of dredged material generated from the recommended plan would be approximately 46.5 mcy of new work material and 257.5 mcy of maintenance material over the 50 years following completion of the project's construction. The material will be placed in open-bay placement areas, a confined upland placement area, a confined bay dredge island placement area, and offshore unconfined placement area.

While local changes would occur to bathymetry and topography during construction of the project, these alterations would be expected to have negligible impacts on the regional physiography, topography, and bathymetry of the submerged and subaerial portions of the study area.

Table 4.3: Typical noise levels from dredge-related equipment

Equipment	Noise Level (dBA)
Cutterhead Dredge (at 160 ft.)	79[1]
Hopper Dredge (at 50 ft.)	87[2]
Large Tug Boat (at 50 ft.)	87[3]
Small Tug Boat	72[3]
Bulldozer (at 50 ft.)	82[4]
Bucket Crane (at 50 ft.)	82[4]

[1]Geier & Geier Consulting, 1997 [2]Assumed same as large tug
[3]Epsilon Associates, 2006 [4]Federal Highway Administration, 2006

4.4 Geology

The impacts on the local geology during dredging associated with the proposed project would include redistribution of existing sediment and potential increases in local scouring and shoaling rates. Net impacts on geology would be minimal from these operations. Additionally, no impacts or modifications to geological hazards, such as faulting and subsidence, are expected.

In an October 2006 Memorandum for Record (USACE, 2006), results of a study performed concerning the cross-sectional stability of Pass Cavallo showed the width of the pass has decreased since construction of the MSC in 1966. The study concluded that Pass Cavallo would remain open at its present cross-sectional channel area or with an increase in area. The proposed widening of the MSC is not expected to notably change the stability of Pass Cavallo because the additional capture of the tidal prism by the ship channel would be small relative to past changes in tidal prism (Appendix G).

4.5 Energy and Mineral Resources

The recommended plan would include widening and deepening the existing MSC. This action would result in 46.5 mcy of new work material and an additional 257.5 mcy of maintenance material over the next 50 years after project completion. The locations identified for dredged material placement do not appear to impact known areas of mineral production.

The DMMP was designed to minimize impacts to oil and gas wells and pipelines. Table 4.5.1 summarizes the energy resources identified within the proposed placement areas. One permitted well location is within the proposed in-bay unconfined PA locations. No active wells are located within the proposed PA sites.

Approximately 22 active pipelines are mapped within the 2,000 ft. wide buffer along the proposed ship channel. Although well sites and pipelines are mapped within the buffer, no impacts are likely with the recommended plan. Well and pipeline locations reported by the Texas Railroad Commission are approximate. No mitigation is expected for well sites, plugged wells, or dry holes.

As a result of the project, pipelines will need to removed and relocated to meet the USACE's policy of a minimum of 20 ft. below the channel and a distance of 50 ft. on each side of the channel. Pipeline relocation will be assessed by the owners. This relocation/removal of pipeline may cause an impact to Matagorda Bay bottoms and temporary increases in turbidity. No long-term or significant impacts are anticipated from the relocation/removal of these pipelines.

4.6 Soils

Possible impacts to surface soils exist from the potential release of petroleum products during construction and hazardous material spills from hazardous cargo during shipping operations. However, the use of best management practices (BMPs) in the project area would minimize the potential for this type of impact.

4.7 Groundwater Hydrology

Construction and operation activities associated with the recommended plan are not expected to result in impacts to groundwater hydrology. In addition, no groundwater withdrawals are anticipated for the project. No apparent public, private, or industrial water wells registered with the TWDB (2017) would be destroyed and/or affected by the recommended plan based on their proximal distances and completed depths below surface grade.

The Chicot Aquifer is the surficial aquifer, with the Evangeline Aquifer below. The total thickness of the Chicot Aquifer ranges from approximately 800 to 1,200 ft. Therefore, deepening of the MSC to -47 ft. below MLLW would not penetrate the Chicot Aquifer. No impacts to the Chicot Aquifer would be anticipated.

Possible impacts to the shallow groundwater exist from the potential release of petroleum products during construction and hazardous material spills from shipping interests. However, the use of BMPs in the project area would greatly minimize the potential for this type of impact. BMPs that meet local, State, and Federal requirements would be developed as part of the Spill Response Plan for the project to address potential spills. In addition, packages for hazardous material must conform to standards set by Research and Special Programs Administration (RSPA) of the DOT and the International Maritime Organization (IMO). A carrier accepting hazardous cargo from a shipper or intermediary is obliged to exercise reasonable care to be sure that the shipment has been properly prepared. This obligation exists each time the cargo is handed off during the transportation process. Specific requirements apply to highway, rail, air, and ocean transport. Compliance with these procedures would greatly reduce the risk of impact to the underlying groundwater in the project area.

4.8 Hazardous Material

The potential for encountering impacted material during the construction of the project is limited. Impacts associated with regulated facilities are most likely to be encountered near the source of the contaminants. These sources include, but are not limited to, industry located in the Point Comfort area. According to a review of database records and research of the environmental history of the region, the industrial activity adjacent to Lavaca Bay has caused measurable impacts to the terrestrials and marine environments adjacent to this and adjacent waterways.

The industrial activity adjacent to Lavaca Bay is extensive and primarily related to two large industrial complexes located immediately adjacent to the project. Industrial activity at Alcoa Point Comfort Operation and Formosa has resulted in quantifiable impacts to groundwater, surface water, soil, and sediment. Corrective action performed at both facilities has minimized the potential to encounter media during project construction. In spite of remedial activities, the potential for the project to encounter impacted media remains. The documented areas impacted by previous industrial activity are isolated to the Lavaca Bay adjacent to Point Comfort. According to the regulatory agency database report, the northern extent of the project enters into an area defined as a National Priority List (NPL or Superfund) site. This area has been defined as having been impacted by contaminant releases from the Alcoa facility. Data provided by NOAA delineates elevated levels of mercury within sediment in the vicinity of Dredge Island. The concentrations of mercury within the impacted area range from below detection limits to 2.00 mg/kg. Coordination with EPA with regards to the Alcoa site will continue prior to and during construction of the MSC.

Due to the prolonged use of portions of the area as military training, the potential of unexploded ordnance within the project area does exist. However, the potential to encounter unexploded ordnance during dredging activity is considered to be quite low. The existing channel has been maintained through maintenance dredging for the last 50 years and there has been no reported incidences of unexploded ordnance encountered in the Matagorda Bay area (USACE, 2001a, 2001b).

4.9 Water and Sediment Quality

4.9.1 Water Exchange and Inflows

The recommended plan would not have any effect on freshwater inflows, but would to a limited extent modify the tidal exchange of water with the Gulf. There would also be modifications to the tidal movement of water produced by the PA features. With tidal exchange, the main constriction points for water entering and leaving the bay are the inlet at the MSC entrance and at Pass Cavallo. There are no modifications to Pass Cavallo under consideration. Hydrologic modeling suggests the deepening and widening of the Matagorda Ship Channel will have little effect on the tides and waves within Matagorda Bay (See Appendix G for more detail.).

4.9.2 Salinity

One effect of deepening the MSC would be to allow the density current to transport a large volume of higher salinity Gulf water up the bay under certain conditions. The biggest effects are expected to occur following large freshwater inflow events when there is a strong salinity gradient from the upper to the lower bay. In this case, the deeper channel can be expected to reduce the time required for the density current to move higher salinity Gulf water to Lavaca Bay. This can be expected to increase the average salinity in the upper Matagorda and Lavaca Bays. During dry periods when salinity levels are relatively high throughout the bay, density differences would be small and the deeper channel would have relatively little effect.

The MIKE3-FM model was used by Moffatt & Nichol to simulate salinity changes resulting from the recommended plan (PBS&J, 2009). In low flow cases, salinities are up to 30 practical salinity units (PSU) in much of the bay and about 26 PSU in Lavaca Bay. In the median flow simulation, salinities are in the 16-24 range in Lavaca Bay and only get to 30 PSU near the Gulf. In contrast, during the high flow period, all of Lavaca Bay averages less than 10 PSU.

The model predicts salinity increases along the channel. The amount of the salinity increase is greater during times of higher inflow. The largest changes in salinity are predicted to occur fairly rarely – less than 10 percent of the time for most months. At the other end, about a quarter of the time the low flows would be low enough that there is little change in salinity. The median salinity changes should correspond to the flow that is exceeded 50 percent of the time.

4.9.3 Water Quality

Under the recommended plan, factors that could affect DO include the increase in both water circulation and salinity. The increased tidal activity is primarily associated with the bottleneck removal, which is not part of this project. In general, increased water velocity would contribute to improved mixing and oxygen transport. The increase in salinity along the axis of the MSC will slightly reduce the DO saturation concentration and thus the absolute value by a similar amount. For example, a change in salinity from 20 to 21 PSU would reduce the DO saturation concentration at 25 degrees Celsius (°C) from 7.39 to 7.35 mg/L (Kraus et al., 2006). The magnitude of change is not likely to have a significant effect on the system.

Although there will be more maintenance material placed in Matagorda Bay under the recommended plan, the source of the material will not change, and the method of placement will not change. Open-bay placement of maintenance material would not occur in Lavaca Bay, and turbidity should decrease somewhat in that bay since the turbidity caused by placement of dredged material would not be added to the natural, wind-and-wave-generated turbidity. Also, the fine material that would have resulted from open-bay placement would not be available for resuspension in the water column. There is the possibility of contamination of the maintenance material by a spill or other event, as there is now, but deepening and widening the channel should increase safety and decrease the probability of a spill. Additionally, the USACE routinely tests the elutriates prepared from maintenance material according to the Inland Testing Manual (ITM, EPA/USACE, 1998) and the RIA (EPA/USACE, 2003) protocols before dredging to ensure that there are no causes for concern. The ITM and RIA provide guidance for testing sediments for in-bay and offshore placement, respectively. Tier I (use of readily available information), Tier II (sediment and water chemistry information, including comparison of elutriates to TWQSs and WQC), and Tier III (bioassays and bioaccumulation testing) testing of elutriates with chemical analyses and water column bioassays indicated no cause for concern. Additionally, significant detrimental environmental effects have not been noted in past maintenance dredging operations are not expected with the recommended plan.

Open-bay placement of maintenance material will continue in Matagorda Bay, so turbidity impacts there should be roughly equivalent to the No-Action Alternative. Offshore placement of construction material will cause a one-time increase in turbidity at the construction material ODMDS, and offshore placement of future maintenance material will periodically create turbidity, as it does now.

Indicator bacteria are a water quality issue in the bay system. The project will not produce any significant alterations in runoff hydrology, so there should not be any change in runoff-related bacteria levels. However, because indicator bacteria are found in sediments (Fries et al., 2006) and the project will disturb sediments as part of the dredging process, some localized and short-term increases in indicator bacteria concentrations during dredging can be expected.

A similar situation exists for mercury in sediment. While the project will not involve dredging in the areas that have highest mercury concentrations, there will be some amount of resuspension of sediment associated with the construction dredging process, and there is some concentration of mercury in sediments. However, no significant change in ambient or sediment mercury concentrations are expected.

The water quality certificate will be sought from TCEQ following publication of the draft EIS.

4.9.4 Sediment Quality

The recommended plan could result in the disturbance of bay sediments and subsequently impact the sediment quality in the project area. The primary concern with regard to sediment quality in the project area is mercury. Activities performed as part of the recommended plan that may potentially disturb bay sediments include dredging, placement of dredged material to build dikes or levees, placement of dredged material within placement areas, and building access channels for moving equipment. There is potential for a change in bay-bottom velocities due to a wider and deeper channel and the actions taken as part of the DMMP.

Alcoa collected soil boring samples approximately every 2 ft. from the mudline, through the consolidated sediment, to the consolidated material. Utilizing data from Alcoa and the procedures outlined in the ITM, mercury concentrations were averaged over a 6 ft. dredge cut. The mercury concentration in the material underlying unconsolidated sediment was assumed to be negligible or, for calculation purposes, 0 mg/kg.

Based on the analysis, all average mercury concentrations were below the remedial action objective of 0.25 mg/kg established for critical habitats (fringe marsh-type) during the remedial investigation of the Alcoa (Point Comfort)/Lavaca Bay Superfund Site. Thus there should be no restrictions on the use of the dredged material.

The area north of Dredge Island (PA ER3/D) was identified as an area of concern following the remedial investigation of the Superfund Site. Alcoa sampling data from 2005 confirmed elevated mercury concentrations in the area. The area is currently undergoing natural recovery by sedimentation. However, the sedimentation rates in the area is lower than rates in the rest of the bay (Alcoa, 1997). No change in surficial sediment quality is expected under the recommended plan.

4.9.4.1 Placement of Dredged Material

Bay sediments can be disturbed by placement of dredged material and from building dikes/levees to contain the dredged material within the placement areas. There is the possibility that placement of dredged material to build the dikes/levees would displace sediments from underneath the dikes, referred to as a mud wave. Mud waves occur when dredged material is rapidly placed on top of soft, weak sediments exceeding the sediment's bearing capacity.

Historical data indicate elevated mercury concentrations at depth in PA ER3/D within Lavaca Bay (Alcoa, 1999). Current analytical data show mercury concentrations above 0.5 mg/kg along the shoreline of Dredge Island. Residual elevated mercury concentrations have been found at the surface and at depth. In areas where very soft sediment exists, it may be difficult to avoid creating mud waves during construction of the levees. The issue of exposing sediments with elevated mercury concentrations in these areas has been recognized. Because there is a potential risk of increasing the surface sediment mercury concentration through the disturbance of mercury-impaired sediment, placement of material at PA ER3/D has been excluded from the placement plan.

The quality of the maintenance material is not expected to change from the No-Action Alternative. While more maintenance material is estimated with the recommended plan, the source of the maintenance material will not change and the method of placement will not change in Matagorda Bay. However, the material from the Channel in Lavaca Bay will all be confined. Project actions should increase safety and decrease the probability of a spill. The USACE routinely tests the maintenance material according to the ITM and RIA protocols before dredging to ensure that there are no causes for concern. Past testing of maintenance material with chemical analysis, whole mud bioassays, and bioaccumulation studies has indicated no cause for concern.

Sediment testing will be undertaken during Pre-Construction, Engineering and Design (PED) phase to determine the concentrations of any contaminants present under the requirements of Section 103 of the MPRSA. This testing includes analysis of the sediment and elutriates to determine whether the sediment poses any potential toxicity to the benthic and open water biota in and around the open water placement areas. Bioassays of the sediment and elutriates are required under the testing regimen to allow for placement in an ODMDS. The sampling regimen will be detailed in the Sampling Analysis Plan to be written during PED. While the exact suite of contaminants to be analyzed will be determined in conjunction with the EPA during PED, an example of materials tested include heavy metals and hydrocarbons.

4.10 Wetlands and Submerged Aquatic Vegetation

The condition and distribution of wetland types can be affected by changes in depth and frequency of inundations as well as salinity. The physiological tolerances of species with respect to many factors, such as salinity, water depth, and frequency of inundations, determines the species composition of plant communities. However, wetland communities are often classified by salinity characteristics, although the actual salinity ranges vary by location. In general, many species can grow and have higher productivity values under fresher conditions; however, there is competition from more species in the fresh water.

There are no known occurrences of submerged aquatic vegetation (SAV) in the footprint of the proposed dredging or placement of dredged material, so SAV would not be directly impacted by excavation of burial. There may be short-term rises in turbidity and associated reduced water clarity during the channel dredging and placement, but these would not be expected to have any lasting, measurable effect on SAV beds.

The hydrodynamic modeling predicts an increase of <1 PSU in average annual salinity throughout the project area over most of the growing season under low flow conditions. This would not be expected to have a measurable impact on any wetland communities, including SAVs. Although high flow conditions show greater differences in salinities for the recommended plan, the absolute values would be relatively low, and so would not stress the estuaries SAV beds.

Nonvascular vegetation, such as freshwater algae and free-floating marine seaweed (*Sargassum* spp.) that occur more commonly near outlets to the Gulf should not be impacted. The freshwater algaes are remote from the proposed activities, and sargassum that drifts into the bay from the Gulf would be carried by currents and/or drift away from turbulent areas.

There would no loss of tidal flats expected within the recommended plan greater than would be expected under the No-Action Alternative. The recommended plan is predicted to have little effect on both tides and waves. It is unlikely tidal flats would be impacted.

There are no estuarine marshes within the footprint of the widened channel under the recommended plan, so no direct impacts associated with construction are anticipated. Changes in salinity predicted by the hydrosalinity model may cause some adjustments in the saline to brackish marshes (i.e., some areas may become more saline or species typical of saline marshes may increase in brackish marshes). However, the salinity ranges provided by the model show less than 1 PSU difference in average annual salinities between the recommended plan and the No-Action Alternative, and so are not expected to have greater impact on these marshes. They are well within the salinity tolerance for wetland communities. The predicted differences are minor under the low flow conditions, thus no loss or reduction in marsh function is anticipated.

The predicted increases in tidal amplitude with the recommended plan are minor. It is unlikely there would be any measurable impacts to the vegetation. However, it is possible that vegetation might exhibit minor shifts in distribution in response to elevated water levels, and if there is any response, it would likely be that small parts of high salt/brackish marshes would become low marsh. Since low marshes are generally considered better habitat for fish and wildlife, this would not necessarily be considered a negative impact.

No negative impacts to existing shrub-scrub wetlands are anticipated.

No impacts to fresh-intermediate wetlands are anticipated (including aquatic vegetation) are anticipated either by dredging or placement of material.

4.11 Wildlife

4.11.1 Dredging and Construction

The dredged material would be deposited in one confined in-bay PA, one ODMDS, and multiple unconfined in-bay PAs. Construction of these PAs would be unlikely to have a direct impact on wildlife species but may have an indirect impact by affecting the food supply of many terrestrial species. The primary direct adverse impact of the recommended plan on wildlife would result from the placement of dredged material over the 50-year life of the project. The mid-coast of Texas, which is located within the Central Flyway for waterfowl, is one of the most significant waterbird wintering regions in North America. Peak populations of duck and geese on this and nearby sites normally exceeds 100,000 birds during the late wintering periods. During migratory periods, the prairies, marshes, and agricultural fields along the Texas Gulf coast provide important stopover habitat for numerous migrating shorebirds, raptors, and songbirds. The consumptive and non-consumptive activities related to these birds provide an important economic resource for the local communities.

Construction activities in the project area might result in the direct destruction of those organisms not mobile enough to avoid construction equipment. These would potentially include individuals of several species of reptiles, mammals, and if construction occurs during the breeding season, the young of some species, including nesting and fledgling birds. Most wildlife species, particularly adult birds and larger wildlife species, would avoid the initial construction activity and move into available habitat outside the project area. Each species, however, is dependent upon available resources such as food, shelter, water, territory, and nesting sites in any given area of habitat (Dempster, 1975). The availability of these resources determines the carrying capacity for a given area. It is assumed, for the purpose of impact analysis that habitats are at their carrying capacity for the species in the particular area. Therefore, displaced wildlife populations would be forced into competition with resident populations in adjoining habitats. Temporary, local impacts to terrestrial communities and habitats may occur due to these activities.

Temporary impacts to aquatic communities and habitat from increased sedimentation and turbidity would be expected. This in turn may temporarily impact birds in the area by potentially reducing the availability of their local food supply. Noise and increased human activity during construction may temporarily impact wildlife in areas adjacent to the machinery. These impacts are expected to be minor and short term.

While dredging activities are unlikely to have a direct impact on wildlife species, they may have an indirect impact. Such activities may cause temporary impacts to aquatic communities and habitats, which in turn may indirectly impact seabirds in the area by potentially reducing the availability of the food supply. These impacts are local and temporary, and considering the large size of the bay and the mobility of birds, these effects are not likely to be significant. The increased potential for accidental spills of petroleum products, chemicals, or other hazardous materials during dredging activities, however slight, also poses a potential, although very small, threat to the aquatic community, and thus the food source of many coastal birds in the area.

The noise of equipment and increased human activity during dredging activities near shorelines may disturb some local wildlife, particularly, coastal birds, especially during the breeding season. Such impacts, however, would be temporary and without significant long-term implications.

Once the initial dredging activities associated with the project have been completed, only minor additional impacts are anticipated. Maintenance dredging activities would have similar temporary impacts as the initial dredging, but on a lesser scale and for a shorter term. Accidental chemical or petroleum product spills that may occur during dredging operations would pose a potential, albeit minor, threat to the aquatic community, and thus the food source of many coastal birds in the area. Impacts from noise and human activity are unlikely to be a substantial factor, although these impacts may force some mobile species to avoid the immediate vicinity of the project and move into similar adjacent habitats. However, these effects would be short term and no different from impacts associated with current maintenance activities.

4.11.2 Operational Activities

Once the initial dredging activities associated with the project have been completed, little additional impact is expected. Proposed improvements to the MSC are not expected to result in substantial increases in ship traffic. Thus, impacts from noise and human activity are unlikely to be a factor.

Temporary impacts to aquatic communities and habitat from increased sedimentation and turbidity during maintenance dredging would be expected. This in turn may impact birds in the area by potentially reducing the availability of their food supply. This impact may be more noticeable at sites located near known bird rookeries. However, this impact would differ from the No-Action Alternative only in the duration of activities.

4.12 Aquatic Resources

4.12.1 Recreational and Commercial Fisheries

Temporary and minor adverse effect to recreational and commercial fisheries may result from altering of removing productive fishing grounds and interfering with fishing activity during construction and maintenance dredging. However, no significant impacts to food sources for nekton are likely; therefore, reductions of nekton standing crop would not be expected. Major species of nekton, including sciaenid fishes and penaeid shrimp, should not suffer any significant losses in standing crop. Thus, recreational and commercial fishing would not be expected to suffer from reductions in the numbers of important species.

Repeated dredging and placement operations for channel maintenance may temporarily reduce the quality of recreational and commercial fisheries in the vicinity of construction and dredging operations. This may result from decreased water quality and increased turbidity during dredging as well as from a loss of attractiveness to game fish resulting from loss of benthic prey. This condition is not permanent, and the quality of fishing in the vicinity of the channel and PAs should steadily improve after dredging is completed and would likely be similar to existing maintenance dredging, as described for the No-Action Alternative. Maintenance dredging operations would only cause temporary effects to the immediate area during the proposed dredging process.

During construction dredging, game fish would leave prime recreational fishing areas for more favorable, less turbid locations; however, once construction is completed, conditions would improve and game fish would return to the area. Placement of new work and maintenance material in an existing ODMDS (PA 1) and a new ODMDS (PA O5) may result in a localized effect on recreational and commercial fishing in the area. However, construction activity should not significantly affect overall fishing in the project area. The recommended plan should enhance habitat for recreational and commercial fishing throughout the Matagorda Bay system and offshore through the creation of oyster reefs.

A slight increase in salinity is likely to be observed as a result of the proposed channel improvements. However, adverse effects are not expected to occur to community structure or productivity as a result of salinity changes with the recommended plan. Therefore, impacts to recreational and commercial fish populations are not expected to be significant.

4.12.2 Open-Bay Bottom

The recommended plan directly affects open-bay bottom by loss of benthic habitat. A total of 4,864 acres (excluding the proposed ship channel) of open-bay bottom will be lost (Table 4.4); however, the acreage involved is a small fraction of the total available habitat within the entire system.

Table 4.4: Acres of aquatic acres impacted

Placement Area	Acres of Bottom Impacted	Creation Type
Proposed Ship Channel	594	None
O5	1600	Offshore placement; topographic relief
In-bay unconfined PAs	2670	Bay bottom

The recommended plan would alter the benthic habitat through dredging and placement activities. Dredging represents two problems for benthic communities: excavation and placement; however, disposal is more harmful than excavation. Excavation buries and remove organisms, but organisms can recover rapidly and recolonize, whereas placement smothers or buries existing benthic communities. Placement of dredged material may cause ecological damage to benthic organisms in three ways: (1) physical disturbance to benthic ecosystems; (2) mobilization of contaminated sediments, making them more bio-available; and (3) increasing the amount of suspended in the water column (Montagna et al., 1998). Organisms that are buried must vertically migrate or die (Maurer et al., 1986). Maurer et al. (1986) demonstrated that many benthic organisms were able to migrate vertically through 35 inches of dredged material under certain conditions; however, the species present in early successional stages of recovery are not the same as those buried by the dredged material. Although vertical migration is possible, most organisms at the center of the disturbance do not survive, and survivability was shown to increase as distance from the disturbance increased (Maurer et al., 1986). Additionally, if placement is completed before the major recruitment period (late winter or early spring in Texas) for that year, then the recovery will be faster (Armstrong et al., 1987; Ray and Clarke, 1999).

Repeated dredging during biennial maintenance dredging operations may prevent benthic organisms from fully developing (Dankers and Zuidema, 1995). Excavation destroys the community that previously existed but creates new habitat for colonization (Montagna et al., 1998) and can actually maintain high rates of macroinfauna productivity (Rhoades et al., 1978). By repeatedly creating new habitat via disturbance, new recruits continually settle and grow. However, these new recruits are always small, surface-dwelling organisms with high growth rates. Large, deep-dwelling organisms that grow slower and live longer are lost to the areas of repeated excavation. In this way, excavation associated with maintenance dredging many not cause a decrease in production, but rather a shift in community structure (Montagna et al., 1998). Sheridan (1999) found that benthic communities can take anywhere from 18 months to over three years to recover for certain parameters.

Benthic organisms are, in general, able to tolerate a wide range of salinities with community structure and abundance varying over the salinity gradient within an estuary (Armstrong et al., 1987; Longley, 1994). The most abundant benthic assemblages in Matagorda Bay and Lavaca Bay are similar; however, the salinity ranges tend to differ, with Matagorda Bay from 18 to 32 and Lavaca Bay from 5 to 20 (Longley, 1994). Kalke and Montagna (1989) presented a conceptual model of benthic organism dynamics in Texas estuaries. This model shows the relationships between abundance, diversity, and freshwater inflow in Texas estuaries. In general, with a decrease in salinity, abundance of benthic organisms increases and diversity decreases. Likewise, with an increase in salinity, diversity increases and abundance decreases. The increase in salinity from the recommended plan may shift species composition and abundance; however, this is not necessarily a negative impact and could be positive, depending on the change that occurs.

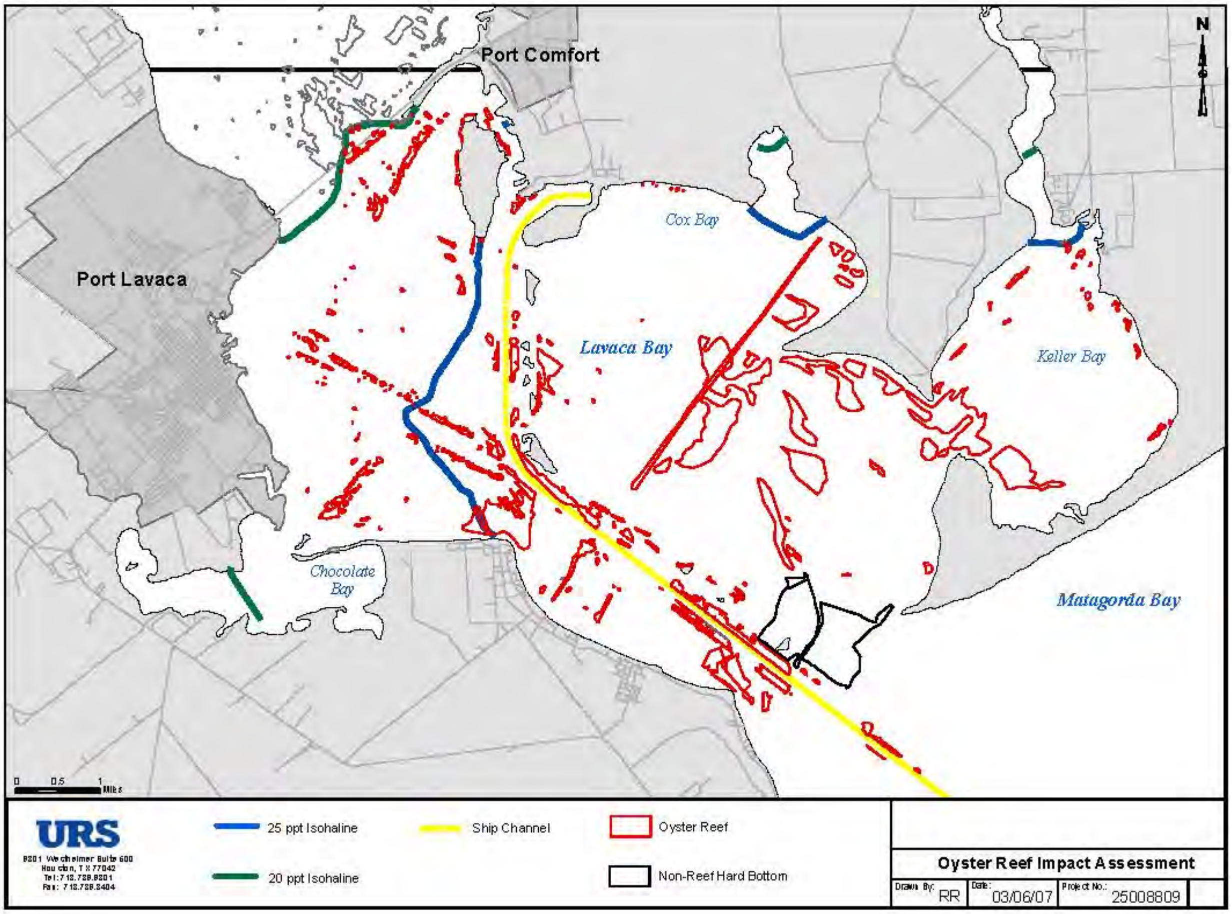
4.12.3 Oyster Reef

During the construction phase of the recommended plan, approximately 129.2 acres of oyster reef habitat will dredged during the construction of the channel (Figure 4.1). Use of the American Oyster HSI model (Swannack et al, 2014) found a net loss of 79.3 AAHUs. The model calculated that 130 acres of new oyster reef would 79.8 AAHUs. The 130 acres of oyster reef would be constructed at locations within the Matagorda Bay. Although it is unknown how long the process may take, an oyster reaches the legal size of three inches in about two years, which a good estimate of the amount of time required for a reef to become productive (Hofstetter, 1998). The unavoidable impacts to the oyster reefs constitute a significant adverse effect. These acreages are based on existing oyster reef maps. Prior to construction new surveys will be conducted to determine a more up-to-date acreage estimate. If the acreages differ from those detailed in this report the modeling will be rerun and the mitigation requirements recalculated.

Indirect effects to oyster reef habitat may result from a higher salinity regime due to the effects of channel improvements. This has the potential to cause an increase in predators such as oyster drills and pathogens such as Dermo (Britton and Morton, 1989). The intensity of Dermo infection increases during the warmer months (August and September) when salinity are greater. With the improved channel, an overall rise of salinity of about 1 to 2 could be expected based on the hydrodynamic salinity model. Numerous studies have been conducted on the effects of temperature and salinity on Dermo. Crosby and Roberts (1990) found that both temperature and salinity increased infection intensity; however, it was demonstrated that temperature was more important. In a laboratory experiment Fisher et al. (1992) also found that temperature was a more important factor than salinity in relation to Dermo infection. Conversely, Craig et al. (1989) surveyed Gulf oysters and found the variation in disease intensity between sites studied had no relationship to temperature. Long-term monitoring in the Gulf by Powell et al. (1992b) showed that long-term climate changes through the years as influenced by El Nino Southern Oscillation may have a significant effect on the presence and intensity of Dermo in this region. Through numerous studies, it is apparent that both temperature and salinity affect Dermo infection on oysters (Maryland Sea Grant College, 1996). Although rising salinities and temperatures have significant control over the intensity of Dermo, there is also a combination of other factors related to oyster health, including availability of food, siltation, current flow, and harvest intensity.

Water column turbidity would increase during project construction and maintenance dredging that could affect survival or growth of oysters. Heavy concentrations of suspended sediment can clog gills and interfere with filter feeding and respiration. Adult oysters are more capable of withstanding such conditions than seed or spat, and during periods of high turbidity can close up tightly for a week or more until normal conditions return (Cake, 1983). Turbidity from the recommended plan should be temporary and local. The location of oyster populations can gradually shift in response to natural and man-made modifications in the bay system (Britton and Morton, 1989). Therefore, it is likely oyster reefs affected by implementation of the recommended plan could adjust to new conditions over time. As stated previously, approximately 130 acres of oyster reef would be created by the construction of new reefs within the Matagorda Bay system.

Figure 4.1. Oyster reefs within Lavaca Bay.



4.12.4 Essential Fish Habitat

All of the federally managed fisheries in and near the Matagorda Bay system utilize estuarine and gulf habitat during some portion of their life cycle for spawning, food, development or protection (GMFMC, 2004). The recommended plan will have negative impacts, both directly and indirectly, to EFH in the project area. However, it also has the potential to enhance habitat for EFH throughout the Matagorda Bay system and offshore by the creation of oyster reef. The recommended plan would temporarily affect EFH by distributing bottom sediments and increasing turbidity in both the marine and estuarine water column in the vicinity of the dredging activity, which can have adverse effects on finfish and shellfish species. Dredging would also directly affect estuarine and Gulf bottom habitats. Although considering the nature of the sediments that would be dredged and the temporary nature of the dredging, these impacts should not be significant.

Unavoidable impacts to EFH would be compensated for through the protection and creation of bird island habitat, increasing the amount of nursery areas, protective habitat, and food sources within the Matagorda Bay estuary. The loss of oyster reef will indirectly benefit certain federally managed species and their prey given that the mercury-impacted area will no longer be available as habitat. The creation of potential oyster reef habitat could benefit federally managed species and their prey since the new habitat will be located in an unimpacted area.

NMFS was involved with the project from the early Interagency Meeting held in April 2017 through the review of the Draft FR-EIS. The agency representatives did not express the need for mitigation for bay bottom impacts in our discussions, nor did they provide written comments requiring such mitigation.

4.13 Threatened and Endangered Species

Multiple threatened and endangered species were identified from county species lists provided by the USFWS. Inclusion in the list does not imply that a species is known to occur in the project area, but only acknowledges the potential for occurrence. Effect determinations for federally listed species are listed in Table 4.5.

The West Indian manatee is extremely rare in Texas and to date has not been seen in the project area. Potential impacts to the manatee of the proposed work would be indirect and minor. Should a manatee wander into the project area, the greatest threats would be from boat traffic or dredging operations. However, due to its rare occurrence, the project is not expected to have any significant impact on this species.

Piping plovers are potential winter residents (November – March), and spring and fall migrants in the project area. Piping plovers are known to occur in the project area. Critical habitats occur in the vicinity of the project area. Minor changes in salinity and tidal amplitude as a result of the recommended plan are expected to have no impact on the piping plover or red knot. The primary constituent elements (PCEs) of the piping plover critical wintering habitat are those components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing PCEs within the designated boundaries are considered critical habitat. The PCEs found in the coastal areas that support intertidal beaches and flats (between annual low and high tide) and associated dune systems and flats above annual high tide (FR, 2001). No placement of dredged material will occur within areas of designated critical habitat or in areas that include PCEs for piping plover. The designated critical habitat for the piping plover would not be directly affected by construction of dredging activities. Waterbird rookeries will be avoided during the periods of February through September.

Red knots are potential winter residents (November – March) and spring and fall migrants in the project area. Minor changes in salinity and tidal amplitude as a result of the recommended plan are expected to have no impact on the red knot. No critical habitat exists for the red knot in the project area. Construction activities and placement of dredged material may have minor, but discountable effects on the red knot, and therefore the recommended plan may affect, but is not likely to adversely affect the species.

Other federal-listed species, such as the Northern aplomado falcon and whooping crane could occur in the project vicinity. However, there is no suitable habitat for the Northern aplomado falcon in the project area and, therefore, the project will have no effect on this species. The whooping crane is not likely to be adversely affected by project activities. No critical habitat has been established for these species in the project area. The Gulf jaguarondi is listed as potentially occurring in the project vicinity, though there are no known records of the species in the project vicinity and therefore the recommended plan will have no effect on this species.

It has been well documented that hopper dredging activities occasionally result in the sea turtle entrainment and death, even with seasonal dredging windows, V-shaped turtle-deflector dragheads, and concurrent relocation trawling (NMFS, 2003). Between January 2008 and December 2017, dredging activities within the USACE, Galveston District resulted in 40 lethal takes of sea turtles: 22 green sea turtles, 13 loggerhead sea turtles, and five Kemp's ridley sea turtles (USACE, 2018). Kemp's ridley sea turtles tend to move offshore in December when cooler waters occur, returning with warmer waters in March (NMFS, 2003). Green sea turtles may be found year-round in inshore waters, although in lesser numbers during the winter months, and are known to move into warm waters during the winter months (Shaver, 2000). Sea turtles easily avoid pipeline dredges due to the slow movement of the dredge. Apart from direct mortality, dredging activities could have an impact on sea turtles through an increase in sedimentation, turbidity, and resuspension of toxic sediments.

Table 4.5: Effect Determinations Summary for the Proposed Matagorda Ship Channel Project.

Common Name	Scientific Name	Dredging	Placement
REPTILES			
Green sea turtle	*Chelonia mydas*	Likely to adversely affect*	May affect, not likely to adversely affect
Hawksbill sea turtle	*Eretmochelys imbricata*	Likely to adversely affect*	May affect, not likely to adversely affect
Kemp's ridley sea turtle	*Lepidochelys kempii*	Likely to adversely affect*	May affect, not likely to adversely affect
Leatherback sea turtle	*Dermochelys coriacea*	Likely to adversely affect*	May affect, not likely to adversely affect
Loggerhead sea turtle	*Caretta caretta*	Likely to adversely affect*	May affect, not likely to adversely affect
BIRDS			
Whooping crane	*Grus americana*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Piping plover	*Charadrius melodus*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Red knot	*Calidris canutus rufa*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Northern aplomado falcon	*Falco femoralis septentrionalis*	No effect	No effect
MAMMALS			
West Indian manatee	*Trichechus manatus*	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Gulf coast jaguarundi	*Herpailurus yaguarondi cacomitli*	No effect	No effect

*The likelihood of adverse effects (incidental take) of sea turtles due to dredging activities is greatly reduced by implementation and adherence to the conservation measures. Adverse effects are not expected to jeopardize the continued survival or recovery of the species.

The sedimentation may affect food sources for the turtles, and the turbidity could affect primary productivity. However, this would be short term. The increased possibility of chemical or oil spills could pose a threat to turtles both directly and indirectly through their food source. While adult sea turtles may be mobile enough to avoid areas of high oil or chemical concentrations, hatchlings, posthatchlings, and juveniles in the area could be more susceptible. An increase in marine traffic may result in a higher incidence of collision with sea turtles. Other potential impacts as a result of the project include disorientation because of lighting on vessels and increased accumulation of plastic detritus.

Although the loggerhead and green sea turtle have not been recorded nesting the in the study area, these two species have been recorded in the study area (USACE, 2017). The hawksbill and leatherback sea turtles are extremely unlikely to nest in the study area. While nesting in the study area is uncommon, hopper dredging outside of the nesting/emergence season (April 1 to September 30), turning off/lowering/shielding unessential lighting, and use of shielded, low-sodium vapor lights for those that cannot be safely eliminated would reduce the potential disorientation impact. The recommended plan may affect, but is not likely to adversely affect nesting of the Kemp's ridley sea turtle, loggerhead sea turtle, green sea turtle, and hawksbill sea turtle. The recommended plan will have no effect on the nesting of the leatherback sea turtle.

Hopper dredging may result in the mortality of Kemp's ridley sea turtles, but no Kemp's ridleys have been reported taken during dredging maintenance operations of the MSC since before October 2008 (USACE, 2018). During the onset of colder waters in December, Kemp's ridley will move away from inshore waters into deeper waters, returning in March with warmer waters, ready to nest on the Texas coast and to forage in tidal passes and bays (NMFS, 2003). Restriction of hopper dredging activities to between December 1 and March 31, whenever possible, would reduce the likelihood of direct mortality. Hopper dredging impacts on sea turtles will be minimized by following the reasonable and prudent measures included in the NMFS BO for construction and the Gulf Regional Biological Opinion (GRBO) for maintenance dredging in the Gulf. No significant impact to Kemp's ridley as a result of this project is anticipated.

The hawksbill sea turtle has not been recorded from the study area, and no hawksbill have been taken during hopper dredging activities in Texas (USACE, 2018). Nevertheless, the proposed hopper dredging activity can be considered as likely to affect the hawksbill sea turtle.

Of the five species of sea turtles occurring in Texas waters, the leatherback sea turtle is the species that is least likely to be affected by the proposed project because of its rare occurrence and pelagic nature. It is unlikely to occur in the action area and has not been caught in hopper dredges. The proposed hopper dredging activity can be considered as likely to affect the leatherback sea turtle.

Sea turtle avoidance measures would include an avoidance plan for hopper dredge impacts to sea turtles. This avoidance plan includes reasonable and prudent measures that have largely been incorporated in USACE regulatory and civil works projects throughout the Gulf for more than a decade. These measures include use of temporary dredging windows, when possible; intake and overflow screening; use of sea turtle deflector dragheads; observer reporting requirements; and sea turtle relocation/abundance trawling.

In summary, for nesting sea turtles (Kemp's ridley, loggerhead, green and hawksbill) the conclusion is "may affect, but is not likely to adversely affect." For nesting leatherback sea turtles the conclusion is "no effect." For hopper dredging activities, the conclusion for the Kemp's ridley, loggerhead, green, and hawksbill sea turtles is "likely to adversely affect", though this can be lessened to "may affect, but not likely to adversely affect" if other forms of dredging are utilized. The conclusion for the leatherback sea turtle is "may affect, but it not likely to adversely affect."

The NMFS Biological Opinion previously submitted for the Matagorda Ship Channel Improvement Project in 2009 is still applicable to this project. After personal communications with NMFS biologists in the St. Petersburg office regarding whether reinitiation was appropriate, the determination was made that, since construction had not commenced, the project is not demonstrably different, and the impacts are not larger than those outlined in the BO, reinitiation is not necessary. The take limits on turtles remains the same, as do all terms and conditions within the 2009 BO.

Coordination with the USFWS is still ongoing. The USFWS BO will be included in the report when it is received by USACE. Coordination with NMFS and USFWS will continue prior to and during the construction of the MSC. This includes re-evaluation of listed threatened and endangered species and reinitiation of consultation, if necessary.

5. CUMULATIVE IMPACTS

The CEQ defines cumulative impacts as those impacts "on the environment which result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or persons undertake such actions." Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Impacts include both direct effects (caused by the action and occurring at the same time and place as the action), and indirect effects (caused by the action but removed in distance and later in time, and reasonably foreseeable).

Cumulative effects can result from a wide range of activities including the addition of materials to the affected environment, repeated removal of materials or organisms from the affected environment, and repeated environmental changes over large areas and long periods. Complex cumulative effects can occur when different types combine to produce a single effect or suite of effects. Cumulative impacts may also occur when individual disturbances are clustered, creating conditions where effects of one episode have not dissipated before the next occurs (timing) or are so close that their effects overlap (distance).

In assessing cumulative impact, consideration is given to the following:

- the degree to which the proposed action affects public health or safety;
- unique characteristics (physical, biological, and socioeconomic factors) of the geographic area;
- the degree to which the effects on the quality of the human environment are likely to be highly controversial;
- the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks; and,
- whether the action is related to other actions with individually insignificant, but cumulatively significant, impacts on the environment.

The methodology is consistent with similar Federal projects.

5.1 Assessment Method

The MSC, TX EIS follows a traditional cumulative impact assessment method, addressing impacts for a finite set of criteria, comparing projects within the study area to the recommended plan. Thirteen cumulative impact criteria were identified to evaluate projects relevant to the future condition of the study area (project area and surrounding Calhoun and Victoria Counties). Ten projects were considered.

5.1.1 Evaluation Criteria

Criteria include ecological, physical, chemical, socioeconomic, and cultural attributes, listed in Table 5.1. These parameters were identified as key resources discussed in NEPA documents and project reports, and they form a basis for comparison of other projects in the area with the recommended plan.

5.1.2 Individual Project Evaluation

Ten past, present, and reasonably foreseeable projects/activities within the study area were determined relevant for this cumulative impacts analysis (in no particular order). These projects are listed in Table 5.2 and are compared to the recommended plan presented in this EIS.

Table 5.1. Cumulative impacts criteria

Ecological Environment	Physical/Chemical Environment	Socioeconomic Environment
Wetlands	Air Quality	Recreational Fisheries
Benthos	Noise Impacts	Commercial Fisheries
Essential Fish Habitat	Sediment Quality	
Threatened/Endangered Species	Water Quality	

Table 5.2 Past, present, and reasonably foreseeable actions within the Study Area

Past or Present Projects/Activities	Reasonably Foreseeable Projects/Activities
Gulf Intracoastal Waterway	Jetty Stabilization Project
Mouth of the Colorado River	Gulf Intracoastal Waterway Reroute
Formosa Plastics Corporation	Port of Calhoun Expansion
E.S. Joslin Power Station	Brazos River Flood Gates/Colorado River Locks
Alcoa	
Palmetto Bend Project	
LCRA-SAWS Water Project	

5.2 Reasonably Foreseeable Future Actions

5.2.1 Jetty Stabilization Project

The entrance to the MSC passes through a man-made cut in the western end of Matagorda Peninsula. North and south jetties were constructed in the 1960s on the Gulfward side of the entrance. The purpose of the jetties is to provide reliable and safe navigation through Matagorda Peninsula to local ports. The jetties also protect the man-made cut through the peninsula from scour and erosion. The existing jetty channel is 38 ft deep, 300 ft wide, and about 4 miles long from the Gulf through the jetties to the inner channel.

The USACE, Galveston and New Orleans Districts are completing a jetty deficiency study report for a proposal to stabilize the MSC jetty at the entrance channel (USACE, 2018). In the report, the objectives of the jetty stabilization project are (1) to improve the efficiency and safety of the deep-draft navigation system, and (2) to maintain or enhance the quality of the area's coastal and estuarine resources. The current proposal is to remove the north and south bottlenecks and flange the bay entrance (USACE, 2018).

The removal of the bottleneck as currently proposed may increase tidal amplitude in the Matagorda Bay system.

5.2.2 Gulf Intracoastal Waterway Reroute

The USACE, Galveston District proposes to reroute the GIWW across Matagorda Bay to provide safety improvements for shipping and reduce maintenance dredging frequency. The proposed alignment crosses the bay about a mile north of the existing channel. Based on barge simulation analysis and modeling, the channel will have a bottom width of 125 ft from Station 0+00 until it approaches the bend at Station 550+00. From that point to Station 585+00, the channel width widens to 847 ft and then narrows to 300 ft to Station 670+00. This will allow for both two-way traffic and safe navigational passage of vessels across strong currents at the MSC. The alignment uses the existing GIWW route on the eastward end for approximately 3.9 miles, then turns westward for 13 miles. Approximately 2.5 mcy of new work material would be dredged during construction, and maintenance dredging quantities are estimated to be 77,500 cy per year (3,875,000 cy for the 50-year life of the project) (USACE, 2002).

A DMMP was designed for each reach of the new channel based on sediment type and quantity. Based on the DMMP, dredged material for Reach 1 will be used to create a test marsh along the shoreline near Palacios Point or will be placed in the surf zone of Matagorda Peninsula. Material from Reach 2 will be placed in the surf zone of Matagorda Peninsula to supply sediment for littoral transport. Material dredged from Reach 3A will be used to create marsh in the bay to the northwest of Port O'Connor and/or pumped in the surf zone along Matagorda Peninsula, depending on the success of a test marsh. The large amount of sand present in new work material and expected from maintenance material in Reach 3B provides the opportunity for beach nourishment. Thus, material from this reach that is not used in marsh creation associated with Reach 3A will be used to nourish Port O'Connor Beach and Sundown Island. Material not suitable for these uses will be placed in the surf zone along Matagorda Peninsula for beach nourishment and littoral transport (USACE, 2002).

The GIWW reroute will impact approximately 350 ac of open-bay bottom from construction of the new channel. Up to 326 ac of bay bottom would be converted to marsh or bird habitat from placement of dredged material. Up to 70 ac of seagrass beds, 295 ac of marsh, and 31 ac of bird habitat could potentially be created in Matagorda Bay as a result of the project (USACE, 2002).

Remote-sensing surveys, including a close-order survey, and coordination with the Texas State Marine Archeologist determined that no cultural resources are present along the proposed channel alignment. Placement areas will be designed to avoid documented shipwrecks and anomalies with signatures similar to that of historic shipwrecks. Thus, no impacts to cultural resources are expected (USACE, 2002).

According to the Finding of No Significant Impact (FONSI) prepared by USACE for the project (USACE, 2002), the following summarizes potential impacts associated with the project:

- Temporary impacts to aquatic habitat, fish, and invertebrates during dredging and placement activities
- Impacts to seagrass, marsh, and terrestrial habitats from pipeline crossings on Matagorda Peninsula
- No significant negative impacts to threatened and endangered species or historic resources
- Temporary impacts to air quality and noise during dredging operations
- No impact to water or sediment quality in Matagorda Bay
- No disproportionate impact to minority, low-income, or Native American tribal populations

Potential benefits resulting from the proposed GIWW reroute include:

- Reduced risk of spills
- Increased productivity in the bay from marsh creation
- Benefits to threatened piping plover from beach nourishment
- Decreased frequency of maintenance dredging reduces overall effects
- Shoreline erosion protection from marsh creation and beach nourishment
- Potential increase in seagrass beds
- Increased recreational use from beach nourishment at Port O'Connor
- Contributing to littoral drift within the surf zone of Matagorda Peninsula and Island

5.2.3 Port of Calhoun Expansion

Three current facilities are planning, or undergoing, expansion in anticipation of the increase of commodities traffic. Arrowhead Offshore is currently constructing a terminal with 250,000 barrels (bbl) of crude oil storage. This terminal is expected to be completed in June 2018. NorthStar Midstream is currently expanding their storage tank facility to allow for an additional 500,000 to 700,000 bbl. Formosa Plastics is expanding the operations of their chemical plant and is expected to be completed in late 2018.

These impacts and benefits of these expansions are accounted for in the future-with-project conditions taking into account the increase in ship traffic expected with the MSCIP.

5.2.3 Maintenance Dredging of the Matagorda Ship Channel

Ongoing maintenance dredging of Matagorda Ship Channel may effect oyster reefs through sedimentation and increases in turbidity during removal and placement of dredged material. If hopper dredging is used for the maintenance dredging activities there may be lethal take of sea turtles, particularly Kemp's ridleys. However, no lethal takes of sea turtles during maintenance dredging has occurred since before October 2008 (USACE, 2018).

5.2.4 Brazos River Flood Gates/Colorado River Locks

The Galveston District proposes to modify the flood gates where the GIWW meets the Brazos River and the locks where the GIWW meets the Colorado River. These modifications would alleviate navigational difficulties, delays, and accidents occurring as tow operators transit through the flood gates and lock structures and across the Brazos and Colorado Rivers. The plan includes removing the existing 75-foot Brazos River flood gates and building a 125-foot wide flood gate on the east side of the river. Construction of an open channel would occur on the west side of the river with a minimum width of 125 feet. The locks on both sides of the Colorado River would be removed and replaced with 125-foot sector gates.

5.3 Past or Present Actions

5.3.1 Gulf Intracoastal Waterway

On July 23, 1942, Congress authorized enlargement of the Gulf Section of the Intracoastal Waterway from Apalachee Bay, Florida, to Corpus Christi, Texas, for a 12-ft-deep and 125-ft-wide channel. Since that time, many improvements have been made. Impacts to the study area are primarily associated with maintenance dredging activities and include periodic impacts to bay bottom at the dredge and placement sites, temporary increases in turbidity, and potential for sea turtle takes.

5.3.2 Mouth of the Colorado River

The River Diversion Project, constructed in 1989–1992, diverted the flow of the Colorado River to the eastern arm of Matagorda Bay and closed Parker's Cut (Wilber and Bass, 1998). The diversion cut was made to restore inflow from the river into the bay, and thus partially restore the fishery conditions that existed before deltaic growth and related dredging produced the direct discharge of river flow into the Gulf. The primary goal was to benefit bay and Gulf commercial fisheries by improving habitat. This included reducing bay salinities, increasing input of nutrients, and creating new intertidal marsh. The diversion cut has lowered bay salinities by 1.6 ppt (eastern arm of Matagorda Bay) and created intertidal marsh that serve as high-quality nursery area (Bass, 2003). Although dredging of the channel removed 104 ac of intertidal marsh, 305 ac of marsh had been created by 2004 as the new delta developed. The original EIS (USACE, 1981) predicted the eventual creation of 4,000 ac of new delta before 2100.

An additional 37 ac of viable oyster reef were created. Catch per unit effort (CPUE) and mean length for oysters remained stable. However, the project led to further burial of the remnants of Dog Island Reef, which had already been impacted by river deposits and dredging. The major oyster-producing reefs, Mad Island and Shell Island, are distant enough to avoid or minimize impacts from bacterial contaminations associated with increased inflow and should benefit from decreased occurrences of Dermo, a parasite that thrives in warm, high-salinity, warm-temperature waters.

There has been no change in finfish landings (i.e., Gulf menhaden, striped mullet, spotted seatrout, red drum) (PBS&J, 2005b); however, mean lengths for all species (except red drum) have decreased. Brown shrimp CPUE has increased, and white shrimp CPUE has decreased. There has been an increase in mean abundance of blue crab.

The diversion cut led to increased currents and navigation dangers at the intersection of the river and the GIWW. This has led to proposals to create another cut from the diversion channel to the old channel.

5.3.3 Formosa Plastics Corporation

Formosa currently operates eight plants and a variety of support facilities at an 1,800-ac complex in Point Comfort. Construction of the plant began in 1980, and it was in continuous production by 1983. In 1994 a $1.5 billion expansion was completed at the plant. The facility, which manufactures plastic resins and petrochemicals for a multitude of products and processes, is a major employer in the study area, employing 3,600 people in 2004. The facility was cited for environmental violations in 1990 by the Texas Water Commission and EPA. Violations included improper storage of oil and other waste, cracked wastewater retention ponds, and releases of acidic wastewater into surface water. Groundwater contamination also exists beneath the facility.

Corrective action was taken under an EPA enforcement order in 1991 and entered into an EPA Region 6 – Texas Natural Resource Conservation Commission (now TCEQ) Corrective Action Strategy (CAS) pilot project. This was an aggressive program to assist in streamlining the RCRA Corrective Action Process and is a useful approach for facilities willing to commit resources up front to manage risk at their sites. As a result, approximately one-quarter of the cost for the $1.5 billion expansion in 1994 was for environmental protection features.

In addition, a Formosa Plastics Receiving Water Monitoring Program was established in 1993 to monitor the discharge of treated wastewater into Lavaca Bay from the Point Comfort Facility. The objectives of the Receiving Water Monitoring Program are as follows: (1) to establish baseline background conditions in Lavaca Bay in the area that receives the Outfall 001 discharge; (2) to monitor the health and structure of the biological community in the vicinity of the Outfall 001 discharge; (3) to monitor the sediment and water quality in the vicinity of the outfall discharge; (4) to evaluate compliance with the TWQS (TAC Chapter 307); (5) to monitor fish and shellfish tissue constituent concentrations for animals in the vicinity of the outfall discharge to assess any potential human health risks; and (6) to comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Sampling and Analysis Program. Data collection began in 1993 and is conducted quarterly as required by the TCEQ and the EPA. Over 43 sampling events have occurred, and more than 10 Annual Reports for the Receiving Water Monitoring Program have been submitted. The results of the monitoring program, to date, indicate that there are no adverse impacts to the health or structure of the biological community in Lavaca Bay. No adverse impacts have been noted in the water and sediment quality of Lavaca Bay in the vicinity of the discharge outfall since discharges first began.

5.3.4 E.S. Joslin Power Station

The E.S. Joslin Power Station generating facility is a 261-MW natural gas–fired facility that began power production in 1971. The facility was shut down in 2004.

The power station was built and activated before it was necessary to obtain an air emissions permit. Instead, several units had been operating under Permit by Rules designed for smaller air emission sources. However, in November 2002 the station did obtain a TCEQ Electric Generating Facility permit that covered the existing parameters for the site at that time, limiting sulfur content in the fuel oil and establishing a NO_x emissions allocation.

Studies were conducted by Central Power and Light Company (Moseley and Copeland, 1971) to assess potential impacts on bay resources from the release of heated effluent from the power station. Baseline field sampling was conducted in Cox Bay for 21 months prior to operation of the facility and postoperation sampling was conducted for 12 months. Sampling was conducted for nekton (i.e., fishes and large, free-swimming invertebrates such as shrimp) and phytoplankton. Environmental temperature ranges for 11 abundant vertebrate and invertebrate species were established, and results indicated no significant decrease in phytoplankton abundance or distribution as a result of power plant operations.

5.3.5 Alcoa

The Alcoa PCO plant currently operates one plant and a variety of support facilities at a 3,500-ac complex in Point Comfort, Texas. The PCO has been producing alumina since at least 1948 and continues today. Other facilities and operations have taken place at the PCO, including chloro-alkali processing from 1966 and into the 1970s, natural gas from 1958 to 1988, and coal tar from 1968 to 1985.

During the chloro-alkali processing operation from 1966 into the 1970s, mercury-laden wastewater was discharged into Lavaca Bay (mercury is involved in the processing). Additional contaminated water may have entered Lavaca Bay through groundwater seepage. In 1988, the

TDSHS issued a closure order banning consumption of finfish and crabs due to elevated mercury level in tissues. In 1994, the EPA added PCO contaminated sites to the NPL list and signed an Administrative Order on Consent to conduct a RI/FS under CERCLA.

The RI/FS revealed mercury contamination within the Lavaca Bay System, PCO soils, and groundwater. Within the bay system, the Witco Channel was found to contain 200,000 cy of mercury-impacted sediment. Proposed remediation measures included dredging and disposal of all mercury-impacted sediments within an on-site confined disposal facility on Dredge Island. The Witco marsh was also identified as a problematic site due to the high potential for bioaccumulation of mercury in local flora and fauna. Remedial measures of the marsh may include dredging or filling of the site. Bay bottoms in areas north of Dredge Island were also found to have high contamination. Two areas within the PCO were identified to have high mercury levels in soils and are found below the former Witco area and the former chloro-alkali processing areas. These areas will be capped with clays and then crushed rock. Lastly, groundwater below the PCO revealed unsafe mercury levels, and this water will be extracted, treated, and then discharged into Lavaca Bay. The Preliminary Close-out Report for the site was signed in July 2007. The EPA completed the second Five-Year Review of the site in July 2016, which found the site is protective of human health and the environment in the short term. Long-term monitoring of the sediments, red drum, and blue crab are ongoing.

5.3.6 Palmetto Bend Project

The Palmetto Bend Project, which included construction of a dam across the Navidad River, concrete spillway, multi-level river outlet works for water releases, and the impoundment of water in an 11,000-ac reservoir, was completed in 1981. The project uses Lake Texana to regulate flows of the Lavaca and Navidad rivers for supplying municipal and industrial water for Jackson and Calhoun counties, and for recreation and fish and wildlife habitat (U.S. Bureau of Reclamation, 2008).

An EIS was conducted by the U.S. Bureau of Reclamation (1974) to assess potential impacts to area habitats. As a result of the project, the most apparent losses include 16,300 ac of land, 11,000 ac of wildlife habitat, and 47 miles of stream and associated riverine habitat. Conversely, there were gains of 11,000 surface ac of water-oriented wildlife habitat, 11,000 surface ac of freshwater recreational opportunities, and a gain of 40,000 waterfowl using the reservoir (U.S. Bureau of Reclamation, 1974).

5.3.7 LCRA-SAWS Water Project

The LCRA and SAWS have joined together in the LCRA-SAWS Water Project. The goal of the project was to conserve and develop water for the lower Colorado River basin and the San Antonio area in the twenty-first century by conserving irrigation water and capturing excess river flows. Additionally, limited amounts of groundwater would be pumped for use by farmers in the lower Colorado River basin when surface water is lacking. The project can divert up to 1.5 million acre-feet per year (LCRA-SAWS, 2018).

The three main components of the LCRA-SAWS Water Project were:

- Conservation of irrigation water used by rice farmers by improving irrigation canals, leveling farmland with laser technology, and planting higher-yielding and more-water-efficient varieties of rice.
- Construction of off-channel reservoirs in the lower Colorado River basin to store excess surface water during flooding.
- Use of groundwater for agriculture in the Lower Colorado River basin when surface water is lacking.

The project included a 6-year study that began in 2004 to assess benefits and detriments to the community, Colorado River, and Matagorda Bay. The implementation of the proposed LCRA-SAWS Water Project could reduce freshwater inflows into Matagorda Bay. Studies unrelated to the proposed MSCIP are currently under way to assess potential impacts resulting from reduced freshwater inflows in the Matagorda Bay System. It is unknown at this time whether or not changes in salinities would affect marshes, seagrasses, oysters, or other aquatic species and/or habitats in the bay.

5.4 Results

The following sections provide discussion regarding potential cumulative impacts resulting from the recommended plan combined with past, present, and reasonably foreseeable actions affecting the study area.

5.4.1 Air Quality

The study area is currently considered an attainment area. Existing industrial facilities in the area are operating within regulated parameters. Temporary impacts from dredging activities have occurred and will continue to occur for maintenance dredging of channels in the bay. Air emissions associated with construction of the recommended plan and the GIWW reroute may temporarily impact the air quality of the study area. However, with both projects there is potential that maintenance dredging would need to occur less frequently, thus reducing the frequency of maintenance dredging. Therefore, no cumulative long-term impacts to air quality are anticipated.

5.4.2 Noise

Noise receptors are located primarily along the west shoreline in Matagorda Bay. These receptors are far enough away from the MSC and GIWW reroute that ship traffic and dredging operations are not likely to increase noise levels from ambient conditions. Likewise, industrial activities in Lavaca Bay are not likely to impact noise levels at receptors nearest them. Thus, no cumulative impacts to noise are anticipated.

5.4.3 Hazardous Material

Past actions in Matagorda Bay have negatively impacted the bay system. Industrial activity by Alcoa and Formosa resulted in quantifiable impacts to groundwater, surface water, soil, and sediment. Corrective actions were performed to minimize the potential for encountering impacted media. Due to prolonged use of portions of the Matagorda Bay area for military training, the potential of unexploded ordnance within the area does exist. However, the potential to encounter unexploded ordnance is considered to be quite low.

5.4.4 Water Quality

The high mercury levels in sediments, resulting from the Alcoa discharges that led to the Superfund site investigations, caused water quality concerns. However, the water quality in the area is good, and should not be negatively impacted by the proposed dredging and dredged material placement. Over the past fifteen years no sediment samples have shown mercury levels that exceed TCEQ water quality standards. While the Colorado River Diversion lowered the salinity in the eastern arm of the bay system, there will be some increase in the salinity in the bay system with the present project.

5.4.5 Sediment Quality

As noted in subsection 3.9.4, as a result of discharges by Alcoa, there are wide areas of Lavaca Bay where the mercury concentrations in sediments are high, but none of these sediments will be dredged for the proposed project.

5.4.6 Wetlands and Submerged Aquatic Vegetation

Past actions in Matagorda Bay have negatively impacted wetland habitat within the system. However, recent and future actions are subject to regulatory authority and impacts would be mitigated. Additionally, although the Colorado River diversion project impacted about 104 ac of wetland, it is expected to create 4,000 ac of wetland habitat by 2092 as the new river delta builds. Planned projects in the bay are expected to impact approximately 60 ac of wetland and create about 905 ac, resulting in a net increase in wetland acreage in the bay. Potential changes in salinity and tidal amplitude due to the recommended plan and the USACE jetty stability project, combined, could result in a transition of marshes from freshwater to saline/brackish marshes.

Over 5,000 ac of bay bottom would be impacted in the bay. These impacts could result in the loss of SAV. However, approximately 325 ac of sand platform is expected to be created as a result of the GIWW reroute. This sand platform is likely to recruit seagrass. Thus, no significant cumulative impacts to SAV in Matagorda or Lavaca bays are expected.

5.4.7 Recreational and Commercial Fisheries

Past projects in the study area have resulted in impacts to fisheries in the Matagorda Bay system. There have been consumption bans on certain finfish and shellfish because of the mercury spill in Lavaca Bay, and decreases in CPUE have been noted. Additionally, although the GIWW resulted in a benefit for navigation access to the area, the Colorado River diversion resulted in increased currents and navigational hazards where the diversion channel meets the GIWW. None of the proposed future projects are expected to impact commercial or recreational fisheries in the study area. However, it should be noted that the net increase in marsh habitat expected in the bay could result in increased productivity, providing a benefit to fisheries in the bay.

5.4.8 Benthos and Oyster Reef

Information available at the time of this analysis for each of the past, present, and reasonably foreseeable projects in the study area indicated that greater than 9,358 ac of bay bottom was or will be directly impacted by 2092. This includes the loss of bay bottom associated with the diversion of the Colorado River, which is expected to continue to build marsh habitat as the delta builds. Approximately 5,900 ac would be or have been directly impacted by dredging operations. Organisms living in the benthos recover fairly quickly following a disturbance. However, the benthos in areas periodically disturbed for maintenance dredging, such as the GIWW and MSC, never fully returns to the pre-disturbed benthic fauna. Impacts to oyster reef associated with the proposed project are mitigated for by creating 130 acres of new oyster reef. The proposed GIWW reroute project was expected to result in the conversion of 305 ac of bay bottom to marsh and create 70 ac of seagrass habitat by 2004, and a total of 4,000 ac of marsh are expected to be created by 2092. Thus, although several acres of open-bay bottom are impacted, habitat created or protected in the bay is expected to increase productivity and potentially benefit the health of the bay system.

5.4.9 Essential Fish Habitat

Although past, present, and reasonably foreseeable projects have or will impact EFH in the bay, as noted above, the creation, enhancement, or protection of more-productive habitats, such as marsh and seagrass beds, would benefit these species by providing productive feeding and potential nursery grounds. Thus, cumulative impacts to EFH are not expected to be significant.

5.4.10 Threatened and Endangered Species

In the past, actions that occurred in the study area have resulted in negative impacts to protected species. Hopper dredging activities have resulted in the take of three loggerheads, two Kemp's ridleys, and one green sea turtle in the entrance channel to the MSC since October 1996 (USACE, 2017). However, over time, mitigation measures applied to dredging activities and habitat creation, enhancement, and restoration activities resulting from enforcement of the ESA and other regulatory programs and conservation efforts have assisted in an increase in sea turtle populations in the area, particularly for Kemp's ridley (NPS, 2018). Due to past mitigation measures and the associated increase in sea turtle populations, it is reasonable to expect that hopper dredging activities associated with the

The recommended plan for both construction and maintenance could result in the take of protected sea turtles. However, many of the mitigation measures proposed for the recommended plan and other reasonably foreseeable future actions discussed here would result in the creation of marsh and seagrass habitat that would increase the productivity within the bay beyond existing conditions. The increased productivity may be beneficial to sea turtles in the area. Because hopper dredges would not be used during the GIWW Reroute or the Jetty Stability project, no take of sea turtles is expected from these activities.

Shoreline erosion and increases in tidal amplitude over time have negatively affected habitat in the Matagorda Bay system, including habitat that may have previously supported piping plovers and other shoreline birds. Critical habitat for the piping plover is present in the study area, including on Matagorda Peninsula where the MSC enters Matagorda Bay. The Jetty Stabilization Project could result in impacts to that habitat. On the other hand, placement of beach-quality material from the GIWW Reroute on Matagorda Peninsula and Sundown Island could result in additional potential habitat for the piping plover. The Kemp's ridley sea turtle has nested on Matagorda Peninsula and Matagorda Island (NPS, 2018). Thus, placement of beach-quality material on Sundown Island, providing such placement follows USFWS guidelines, may be beneficial to nesting sea turtles.

5.4.11 Any Adverse Environmental Impacts That Cannot Be Avoided Should the Recommended Plan Be Implemented

The recommended plan would result in minor direct adverse impacts to benthos from the open-bay placement of dredged material, but these impacts will be temporary. The construction of the recommended plan would result in the loss of 1.5 acres of wetlands and 129.2 acres of oyster reef. The wetland and oyster reef acreage would be mitigated for within the general area of the project. No other long-term environmental impacts are expected to occur as a result of the recommended plan.

5.4.12 Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

The construction of the recommended plan would result in the loss of 1.5 acres of wetlands and 129.2 acres of oyster reef. These impacts would be fully mitigated in the same general area, resulting in no net loss of wetlands or oyster reef and preservation of the areas long-term productivity. Post construction monitoring of mitigation sites will be conducted to ensure the success of the created oyster reefs sites.

5.4.13 Energy and Natural or Depletable Resource Requirements and Conservation Potential of Various Alternatives and Mitigation Measures

NEPA regulations in 40 CFR 1502.16 (e) and (f) require a discussion of project energy requirements and natural or depletable resource requirements, along with conservation potential of alternatives and mitigation measures in an EIS. Energy (fuel) will be required to widen and deepen the channel and to place the dredged material, but this is a short-term impact. Construction of the recommended plan would not result in a significant depletion of depletable energy or natural resources.

5.5 Conclusions

Cumulative impacts due to past, existing, and reasonably foreseeable future projects, along with the recommended plan, are not expected to have significant adverse effects to resources in the study area. The majority of impacts associated with these projects would be temporary, and some result in positive impacts for the area. Existing governmental regulations, in conjunction with the goals and coordination of community planning efforts, address the issues that influence local and ecosystem-level conditions. Resources in the area are provided some protection through the coordination of the numerous stakeholder groups, local organizations, and State and Federal regulatory agencies, and through regulations such as the Texas Coastal Management Program (TCMP), the Clean Water Act, and the Clean Air Act. This coordination and regulation of resources should prevent or minimize negative impacts that could threaten the general health and sustainability of the region.

Several of the projects included in the analysis involve dredging operations, which result in temporary impacts such as increased turbidity and air emissions and long-term impacts such as impacts to bay bottom. As described above, there would be a net increase in the productivity in the bay system as a result of mitigation associated with many of the proposed or ongoing projects. Overall, this would benefit the bay. Perhaps the most substantial impact would be potential for increased salinity and tidal amplitude in the bay, which could affect shoreline habitat. However, as previously discussed, the expected salinity changes are not outside the normal ranges for the species present in the system and changes in tidal amplitude are fairly minor.

6. CONSISTENCY WITH OTHER STATE AND FEDERAL LAWS

The following sections summarize actions being taken in this study to comply with various statutes applicable to Federal study or project.

6.1 Clean Air Act

The Clean Air Act (CAA) contains provisions under the General Conformity (GC) Rule to ensure that actions taken by Federal agencies in air quality nonattainment and maintenance areas do not interfere with a state's plans to meet national standards for air quality. Under the General Conformity Rule (the Rule), Federal agencies must work with state, Tribal and local governments in a nonattainment or maintenance area to ensure Federal actions conform to the air quality plans established in the applicable state or tribal implementation plan. The regulations codifying the Rule under 40 CFR Part 93, Subpart B, specify that no Federal agency shall engage in, or provide financial assistance for any activity which does not conform to an applicable implementation plan.

Appendix B, Section 4.1 of this IFR-EIS discusses the conformity demonstration requirements that will be necessary in the next planning phase, once the recommended plan has been refined. An estimate of construction emissions will be conducted in the next planning phase to determine if the de minimis thresholds applicable to the Corpus Christi-Victoria AQCR for the ozone precursors NO_x and VOCs under this rule would be exceeded. The Corpus Christi-Victoria AQCR is currently in attainment status for all NAAQS.

It is not anticipated emissions would be above de minimis requiring a Formal Determination of Conformity. A Draft General Conformity Determination (GCD) would be prepared to help determine if emissions that would result from construction of the proposed action are in conformity with the Texas State Implementation Plan (SIP) for the Corpus Christi-Victoria AQCR and consultation and coordination with the TCEQ and the EPA would be initiated. The Draft GCD will be publicly coordinated in accordance with 40 CFR Part 93, and a Final GCD, with the results and details of the air conformity threshold analysis issued after the coordination and required public noticing and comment period. A public notice of availability for the Final GCD will also be published as required by 40 CFR Part 93.

6.2 Clean Water Act

Section 404 of the CWA regulates dredge and/or fill activities in U.S waters. The proposed action would require dredging in U.S. waters. Since 1989, the USACE and EPA have implemented policy under the Section 404 program to achieve a Presidential goal of "no net loss" of wetlands. This program is responsible for ensuring the Administration's policy regarding "no net loss" of wetlands by requiring permit applicants to make every effort to avoid and minimize aquatic resource impacts, and provide compensatory mitigation to offset any permitted impacts. Therefore, impacts to wetlands and achieving no net loss of wetlands are important factors in complying with the CWA. No wetlands would be impacted by the recommended plan channel modifications or placement of material.

The regulations implementing the CWA Section 404 also include the mandatory guidelines developed to implement Section 404(b)(1) which prescribes procedures for specifying dredged material disposal sites and determining the suitability of dredged material for placement. An extensive review of existing past maintenance and new work sediment testing data covering the MSC was performed to determine the next steps in applying the procedures pursuant to USACE Regulatory Guidance Letter (RGL) 06-02, the Section 404(b)(1) guidelines, and the related joint testing manuals developed for them, including the Upland, and Inland Testing Manuals, as needed and appropriate, for the placement methods and sites selected during the development of the DMMP for the recommended plan. A 404(b)(1) Evaluation Form for the recommended plan channel modifications and DMMP has been prepared and was released concurrent with the release of the Draft EIS. A Water Quality Certification has been received from TCEQ.

6.3 Section 103 of the Marine Protection, Research, and Sanctuaries Act

Section 103 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) prescribes regulations, procedures, and evaluations applicable to Federal projects for the disposal of dredged materials in offshore waters. The currently permitted Offshore Dredged Material Disposal Site (ODMDS) has been identified as one of the existing placement areas in the Matagorda Bay system that will be considered for maintaining recommended plan features. New work Material from the existing channel is approved to be placed in the ODMDS. It is expected that maintenance material from the recommended plan improvements directly adjacent to the existing MSC in this reach is similarly of suitable quality and would be approved for placement there. This necessary testing to establish suitability according to the Ocean Testing Manual will be identified and performed in later planning phases and coordination with EPA Region 6 will be conducted to verify the suitability.

6.4 Section 7 of the Endangered Species Act

The Endangered Species Act (ESA) provides a program to conserve threatened and endangered plants and animals, and the habitats in which they are found. The lead agencies for implementing and administering it are the USFWS and the NMFS. The Act requires Federal agencies to consult with the USFWS and NMFS, to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of listed species or result in destruction or adverse modification of designated critical habitat of listed species. The Act also prohibits any action that causes an avoidable "taking" of any listed species of endangered fish or wildlife.

Compliance with the Endangered Species Act (7 U.S.C. 136; 16 U.S.C. 460 et seq.) was coordinated with the USFWS and the National Oceanic and Atmospheric Administration (NOAA) for those species under their respective jurisdictions. The USACE has provided a copy of the BA to the USFWS and NOAA. Formal consultation with USFWS was reinitiated due to the listing of the red knot. Discussions with NOAA have confirmed that the BO issued for the MSCIP study in 2009 is still valid and reinitiation is not necessary unless the impacts change significantly.

The BA covers the proposed action of the recommended channel modifications and the DMMP. The determination of may affect, but not likely to adversely affect, was made for sea turtles with respect to placement of material. The determination of may affect, but not likely to adversely affect, was made for leatherback sea turtle, but a determination of likely to adversely affect was made for sea turtles with respect to dredging. The existing ODMDS offshore placement site approved under MPRSA is located in the Sargassum critical habitat designated in 2014 for the Loggerhead turtle, which is essentially offshore Gulf waters from the 10 meter contour. The conditions placed on dredging within the MSC are identical to those for avoiding loggerheads in their critical habitat. Discussions with NOAA have indicated that this will not be cause for reinitiation of consultation.

The determination of may affect, but not likely to adversely affect, was made for whooping crane, piping plover, red knot, and West Indian manatee with respect to both dredging and placement of material. A determination of no effect was made for Northern aplomado falcon and Gulf coast jaguarondi with respect to both dredging and placement of material.

Though it is not likely that West Indian manatee, and the other listed marine and shorebird species would be encountered within the recommended plan's project area, their presence in the area is possible. An advisory for construction contractors to be aware of their possible presence, and contact numbers to immediately call in case of contact with any of these species for the USFWS's Corpus Christi Coastal Ecological Services Field Office in the case of listed shorebirds, or the Marine Mammal Stranding Network in the case of a turtle or manatee, will be added to the USACE contract specifications for this project.

Best management practices would be utilized, to the maximum extent practicable, to avoid project construction impacts to any T&E species or their critical habitat within the project area. The USACE will continue to closely coordinate and consult with the USFWS and the NMFS regarding T&E species under their jurisdiction that may be potentially impacted by implementing the proposed action. Consultation will not be considered complete until the Record of Decision is signed.

6.5 Magnuson-Stevens Fishery Conservation and Management Act

The MSFCMA (PL 94-265), as amended, establishes procedures for identifying EFH and required interagency coordination to further the conservation of federally managed fisheries. Regulations codifying the Act in 50 CFR Sections 600.805–600.930 specify that any Federal agency that authorizes, funds, or undertakes, or proposes to do, an activity that could adversely affect EFH, is subject to the consultation provisions of the Act and identifies consultation requirements. EFH consists of habitat necessary for spawning, breeding, feeding, or growth to maturity of species managed by Regional Fishery Management Councils (RFMC) in a series of FMP. The GMFMC is the RFMC applicable to the project location. EFH is designated for the project area in which the recommended plan is located. Consultation with NMFS had been initiated

6.6 Coastal Zone Management Act

The CZMA of 1972, as amended, provides for the effective management, beneficial use, protection, and development of the resources of the nation's coastal zone. The CZMA directs Federal agencies proposing activities within or outside of the coastal zone that could affect any land or water use or natural resource of the coastal zone, to assure that those activities or projects are consistent, to the maximum extent practicable, with the approved State programs. The Texas Coastal Management Program is the State entity that participates in the Federal Coastal Zone Management Program created by the CZMA. The TCMP designates the coastal zone and coastal natural resource areas (CNRA) requiring special management in that zone, including coastal waters, waters under tidal influence, coastal wetlands, submerged lands and aquatic vegetation, dunes, coastal historic areas, and other resources. The following CNRAs are found in the vicinity of the recommend plan and PAs:

- Water under tidal influence – Matagorda Bay waters
- Waters of the Open Gulf of Mexico – ODMDS
- Submerged land – Matagorda Bay bottom in the project area.
- Hard substrate reefs and oyster reefs – Hard-bottom habitat and oyster reef discussed in Section 4.12.3
- Special hazard areas – Floodplain areas mapped by the Federal Emergency Management Agency (FEMA) as special hazard areas Zone AE and floodway, and Zone VE are located in the MSC as discussed in Section 6.12.
- Coastal shore areas – Areas 100-ft landward of the highwater mark on submerged lands, which includes land surrounding the entrance channel and along the shorelines of Matagorda Peninsula, Matagorda Bay and Lavaca Bay.
- Coastal historic areas – Onshore historical markers and archaeological sites adjacent to the channel. Architectural surveys within the recommended plan's Area of Potential Effect (APE) will be conducted as needed to determine presence of submerged cultural resources.
- Coastal wetlands – Estuarine wetlands (salt water marsh etc.) discussed in Section 4.10.
- Submerged aquatic vegetation – Channel area is not characterized as having large expanses of SAVs.
- Coastal barriers – The recommended plan is not directly located in any designated coastal barrier.
- Gulf beaches – The Matagorda Peninsula contains Gulf beaches, though no dredging or placement will take place there.
- Critical erosion areas – The shoreline from Chocolate Bay to Powderhorn Lake is listed as eroding per latest Texas Bureau of Economic Geology data.
- Tidal sand or mud flats – Tidal sand flats located between and around the fringes of existing PAs 14 and 15 or unarmored shoreline.
- Coastal preserves – Welder Flats Coastal Preserve is located in the study area, though not within the recommend plan.

Of these CNRAs, the first five are found in the recommended plan and DMMP footprint. All other CNRAs would be avoided. Changes in 2012 to the TCMP resulted in the Coastal Coordination Advisory Committee (CCAC) replacing the previous Coastal Coordination Council (CCC). The CCAC is composed of several State agencies and local officials, to advise the TxGLO Commissioned on administering the TCMP. The TCMP reviews all Federal actions that may affect natural resources in the coastal zone for consistency with the Federal goals and objectives. The Federal Agency proposing the action prepares a Consistency Determination for review by the TxGLO for consistency with the TCMP. A Statement of Compliance with the TCMP has been received from the TxGLO.

6.7 Fish and Wildlife Coordination Act

The USACE's proposed action under the recommended plan was coordinated with the USFWS, NMFS, TPWD and other State and Federal resource agencies through resource agency meetings held for this study, and additional coordination and consultation. Additionally, the USFWS, NMFS and TPWD were sent copies of the DIFR-EIS for review and comment during the agency and public review period. Pursuant to Fish and Wildlife Coordination Act (FWCA), the USFWS provided a draft Planning Aid Letter (PAL) to assist with the planning of the proposed project by providing comments and recommendations related to impacts on fish and wildlife resources. The Coordination Act Report was completed on July 10, 2019.

6.8 Marine Mammal Protection Act of 1972

The Marine Mammal Protection Act (MMPA) was passed in 1972 and amended through 2007. It establishes a moratorium on the taking and importation of marine mammals and marine mammal products by persons subject to the jurisdiction of the U.S, with certain exceptions. The definition of "persons" also includes any officer, employee, agent, department, or instrumentality of the Federal Government. The Act is intended to conserve and protect marine mammals and it established the Marine Mammal Commission, the International Dolphin Conservation Program, and a Marine Mammal Health and Stranding Response Program. Review and consultation for the MMPA is also triggered via the ESA when actions involve marine mammals.

The only marine mammals covered under the MMPA expected to regularly be present in Matagorda Bay are bottlenose dolphins (*Tursiops truncatus*). These are highly mobile species that would be able to readily avoid dredging activities and vessels. As avoidance of the area would be only during construction, and there is an abundance of similar habitat within the area, the proposed action would have minimal and temporary impacts, by way of disturbance, to the individuals present.

6.9 Federal Water Project Recreation Act

This Act directs ". . . that . . . in investigating and planning any Federal navigation, flood control, reclamation, hydroelectric, or multipurpose water resource project, full consideration shall be given to the opportunities, if any, which the project affords for outdoor recreation." Any such features are subject to cost sharing with the beneficiaries of the recreational feature.

6.10 Farmland Protection Policy Act of 1981 and the CEQ Memorandum on Prime and Unique Agricultural Lands

The purpose of the Farmland Protection Policy Act is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses. The act requires among other things, agencies to identify and take into account the adverse effects of Federal programs on the preservation of prime and unique farmlands, and consider alternative actions, as appropriate that could lessen such adverse effects. The CEQ issued a memorandum "Analysis of Prime and Unique Agricultural Lands in Implementing the National Environmental Policy Act" that supplemented NEPA procedures to include analysis of these impacts in NEPA documents. The regulation codifying the Act in 7 CFR Part 658 specified procedures and criteria for the analysis of these impacts. The definitions in this regulation specify that farmland does not include land already used as water storage, which would include open water. The recommended plan channel modifications are entirely in open water.

No terrestrial resources other than very small amounts of urbanized, disturbed land at the channel margins are impacted by the recommended plan channel modifications, and therefore, no prime or unique farmlands would be affected.

6.11 Executive Order 11988, Floodplain Management

This EO directs Federal agencies to avoid possible impacts associated with the modification of floodplains and to avoid support of floodplain development wherever there is a practicable alternative. In carrying out the activities described above, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain associated with the one percent annual chance event.

The recommended plan is in sections of the Calhoun County Coastal Project Area and Matagorda Bay mapped by the Federal Emergency Management Agency as either subject to inundation by the one percent annual chance event (Zone AE) or floodways designated for Zone AE, or coastal flood zone with velocity hazard (Zone VE). As discussed in Appendix G, the recommended plan is not expected to have substantial hydrodynamic impacts including tidal variations or surge conditions, based on recent modeling studies for other channel modification projects, which will be confirmed by hydrodynamic modeling in the next planning phase.

6.12 Executive Order 11990, Protection of Wetlands

This EO directs Federal agencies to avoid undertaking or assisting in new construction located in wetlands, unless no practical alternative is available, and the proposed action includes all practicable measures to minimize harm to wetlands which may result from such use. The EO directs agencies to take such actions in carrying out its responsibilities in (1) acquiring, managing, and disposing of Federal lands and facilities; and (2) providing federally undertaken, financed, or assisted construction and improvement; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities. As discussed in Section 6.9.2, the CWA Section 404 program is responsible for ensuring the Presidential policy to achieve "no net loss" of wetlands. This EO further strengthens the commitment for Federally-implemented and permitted projects to achieve no net loss of wetlands, primarily through avoidance of impacts. Therefore, impacts to wetlands and achieving no net loss of wetlands are important factors in complying with this EO. The recommended plan channel modifications would not impact any wetlands.

6.13 Executive Order 12898, Environmental Justice

This EO directs Federal agencies to determine whether their programs, policies, and activities would have a disproportionately high or adverse effect on minority or low-income population groups within the Project Area. Most of the project area is in the open waters of Matagorda Bay and the industrial part of the MSC, with large, relatively sparsely populated census tracts (due to the land use and water). As documented in Section 2.8.1, examination of the census where populated land was closest to the recommended plan indicated an average of 51 percent minority and an average median household income of $22,939 in Matagorda County, slightly below the state average. These blocks would be closest to the recommended plan footprint where direct effects experienced would be their greatest. Given the income and percent minority of those blocks, an EJ issue would not be expected. Therefore, the proposed action is not expected to have any disproportionately high or adverse effect on low-income or minority population groups.

6.14 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds and the Migratory Bird Treaty Act

This EO directs Federal agencies to increase their efforts under the Migratory Bird Treaty Act, Bald and Golden Eagle Protection Acts, Fish and Wildlife Coordination Act, the ESA of 1973, NEPA of 1969, and other pertinent statutes to avoid or minimize impacts on migratory bird resources. The 2006 Memorandum of Understanding (MOU) between the DOD and the USFWS developed pursuant to this EO lists activities covered under the purpose and scope of the MOU, including natural resource management activities. The EO directs DOD to encourage incorporation of comprehensive migratory bird management objectives in the preparation of DOD planning documents, including NEPA analyses. The EO also directs DOD to, prior to starting any activity likely to affect migratory birds populations, 1) identify the species likely to occur in the area of the proposed action and determine if any species of concern could be affected by the activity, 2) assess and document the effect of the proposed action on species of concern through the NEPA process when applicable, and 3) engage in early planning and scoping with the USFWS to proactively address conservation, and initiate appropriate actions to avoid or minimize the take of migratory birds.

The proposed action is not expected to permanently impact migratory bird populations. Options to avoid migratory and nesting bird impacts may include adjusting the construction timeline to accommodate the nesting season or re-sequencing construction activities to work in areas where no active nests are present. Maintenance dredged material placement cycles in these and other PAs have been conducted successfully with minimal disturbance to migratory species.

6.15 Executive Order 13045, Protection of Children from Environmental and Safety Risks

This EO mandates that federal agencies identify and assess disproportionate environmental health and safety risks to children, and ensure that its policies, programs, activities, and standards address them. "Environmental health risks and safety risks" are defined as risks to health or safety that are attributable to products or substances that the child is likely to come in contact with or ingest, such as air, food, drinking or recreational use of water, soil children may live on, and products they use or are exposed to. The proposed action of building the recommended plan was evaluated for disproportionate effects towards children. Construction dredging of the recommended plan and the associated temporary ambient air and noise emissions will not have an impact that particularly targets or disproportionately affects children given the distance and general nature of the temporary impacts. Therefore, there would be no disproportionate effects on children due to environmental health or safety risks.

6.16 Executive Order 13751, Safeguarding the Nation from the Impacts of Invasive Species

EO 13751, dated December 5, 2016, which amends EO 13112 (1999), directs federal agencies to expand and coordinate their efforts to prevent the introduction, establishment, and spread, as well as to eradicate and control populations of invasive species, (i.e. noxious plants and animals not native to the U.S.). Non-native flora and fauna can cause significant changes to ecosystems, and upset ecological processes and relationships. Numerous factors can facilitate the spread of plant and animal species outside their natural range, both domestically and internationally. Invasive species damage the habitats that native plants and animals need to survive, and they hurt economies and threaten human well-being. Standard operating procedures for dredging operations should minimize the likelihood of invasive species being introduced into the project area.

6.17 Rivers and Harbors Act of 1899

Section 9 of the Rivers and Harbors Appropriation Act of 1899 (33 USC 403; Chapter 425, March 3, 1899) is commonly known as the Rivers and Harbors Act of 1899. This act prohibits construction of any dam, dike, bridge, or causeway over or in the navigable waters of the United States without Congressional approval. Section 10 of the Act requires approval of the Chief of Engineers for excavation or fill within navigable waterways of the U. S. The Final Integrated

Feasibility Report – Environmental Impact Statement will be provided to the Chief of Engineers for approval of the excavation and fill with the Matagorda Bay as it relates to the recommended plan.

6.18 Coastal Barrier Resources Act

The Coastal Barrier Resources Act (CBRA) (Publ. L. 97-348) established the Coastal Barrier Resources System. The CBRA prohibits all new Federal expenditures and financial assistance within the units of the System, unless, after consultation with the Secretary of Interior, the expenditures and/or assistance meets the specific exceptions of Section 6 of the CBRA. Section 6(a)(2) allows for the continued use of disposal sites for dredged maintenance material. Section 6(b) requires that an existing channel improvement be funded, in part or totally, before October 18, 1982. The existing Matagorda Ship Channel and the deepening and widening of the channel proposed under the recommended plan cross System Unit T07, and Otherwise Protected Area T07P. A portion of the Entrance Channel sits within CBRS unit T07. This section will be deepened from the current depth of -47 feet MLLW to -49 feet MLLW and widened from the existing bottom width of 200 feet to 600 feet. Dredged material from the entrance channel will placed in a sand engine located within T07. No other work will be done within a CBRS unit. Construction authority for the Matagorda Ship Channel was provided by Congress in the Rivers and Harbors Act of July 3, 1958 (PL 85-500). Therefore, the recommended plan meets the exceptions set forth in Sections 6(a)(2) and 6(b). Coordination with the USFWS was completed on June 25, 2019..

7. ANY IRREVERSIBLE OR IRRETRIEVABLE COMMITMENTS OF RESOURCES INVOLVED IN THE IMPLEMENTATION OF THE RECOMMENDED PLAN

The labor, capital, and material resources expended in the planning and construction of the recommended plan would be irreversible and irretrievable commitments of human, economic, and natural resources. Material resources would chiefly be the fuel spent in dredging, and the minor portion would be steel and concrete for the few structural components of the recommended plan, such as sheet piling and mooring dolphins. These commitments would be a relatively minor portion of the available material resources. The commitment of economic resources would be for a plan analyzed to reasonably maximize NED benefits to the Nation, producing more in net annual benefits than cost, as demonstrated in the economic analysis for this study. The oyster reef, an impacted fisheries resource, would be mitigated, and would therefore be replaceable.

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Enclosure 1 – Ecosystem Mitigation

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Feasibility Report and Environmental Impact Assessment

July 2019

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List of Acronyms

AAHU Average Annual Habitat Unit

DMMP Dredged Material Maintenance Plan

ER Engineering Regulation

HSI Habitat Suitability Index

MLLW Mean Lower Low Water

MSC Matagorda Ship Channel

OHSIM Oyster Habitat Suitability Index Model

PCX Planning Center of Excellence

USACE US Army Corps of Engineers

USFWS US Fish and Wildlife Service

1.0 INTRODUCTION

The U.S. Army Corps of Engineers requires that adverse impacts to significant ecological resources be avoided or minimized to the extent practicable, and that the remaining impacts be compensated through mitigation to the extent justified (USACE, 2000). The recommended plan from the Matagorda Ship Channel (MSC), Port Lavaca, TX project will have unavoidable impacts to oyster reefs along the channel and to marsh in an upland placement area. The Planning Guidance Notebook (Engineering Regulation (ER) 1105-2-100) requires that impacts and mitigation for those impacts be quantified. The use of habitat evaluation models to calculate habitat units are one of the accepted methodologies for quantifying the impacts.

USACE planning regulations requires that impacts to significant resources resulting from project activities be forecasted, and compared and contrasted with the condition of these resources without the project over the project period of analysis. The period of analysis is the time required for the implementation of the project plus 50 years for this type of project (deep draft navigation). The modeling procedures used to calculated the habitat units for with- and without-project impacts over the period of analysis plus 50 years are detailed in this appendix. The mitigation construction methodologies and locations listed below will be refined in the planning and construction phase.

The Matagorda Ship Channel (MSC) extends from the Port of Port Lavaca-Point Comfort Turning Basin in Lavaca Bay through the Matagorda Bay and extends into the Gulf of Mexico via the Matagorda Peninsula. The current length of the ship channel is approximately 26 miles (Figure 1). The in-bay channel is authorized to a current depth of -38 feet Mean Lower Low Water (MLLW) with a bottom width of 200 feet. The Entrance Channel is maintained at -40 feet MLLW.

The MSC Project would widen the in-bay channel to 300 feet and deepen the channel to -47 feet MLLW. The Entrance Channel would be widened to 600 feet and deepened to -49 feet MLLW. Alternative depths were analyzed to determine the most economically justifiable and environmentally acceptable plan. Details of the plan selection can be found in the Feasibility Report and the Economics Appendix (Appendix A). In addition a limited ship simulation was performed to determine the width necessary for safe and efficient shipping operations (see Appendix F).

1.1 Oysters

While oysters are an important commercial fishery the oyster reefs also play an important role in the ecology of estuarine ecosystem. The reefs provide a hard structure in an area surrounded by soft sand or clay sediments. The hard structure of the oyster shells provides a three-dimensional space replete with crevices and nooks that allow for larval invertebrates and fishes to seek refuge from larger predators. These smaller individuals can leave the protection of the reefs to feed, but move back into the crevices for refugia. These reefs are important nursery habitat for many commercial species, including anchovies (*Anchoa mitchilli*) and blue crab (*Callinectes sapidus*).

2.0 MODEL SELECTION

2.1 Oysters

USACE Civil Works policy in the CECW-CP policy memorandum *Policy Guidance on Certification on Ecosystem Output Models*, dated August 13, 2008, requires that only standard habitat models already certified by the USACE Ecosystem Planning Center of Excellence (PCX) be used to determine mitigation, or that models proposed for use undergo the model certification process outlined by the USACE. The Oyster Habitat Suitability Index Model (OHSIM) developed by Swannack *et al.* (Swannack *et al.* 2014) was certified under the process mandated by this memo and was selected for use in this mitigation plan. This model is a modification of a 2012 suitability index model that follows the methodology in the USFWS habitat suitability indices (HSI) model for the Gulf of Mexico American Oyster (Cake 1983). Reefs in Matagorda Bay are predominantly American oyster. This model was selected to assess the reef function and quality and to quantify the required mitigation acreage.

3.0 RESOURCE AGENCY COORDINATION

The agency coordination began at the initial Scoping meeting and continued through regularly scheduled resource agency meetings. Representatives from USFWS, National Marine Fisheries Service (NMFS), the Environmental Protection Agency (EPA), Texas Parks and Wildlife Department (TPWD), and Texas General Land Office (GLO), and Texas Commission on Environmental Quality (TCEQ) were all invited to attend the meetings. Initial meetings focused on the development of the alternatives of the project. Later meetings discussed the DMMP and the needs for mitigation of unavoidable impacts. The proposed models were agreed to by the resource agencies, as was the approach to propose a conceptualized mitigation plan with further refinements in the planning and construction phase. Locations of mitigation sites were discussed but not finalized. Further discussion of locations will be included in section 5.

4.0 PROJECT IMPACTS

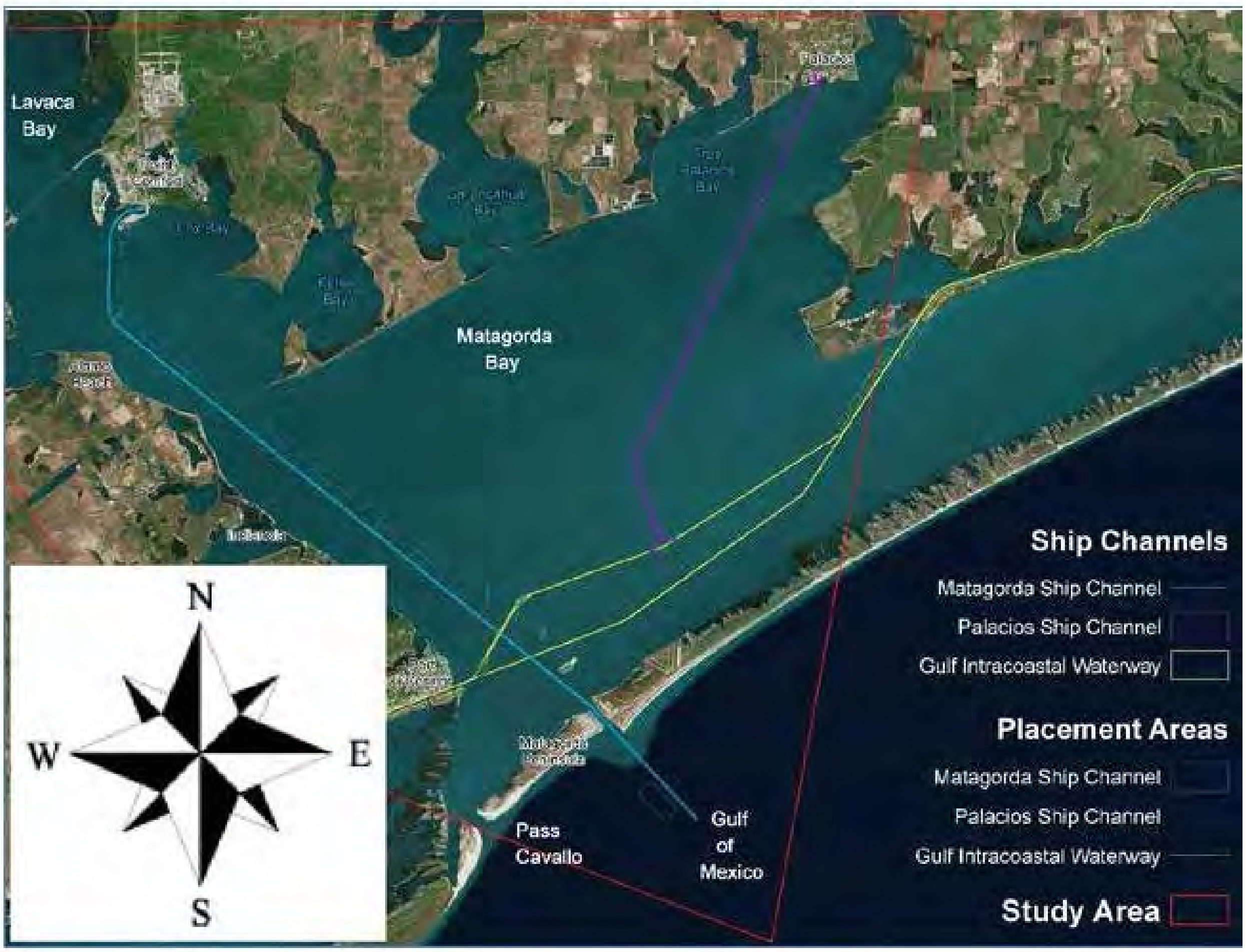
Dredging operations required for the proposed Matagorda Ship Channel Project would convert shallow open bay bottom to deep water habitats in the channel and remove oysters present on the side slope of, and areas adjacent to, the existing channel. Existing depths adjacent to the channel vary between approximately -5 feet MLLW and -12 feet MLLW. Placement of materials dredged from the channel, during both initial construction and in subsequent maintenance dredging, would displace additional bay bottom and cover some areas of existing intertidal marsh, farmed wetland, and oyster reef (Figure 1). There are no anticipated impacts to submerged aquatic vegetation from the MSC Project. The design of placement areas and placement of new work and maintenance material are discussed in the Dredged Material Management Plan (DMMP) (Appendix E). Table 1 provides a breakdown of habitat types impacted by acreage and mitigation.

4.1 Impacts to Oyster Reefs

A total of 129.2 acres of oyster reef would by directly impacted by the recommended project. The majority of direct impacts in the project area are from the widening of the existing ship channel. There are 129.2 acres of oyster reef on the side slope and on the bay bottom adjacent to the existing channel. Oysters will likely recolonize the side slopes of the widened channel, however these areas are considered permanent losses and require compensation at the same ratio as other direct losses. Oyster reefs delineated in the field are shown in Figure 2.

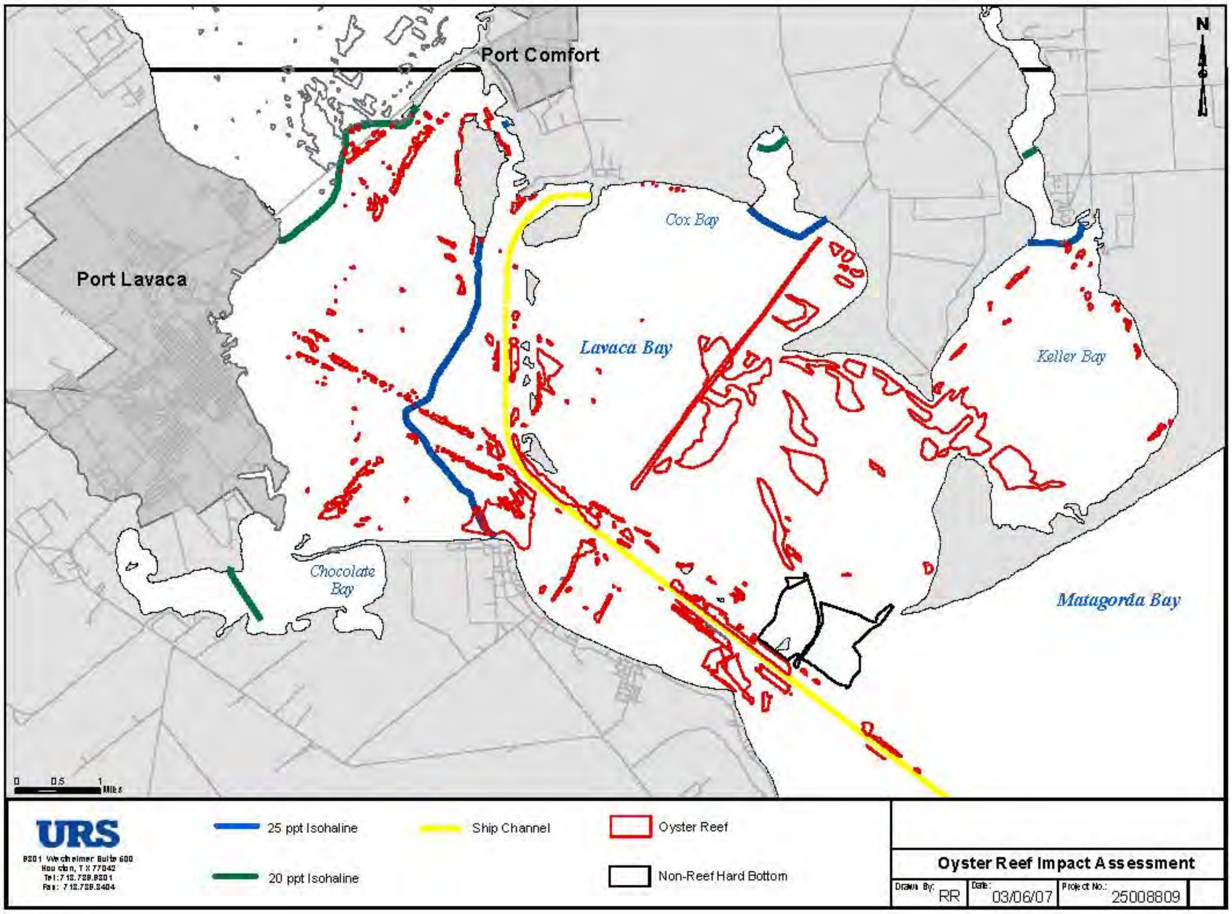
Indirect effects to oyster reef habitat may result from a higher salinity regime due to the effects of channel improvements. This has the potential to cause an increase in predators such as oyster drills and pathogens such as Dermo (Britton and Morton, 1989). The intensity of Dermo infection increases during the warmer months (August and September) when salinity are greater. With the improved channel, an overall rise of salinity of about 1 to 2 could be expected based on the hydrodynamic salinity model. Numerous studies have been conducted on the effects of temperature and salinity on Dermo. Crosby and Roberts (1990) found that both temperature and salinity increased infection intensity; however, it was demonstrated that temperature was more important. In a laboratory experiment Fisher et al. (1992) also found that temperature was a more important factor than salinity in relation to Dermo infection. Conversely, Craig et al. (1989) surveyed Gulf oysters and found the variation in disease intensity between sites studied had no relationship to temperature. Long-term monitoring in the Gulf by Powell et al. (1992) showed that long-term climate changes through the years as influenced by El Nino Southern Oscillation may have a significant effect on the presence and intensity of Dermo in this region. Through numerous studies, it is apparent that both temperature and salinity affect Dermo infection on oysters (Maryland Sea Grant College, 1996). Although rising salinities and temperatures have significant control over the intensity of Dermo, there is also a combination of other factors related to oyster health, including availability of food, siltation, current flow, and harvest intensity.

Figure 1. Map of the Matagorda Ship Channel Project Study Area.



Water column turbidity would increase during project construction and maintenance dredging that could affect survival or growth of oysters. Heavy concentrations of suspended sediment can clog gills and interfere with filter feeding and respiration. Adult oysters are more capable of withstanding such conditions than seed or spat, and during periods of high turbidity can close up tightly for a week or more until normal conditions return (Cake, 1983). Turbidity from the TSP should be temporary and local. The location of oyster populations can gradually shift in response to natural and man-made modifications in the bay system (Britton and Morton, 1989). Therefore, it is likely oyster reefs affected by implementation of the TSP could adjust to new conditions over time. As stated previously, approximately 130 acres of oyster reef would be created by the construction of new reefs within the Matagorda Bay system.

Figure 2. Oyster reefs within Lavaca Bay.



The American Oyster HSI model (Swannack et al, 2014) was used to quantify the loss of functional value of oyster reef habitats impacted by the recommended project. The HSI addresses losses due to channel enlargement, and placement of new work and maintenance material over a 50-year planning period. The analysis is also used to ensure that proposed mitigation would restore all lost functional value over the 50-year analysis period. The HSI for oyster reef was calculated using the model of American Oyster (Swannack et al., 2014) using a spreadsheet certified for one-time use by the USACE EcoPCX.

The American Oyster HSI model uses four variables to calculate an HSI – percent cultch cover, mean salinity during spawning season, minimum annual salinity, and annual mean salinity. After discussions with the resource agencies percent cultch cover was estimated to be 90 percent over the 129.2 acres impacted along the channel. This coverage was assumed to remain consistent over the entire period of analysis for the future without project calculation. Salinity data was taken from TPWD historical trawling data (Brown, 2013). Spawning season for oysters is considered to be May through September and a salinity value of 24 was used for this variable.

The value for minimum annual salinity was 22 and the annual mean salinity was 25. A slight increase in salinity in target years 11 and 51 was included to account for relative sea level rise and the resulting intrusion of more saline water into the bay. The future with project calculations hold the salinities the same, but zero out the cultch cover in target year 1. The model shows a net loss of 79.3 Average Annual Habitat Units (AAHUs).

To calculate the acreage required for mitigation we assumed at target year 0 the site would have zero cultch cover, but the same salinities as the future without project calculations. The construction of the oyster reefs would be done at target year 1, so a 90 percent cultch cover was included at target years 1, 11, and 51. The salinities were as above. The model calculated that 130 acres of new oyster reef would generate 79.8 AAHUs. Screenshots of the spreadsheets are included at the end of the appendix.

4.2 Impacts to Bay and Offshore Bottom

The conversion of bay bottom habitat as a result of the MSC Project is expected to have both positive and negative effects on the overall habitat functional value of the bay system, with an expected net increase in functional value. Some of the dredged material from the proposed MSC Project would be used to convert open bay bottom to oyster reef. A total of 130 acres of bay bottom would be enhanced by habitat creation.

Unconfined placement areas would also receive dredged material. A total of 3927 acres would be impacted by unconfined placement. Areas impacted by open bay placement are allowed to recover between dredging cycles with productivity restored within one year. In the proposed project 1874 acres of Matagorda Bay bottom associated with placement areas adjacent to the widened ship channel would be impacted by new work placement. Of the 2053 acres of Offshore Bottom impacted, approximately 1600 acres would be used for new work material, with the remaining 453 acres receiving maintenance material.

NMFS was a participant throughout the study and did not provide any requirement for mitigation of bay bottom during our discussions nor did they provide any written comments requiring mitigation for these impacts.

Table 1. Acreages of habitats impacted and mitigation

Habitat Type	Acreage Impacted	Acreage Created	Responsible Action
Oyster Reef	129.2		Dredging/Placement
Bay Bottom	3927		Placement
Offshore Bottom	2053		Placement
Oyster Reef		130	Mitigation

5.0 MITIGATION MEASURES

Selection of potential mitigation sites and modeling of benefits will be conducted in coordination with resource agencies. While the exact locations have not been selected at this point for oyster reef mitigation construction, discussions with TPWD and USFWS have indicated that placing the reefs near the mouth of Powderhorn Lake or Keller Lake would provide a buffer from erosive forces currently effecting these areas. Further discussions with these agencies and their local biologists will continue during the planning and construction phases to confirm the best location for reef construction. The location of the marsh mitigation sites will be, to the extent practicable, within the areas surrounding Matagorda Bay.

Costs of the mitigation measures were estimated based on recent work in nearby bays and given to the economists for inclusion in the benefit:cost ratio calculation. Impacts of the recommended plan will be fully compensated in accordance with specific impacts and benefits quantified by the HSI modeling. Marsh creation/mitigation will be conducted in compliance with ER 1165-2-27 (Establishment of Wetland Areas in Connection with Dredging).

5.1 Oyster Reefs

The preferred option for oyster reef restoration is through artificial cultch placement. This method entails placing a hard substrate on the bay bottom which allows oyster spat to attach and mature into adults and develop into reefs. This is the most common method employed along the Texas Gulf coast.

The most common method of providing artificial cultch for reef development is the use of crushed limestone of river pebble placement. Placement of this material in layers of thickness from 6-9" thick has been shown to be the most successful method of oyster reef creation. The use of rock allows for small pore spaces for the oyster spat to attach, but does not allow for larger spaces for predators, such as crabs and oyster drills, to settle. The mass placement of rock allows for effective coverage of the bay bottom to accomplish our goal of 90 percent cultch coverage.

There are two methods of seeding artificial cultch for the generation of oyster reef. The first method relies on the natural recruitment of oyster larvae. The oyster larvae drift with the bay currents and when they find a suitable hard substrate (cultch) they settle to begin the maturation stage of their life cycle, this is a process known as spat set. This is the primary method of oyster seeding for reef development in the Gulf coast. This method has a high degree of success due to the high fecundity of the American oyster.

A second method, which could be used if natural seeding is unsuccessful, is direct seeding. This method involves the purchase of spat from farmed oysters and placing them directly on the artificial cultch. This method requires the utilization of cultch contractors who have experience in transporting and placing the spat in a manner that causes minimum damage to the organisms, adding to the costs of the project.

The method of mass placement of crushed limestone and natural recruitment is the most common and most successful method of reef creation on the Gulf coast and is the recommend method of oyster mitigation.

Two alternatives of building the oyster reef were compared for this mitigation. The first method entails building the base of the reef by utilizing new work dredge material directly from the ship channel. The hard clay material provides a hard substrate which could substitute for some of the crushed limestone and allow for the dredged material to be used beneficially. There are two drawbacks to this method. The first is the long pumping distance the distance would be between three and five miles. This pumping distance reduces the amount of clay balls in dredged material and results in an end product that is more of a slurry mixed with clay balls. The second drawback is that the slurry increases the turbidity at the outflow and can impact nearby oyster reefs as well as surrounding benthic habitats. While oysters can grow on hard clay surfaces the reef success would be low without further introduction of crushed limestone. So this alternative provides a way to beneficially use some dredged material while reducing the amount of crushed limestone required for construction of the reef.

The second alternative for reef construction relies on utilizing crushed limestone as the sole material for the base of the reef. This allows for a solid hard substrate with lots of nooks and crannies for the spat to settle in, as well as other inverts and larval fishes. This alternative does not allow for beneficial use of dredged material, but also does not increase turbidity to the high degree that the first alternative does.

The costs of the first alternative include the incremental costs of pumping the dredged material to the site. The costs are broken down as follows:

1) (Fixed Cost) $85,000 for Mobilization/Demobilization

2) (Variable Cost) $100,470 per acre of oyster reef construction (purchase and deliver limestone cultch, and place to grade). This is for a 3-inch emergent pad (plus 25% contingency for additional settlement).

3) (Variable Cost) Surveying: Assume $1,750 per day for ten hour days. Assume 1.2 acres per day of reef can be built.

4) (Variable Cost) Field Supervision (QC, Superintendent, Safety): Assume $2,230 per day.

5) (Variable Cost) Pumping of dredged material: Assume the material is 75% stiff clay, and the pump distance is 3 miles, then it would cost $7.00/CY and shaping would be $1.00/CY. 130 acres would require 945,000 CY.

The total cost for the first alternative comes out to $21,320,550/13, or $164,004 per acre.

The costs of the second alternative are broken down as follows:

1) (Fixed Cost) $85,000 for Mobilization/Demobilization

2) (Variable Cost) $152,538 per acre of oyster reef construction (purchase and deliver limestone cultch, and place to grade). This is for a 9-inch pad (6-in emergent, and 3-inches for settlement into mud, plus 25% contingency for additional settlement).

3) (Variable Cost) Surveying: Assume $1,750 per day for ten hour days. Assume 1.2 acres per day of reef can be built.

4) (Variable Cost) Field Supervision (QC, Superintendent, Safety): Assume $2,230 per day.

The total cost for the second alternative comes out to $20,354,620, or $156,574 per acre.

A Cost Effective / Incremental Cost Analysis (CE/ICA) was done to select the least cost plan to mitigate for oyster reef impacts. The CE/ICA shows that the least cost plan is the second alternative (use of all crushed limestone). In addition to being the lower cost alternative, this alternative also has fewer ecological drawbacks and higher performance potential.

6.0 REFERENCES

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Project: MSC

American Oyster HSI Model Spreadsheet

Acres 129.2

Condition: Future Without Project		TY	0	TY	1	TY	11
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	90	0.90	90	0.90	90	0.90
V2	Mean salinity during spawning season	24	0.83	24	0.83	24.3	0.80
V3	Minimum annual salinity	22	1	22	1	22.3	1
V4	Annual mean salinity	25	0.25	25	0.25	25.3	0.241
		HSI=	0.66	HSI=	0.66	HSI=	0.65

Condition: Future With Project		TY	0	TY	1	TY	11
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	90	0.90	0	0.00	0	0.00
V2	Mean salinity during spawning season	24	0.83	24	0.83	24.3	0.80
V3	Minimum annual salinity	22	1	22	1	22.3	1
V4	Annual mean salinity	25	0.25	25	0.25	25.3	0.241
		HSI=	0.66	HSI=	0.00	HSI=	0.00

Condition: Future Without Project		TY	51	TY		TY	
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	90	0.90				
V2	Mean salinity during spawning season	26	0.65				
V3	Minimum annual salinity	24	1				
V4	Annual mean salinity	27	0.19				
		HSI=	0.58	HSI=		HSI=	

Condition: Future With Project		TY	51	TY		TY	
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	0	0.00				
V2	Mean salinity during spawning season	26	0.65				
V3	Minimum annual salinity	24	1				
V4	Annual mean salinity	27	0.19				
		HSI=	0.00	HSI=		HSI=	

HSI impact calculations for oysters

American Oyster HSI Model Spreadsheet

Condition: Future Without Project

TY	Acres	HSI	Total HUs	Cumulative HUs
0	129	0.66	84.81	
1	129	0.66	84.81	84.81
11	129	0.65	83.35	840.80
51	129	0.58	74.60	3159.10
Max TY=	51		AAHUs=	80.1

Net Change in AAHUs due to Project

Future With Project AAHUs	0.8
Future Without Project AAHUs	80.1
Net Change	-79.3

Condition: Future With Project

TY	Acres	HSI	Total HUs	Cumulative HUs
0	129	0.66	84.81	
1	129	0.00	0.00	42.40
11	129	0.00	0.00	0.00
51	129	0.00	0.00	0.00
Max TY=	51		AAHUs=	0.8

Calculation of net change of AAHUs for oyster impacts

Project: Matagorda Ship Channel study Mitigation

American Oyster HSI Model Spreadsheet

Acres 130

Condition: Future Without Project		TY	0	TY	1	TY	11
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	0	0.00	0	0.00	0	0.00
V2	Mean salinity during spawning season	24	0.83	24	0.83	24.3	0.80
V3	Minimum annual salinity	22	1	22	1	22.3	1
V4	Annual mean salinity	25	0.25	25	0.25	25.3	0.241
		HSI=	0.00	HSI=	0.00	HSI=	0.00

Condition: Future With Project		TY	0	TY	1	TY	11
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	0	0.00	90	0.90	90	0.90
V2	Mean salinity during spawning season	24	0.83	24	0.83	24.3	0.80
V3	Minimum annual salinity	22	1	22	1	22.3	1
V4	Annual mean salinity	25	0.25	25	0.25	25.3	0.241
		HSI=	0.00	HSI=	0.66	HSI=	0.65

Condition: Future Without Project		TY	51	TY		TY	
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	0	0.00				
V2	Mean salinity during spawning season	26	0.65				
V3	Minimum annual salinity	24	1				
V4	Annual mean salinity	27	0.19				
		HSI=	0.00	HSI=		HSI=	

Condition: Future With Project		TY	51	TY		TY	
Variable			**SI**		**SI**		**SI**
V1	Percent cultch cover	90	0.90				
V2	Mean salinity during spawning season	26	0.65				
V3	Minimum annual salinity	24	1				
V4	Annual mean salinity	27	0.19				
		HSI=	0.58	HSI=		HSI=	

HSI mitigation calculations for oysters

American Oyster HSI Model Spreadsheet

Condition: Future Without Project

TY	Acres	HSI	Total HUs	Cumulative HUs
0	130	0.00	0.00	
1	130	0.00	0.00	0.00
11	130	0.00	0.00	0.00
51	130	0.00	0.00	0.00
Max TY=	51		AAHUs=	0.0

Net Change in AAHUs due to Project

Future With Project AAHUs	79.8
Future Without Project AAHUs	0.0
Net Change	79.8

Condition: Future With Project

TY	Acres	HSI	Total HUs	Cumulative HUs
0	130	0.00	0.00	
1	130	0.66	85.33	42.67
11	130	0.65	83.87	846.00
51	130	0.58	75.06	3178.66
Max TY=	51		AAHUs=	79.8

Calculation of net change of AAHUs for oyster mitigation

Enclosure 2 – Ocean Dredged Material Disposal Site Analyses

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

December 2018

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Contents

List of Figures

List of Tables

List of Acronyms

CFR Code of Federal Regulations

COD Chemical Oxygen Demand

DMF Dredged Material Fate

DMMP Dredged Material Maintenance Plan

EPA Environmental Protection Agency

ERDC Engineering, Research, and Development Center

ERL Effects Range Low

FEIS Final Environmental Impact Statement

FWPCA Federal Water Pollution Control Act

LPC Limiting Permissible Concentration

MDFATE Multiple-disposal Fate

MLLW Mean Low Low Water

MLT Mean Low Tide

MPRSA Marine Protection, Research, and Sanctuaries Act

MSC Matagorda Ship Channel

MSCIP Matagorda Ship Channel Improvement Project

NAD North American Datum

NOAA National Oceanic and Atmospheric Administration

ODMDS Offshore Dredged Material Disposal Site

RIA Regional Implementation Agreement

SP Solid Phase

SPP Suspended Particulate Phase

TWQS Texas Surface Water Quality Standards

USACE United States Army Corps of Engineers

WES Waterways Experiment Station

WQC Water Quality Criteria

ZSF Zone of Feasibility

1. INTRODUCTION

The MSC is approximately 26 miles long extending from Port of Port Lavaca – Point Comfort (Port) turning basin in Lavaca Bay through the southwest section of Matagorda Bay and offshore into the Gulf of Mexico (Gulf) through Matagorda Peninsula (Figure 1), and was first authorized by Congress under the Rivers and Harbors Act of 1958 (House Document 388, 84th Congress, Second Session). The In-Bay Channel is authorized to be maintained at a project width of 200 feet (ft) and a depth of –36 ft mean low tide (MLT), plus 2 ft of advanced maintenance depth and an additional 2 ft of paid over depth to compensate for physical conditions and inaccuracies in the dredging process. Side slopes for the In-Bay Channel are maintained at a 3 vertical to 1 horizontal slope ratio. The Entrance Channel is authorized to be maintained at a width of 300 ft and a depth of –38 ft MLT plus 3 ft of advanced maintenance depth and 2 ft of paid allowable over depth, with a 10 to 1 side slope ratio. The frequency of routine maintenance dredging within the authorized Entrance Channel limits is approximately once every 1.55 years, producing an average of 682,067 cubic yards of dredged material per cycle, with the material placed at an existing designated maintenance Ocean Dredged Material Disposal Site (ODMDS). This existing 474-acre ODMDS is located approximately 2 miles offshore and 1,000 ft south of the Entrance Channel centerline in ambient water depths ranging from approximately –30 ft to –38 ft MLT.

1.1 Proposed Channel Project

The Matagorda Ship Channel (MSC) extends from the Port of Port Lavaca-Point Comfort Turning Basin in Lavaca Bay through the Matagorda Bay and extends into the Gulf of Mexico via the Matagorda Peninsula. The current length of the ship channel is approximately 26 miles (Figure 1). The in-bay channel is authorized to a current depth of -38 feet Mean Low Low Water (MLLW) with a bottom width of 200 feet. The Entrance Channel is maintained at -40 feet MLLW.

The MSC Project would widen the in-bay channel to 350 feet and deepen the channel to -47 feet MLLW. The Entrance Channel would be widened to 600 feet and deepened to -47 feet MLLW.

The purpose of this appendix is to discuss conceptual mitigation procedures for the unavoidable impacts to habitat from the proposed project. This appendix describes the impacts to each habitat type and describes the compensation calculated for these losses.

1.1.1 Project Purpose and Need

The existing MSC project provides deep-draft liquid tanker and dry bulk carrier access from the Gulf to the Port. The CCND has determined a need to reduce transportation costs, increase operational efficiencies of commodities moving through the Port, and improve navigation safety. This need was derived from an analysis of current and projected vessel transits, cargo tonnage, and capacity at the existing and proposed terminal facilities. The Port currently handles a variety of products, the principal being petroleum, aluminum ore, chemicals, and allied products. Approximately 90% of vessels that call at the Port are required to light load due to draft limitations of the present channel configuration. By expanding channel dimensions, cargo vessels could reduce or eliminate light-loading requirements, and larger cargo vessels currently unable to transit due to the existing channel configuration could begin port calls. An expanded channel may also allow two-way traffic for certain vessel classes to safely transit and/or reduce tug usage.

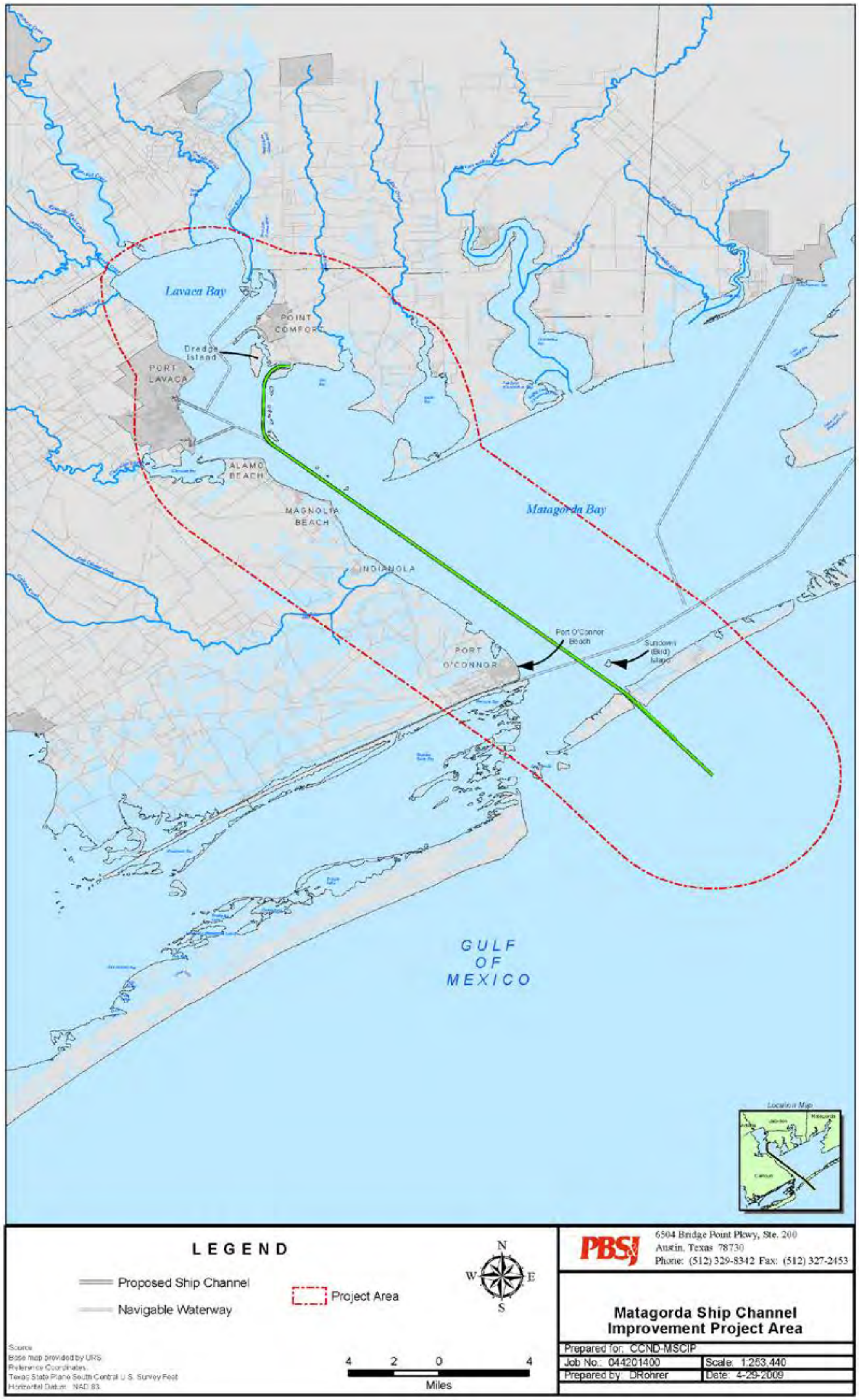

Figure 1. Matagorda Ship Channel Project Study Area.

1.2 ODMDS Designation

Ocean disposal of dredged material was not specifically regulated in the United States until passage of the Marine Protection, Research and Sanctuaries Act of 1972 (MPRSA). Limited regulation was provided by the Supervisors' Act of 1888 and the Refuse Act of 1899. Under these acts, transportation and navigation factors, rather than environmental considerations, guided selection of placement locations by the USACE and the issuance of permits for ocean disposal.

Although the Fish and Wildlife Coordination Act of 1958 initially referred to inland tidal waters, it included consideration of the effects of dredged material on commercially important marine species. This act, together with subsequent judicial decisions, empowered the USACE to refuse permits if the dredging or filling of a bay or estuary would result in significant, unavoidable damage to the marine ecosystem.

MPRSA and the Federal Water Pollution Control Act (FWPCA), later amended by the Clean Water Act of 1977, both passed in 1972 and specifically addressed waste disposal in the aquatic and the marine environment. The FWPCA and the Water Quality Improvement Act of 1970 set up specific water-quality criteria to be used as guidelines in controlling discharges into marine and aquatic environments. These water-quality criteria applied to placement of dredged material only in cases where fixed pipelines were used to transport and discharge dredged material into the environment at discrete points. MPRSA, however, specifically regulates the transport and ultimate disposal of waste materials in the ocean. Under Title I of MPRSA, the primary regulatory vehicle of the Act, a permit program for the disposal of dredged and nondredged materials was established that mandates determination of impacts and provides for enforcement of permit conditions.

The August 1975 London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (Convention) is the principal international agreement governing ocean dumping. The Convention specifies that contracting nations will regulate disposal in the marine environment within their jurisdiction, disallowing all disposal without permits. The nature and quantities of all waste material and the circumstances of disposal must be periodically reported to the International Maritime Organization (formerly the Inter-Governmental Maritime Consultative Organization), which administers the Convention.

In October 1973, the Environmental Protection Agency (EPA) issued the final Ocean Dumping Regulations and Criteria (the Regulations, or Ocean Dumping Regulations), revised in January 1977 (40 CFR Parts 220 to 229). These regulations established procedures and criteria for review of ocean disposal permit applications (Part 227); assessment of impacts of ocean disposal and alternative disposal methods; enforcement of permits; and designation and management of ocean disposal sites (Part 228). They also established procedures by which the EPA is authorized to designate ODMDSs and times for ocean disposal of acceptable materials under Section 102(c) of the MPRSA and the criteria for site designation, including general and specific criteria for site selection.

The EPA is mandated with the authority granted by Congress to regulate ocean dumping and with the responsibility for site designation, monitoring, and management, as stated specifically in 40 CFR 228.4(e)(1). The EPA has been requested to designate an ocean disposal site for the one-time placement of new work dredged material generated by the MSC Project. Although EPA is responsible for designating ocean dumping sites according to Section 102 of the MPRSA, and such sites may be necessary to construct and maintain the proposed MSCIP, USACE may, with the concurrence of EPA, select an alternative ocean disposal site in accordance with MPRSA 103(b), when use of an EPA-designated site is not feasible. Site designation by EPA does not authorize any dredging project nor does it permit placement of any dredged material. Sites are designated in areas where a need for ocean disposal has been indicated, based on past dredging demands and/or projected demands associated with new or expanded projects. However, site designation does not in and of itself preclude the consideration of other placement options, including beneficial use options or the no action alternative. Once designated as an approved ocean disposal site, the appropriateness of ocean disposal is determined on a case-by-case basis in accordance with the ocean dumping criteria.

The existing designated maintenance material ODMDS is bounded by:

28° 23' 48" N, 96° 18' 00" W; 28° 23' 21" N, 96° 18' 31" W
28° 22' 43' N, 96° 17' 52" W; 28° 23' 11" N, 96° 17' 22" W

Water depths range from 30 to 38 ft and the site is located approximately 2 miles offshore from the Matagorda Peninsula shoreline (Figure 2), and 1,000 ft southeast of the MSC Entrance Channel centerline. The area of the site equals approximately 456 acres.

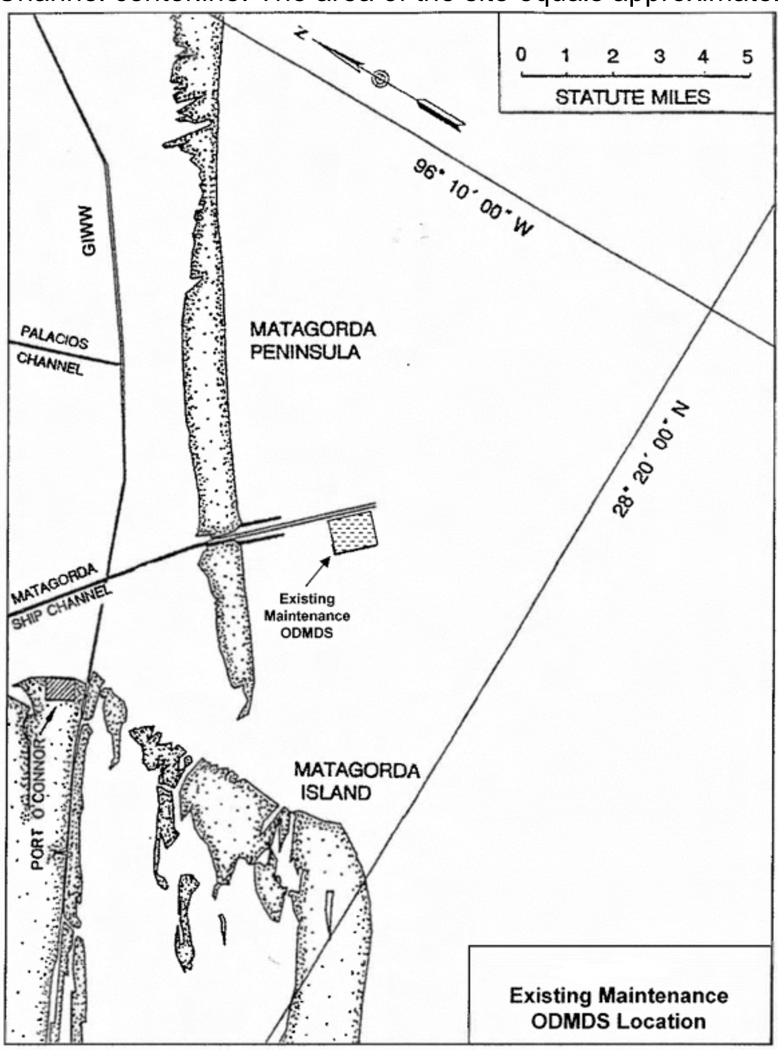

Figure 2. Location of Existing Maintenance ODMDS

1.2.1 ODMDS Designation Purpose and Need

The federal action for which this document was prepared is the possible designation by EPA or the USACE of a site or sites for the ocean placement of new work material to be dredged for the MSC Project. A Final Environmental Impact Statement (FEIS) for the maintenance dredging of the MSC was prepared by USACE (1974). One offshore site is currently in use for the existing channel. This site was designated by EPA for the continued placement of maintenance dredged material removed from the MSC Entrance Channel (EPA, 1990). The purpose of EPA's action is to either designate, based on 40 CFR 228, an ocean disposal site for the one-time placement of new work dredged material generated by the MSCIP that will provide environmentally acceptable and economically and physically feasible areas or to concur with USACE's selection of an alternative offshore disposal site for the onetime placement of the new work dredged material generated by the MSCIP.

1.2.2 ODMDS Designation Alternatives

EPA (1990) examined a suite of alternatives to locate the maintenance material ODMDS. These alternatives included the no action, non-ocean, and offshore disposal alternatives. The offshore alternatives included mid-shelf; continental slope; and nearshore, including the interim designated, historically used site. Through the Zone of Feasibility (ZSF) analysis performed by EPA (1989), it was concluded only the nearshore alternative was feasible, and the most appropriate sites were selected by eliminating areas considered to be not feasible. The existing maintenance material ODMDS resulted from this selection process and was designated.

1.2.2.1 No-Action Alternative

The No-Action alternative entails that the EPA refrain from designating a new ODMDS for the placement of 11.9 mcy of new work dredged material generated by the proposed MSCIP. Without site designation or allowance to place material within the nearshore, a much more expensive, and possibly much less safe alternative of land-based or open-bay placement methods would be required. Use of upland placement areas would greatly increase dredging costs because of double handling and the long distances involved in transporting dredged material from the offshore Entrance Channel or would require converting in-bay open-bottom habitat areas to an upland disposal site for receipt of In-Bay and Entrance Channel dredged sediments. The economic benefits of the navigation improvements would not be sufficient to justify the higher costs, nor would the environmental impacts of converting in-bay open-bottom habitats to upland placement areas warrant justification. Therefore, in the absence of Federal action to designate a new ODMDS, expand the existing ODMDS, or permit the one-time nearshore placement of new work dredged material in support of the proposed MSCIP, the existing project would continue to be maintained at its current dimensions and dredged material would be placed in compliance with the applicable DMMP. Material from the Entrance Channel would continue to be placed in the existing ODMDS, and none of the material would be used beneficially. Foregoing navigation improvements to the MSC would have the following impacts: (1) long-term increases in transportation costs to navigation relative to those that would result from project implementation; (2) loss of potential for increased channel usage, since a widened and deepened channel would permit two-way traffic and allow for larger vessel classes to transit; and (3) failure to improve vessel traffic safety that would result from a widened MSC. Therefore, the No-Action alternative is not considered viable.

1.2.2.2 Non-ocean Sites

Dredged material placement alternatives evaluated in this document consist of upland placement, beneficial use, and ocean placement. Alternate dredging methods include the use of dipper dredges, ladder dredges, and clamshell dredges. However, through the years, only hopper dredges and cutterhead-suction pipeline dredges have proved to be both safe and efficient for nearshore and offshore use, and hopper dredges are preferred for dredging areas offshore. A review of the capabilities of the dredging industry's equipment confirms that the hopper dredge is the most economical and feasible means for dredging at sea. The Port of Calhoun has determined the most economical construction methodology to modify the MSC Entrance Channel seaward of the Matagorda Peninsula is to excavate the channel with a hopper dredge and dispose the material at an ocean placement site. Additionally, the Port of Calhoun determined the least environmentally intrusive and most economical method to dredge the soft clay reaches within the In-Bay Channel is with a clamshell dredge and placing the material with a dump scow at an ocean disposal site. Transporting dredged material on a hopper dredge from the Entrance Channel to in-bay and upland placement areas rather than to an ocean disposal site would not be economically viable, given the hopper dredge would need to travel toward shore an additional 4 to 28 miles. Furthermore, the draft of a fully loaded hopper dredge or dump scow would restrict their movements within bay waters. As a result, the hopper dredge or dump scow would only be able to discharge its dredged material through a pump-out system, which involves mooring and connecting to a discharge pipe for each load of dredged material, thus slowing down dredge operations and increasing the cost to construct. The technology for other dredge types has not progressed sufficiently to be suitable alternatives to hopper dredging within the MSC Entrance Channel.

The nearest available land placement area is located 24 miles away from the seaward end of the project and 3.5 miles from MSC-Port Lavaca channel split. This land placement area does not have sufficient capacity to receive offshore channel construction, In-Bay Channel construction, and future maintenance material. Therefore, use of this site for offshore or a portion of the in-bay construction material would require the acquisition and construction of new placement areas to receive routine maintenance material from the in-bay reaches of the MSC. Since the surrounding land areas are wetlands or shallow bay habitats, it is not likely that suitably sized replacement areas could be obtained without significant loss of quality wetlands or bay bottoms. Additionally, utilizing land placement areas for the entrance or the soft clay reaches of the In-Bay Channel's new work dredged material would extend the period of construction, resulting in an increase in total emissions of particulates into the air during the period of project construction. Therefore, a land-based disposal alternative would not offer sufficient net environmental benefits to replace the disposal of the entrance and In-Bay Channel's dredged material at an offshore placement site.

After a review of the options, it is concluded that for this project, land-based and in-bay alternatives offer no environmental or economic advantages over placement of the MSC Entrance Channel's new work and maintenance dredged material or the MSC In-Bay Channel's soft clay reaches new work dredged material in the ocean. Furthermore, the methodology of hopper dredging in the Entrance Channel and clamshell dredging in the soft clay reaches of the In-Bay Channel, coupled with ocean placement of the dredged material, are considered to be both environmentally and economically viable. All other alternatives, including the No-Action alternative, have negative consequences associated with them.

1.2.2.3 ODMDS Offshore Sites

The mid-shelf and continental slope areas are located approximately 30 and 70 miles, respectively, from the entrance of the MSC. Hauling dredged material to these deeper offshore sites will extend the project schedule and require additional fuel, manpower, and closer surveillance to guard against short dumps. A straightforward analysis of transporting material with a hopper dredge a distance from 1 to 10 miles increases the cost of dredging on a per-cubic-yard (cy) basis by a factor of 2.5. EPA (1983) notes an increase of $0.15/cy/mile of transport distance for disposal at a mid-shelf site off Tampa Bay, Florida. Since fuel costs have skyrocketed since 1983, this value is very low. The value of $0.15/cy/mile, noted above, would be $0.29/cy/mile, if adjusted for inflation (ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai.txt). Using a unit value of $0.29/cy/mile, with an expected quantity of new work material of 12.0 mcy and an incremental round-trip transport distance of 64 miles to a mid-shelf site.

Additionally, deep-water sites are more difficult to monitor baseline conditions and postdisposal impacts. Whereas grab samplers and SCUBA divers can be used to monitor shallow-water sites, more-sophisticated sampling devices and larger support vessels are necessary to monitor deep-water sites. Working farther offshore also carries greater safety risks during both the disposal and monitoring operations. For these reasons, the mid-shelf and continental-slope sites were eliminated from further consideration.

1.2.2.4 ODMDS Nearshore Sites

Nearshore sites that are suitable for establishment of ODMDSs for the MSC were identified following the ZSF analysis performed by EPA (1989). This analysis involved identifying a large area within which the ODMDS could be located, based primarily on physical and geographical constraints. Subareas within the ZSF were then excluded from ODMDS siting, based on the locations of biologically sensitive areas, beaches and recreational areas, cultural and historical areas, and living and nonliving resources. These areas were excluded from the ZSF based on the interpretation of 5 general and 11 specific criteria described in 40 CFR 228.5 and 228.6(a) of the Ocean Dumping Regulations. The boundaries of the Matagorda ZSF were defined by a 10-mile radius from the intersection of the Entrance Channel and the beach line. Monitoring and surveillance are feasible within all regions of the Matagorda ZSF, and the ZSF does not intersect any political boundaries. The enclosed area is approximately 157 square miles, and all areas outside the ZSF were eliminated from further consideration.

1.2.2.5 ODMDS Size and Location for New Work Dredged Material

The multiple-disposal fate (MDFATE) model developed by the USACE Engineering, Research and Development Center (ERDC), formerly known as the Waterways Experiment Station (WES), was employed to assist in determining the dimensions and location of a proposed ODMDS for the MSCIP's new work dredged material. The results of the MDFATE simulations are described in Section 5.0 of this report. Based upon these results, it is recommended to either designate an additional Matagorda ODMDS for the one-time use to place 12.0 mcy of the MSCIP's new work dredged material under Section 102 of the MPRSA or permit the one-time placement of the new work material consistent with Section 103 (b) of the MPRSA. The proposed new work ODMDS would be located adjacent and seaward of the existing maintenance material ODMDS, within the non-exclusionary boundaries as originally established by the ZSF analysis (Figure 3) originally performed by EPA for the MSC ODMDS Designation (EPA, 1989, 1990).

This proposed ODMDS is bounded by:

28° 21' 52' N, 96° 16' 01" W; 28° 23' 01" N, 96° 17' 12" W
28° 22' 08" N, 96° 18' 14" W; 28° 21' 01" N, 96° 17' 04" W

Water depths range from 43 to 50 ft, and the site is located 3.5 miles offshore from the Matagorda Peninsula shoreline (Figure 4), and 1,000 ft southeast of the MSC Entrance Channel centerline. The area of the site equals approximately 1,647 acres. The depth of closure typically for the Gulf Coast ranges from –20 ft to –30 ft (USACE, 1989). Since the water depths of the proposed ODMDS are beyond the depth of closure for the shoreward transport of sediments, the dredged material proposed for placement in the new work ODMDS is not expected to migrate onshore nor impact the Pass Cavallo inlet located downdrift of the ODMDS.

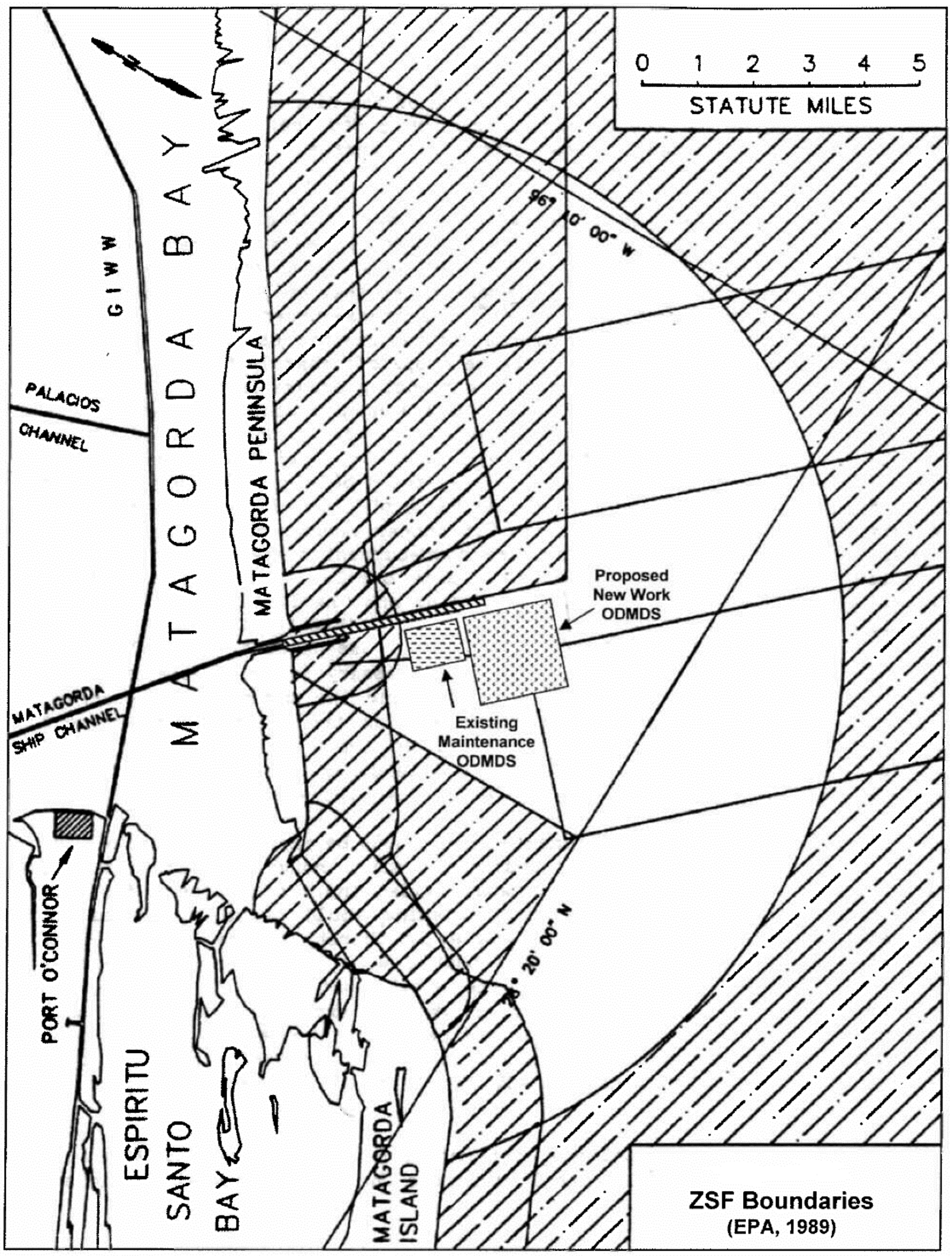

Figure 3. Boundaries of the EPA ZSF study for the New Work ODMDS.

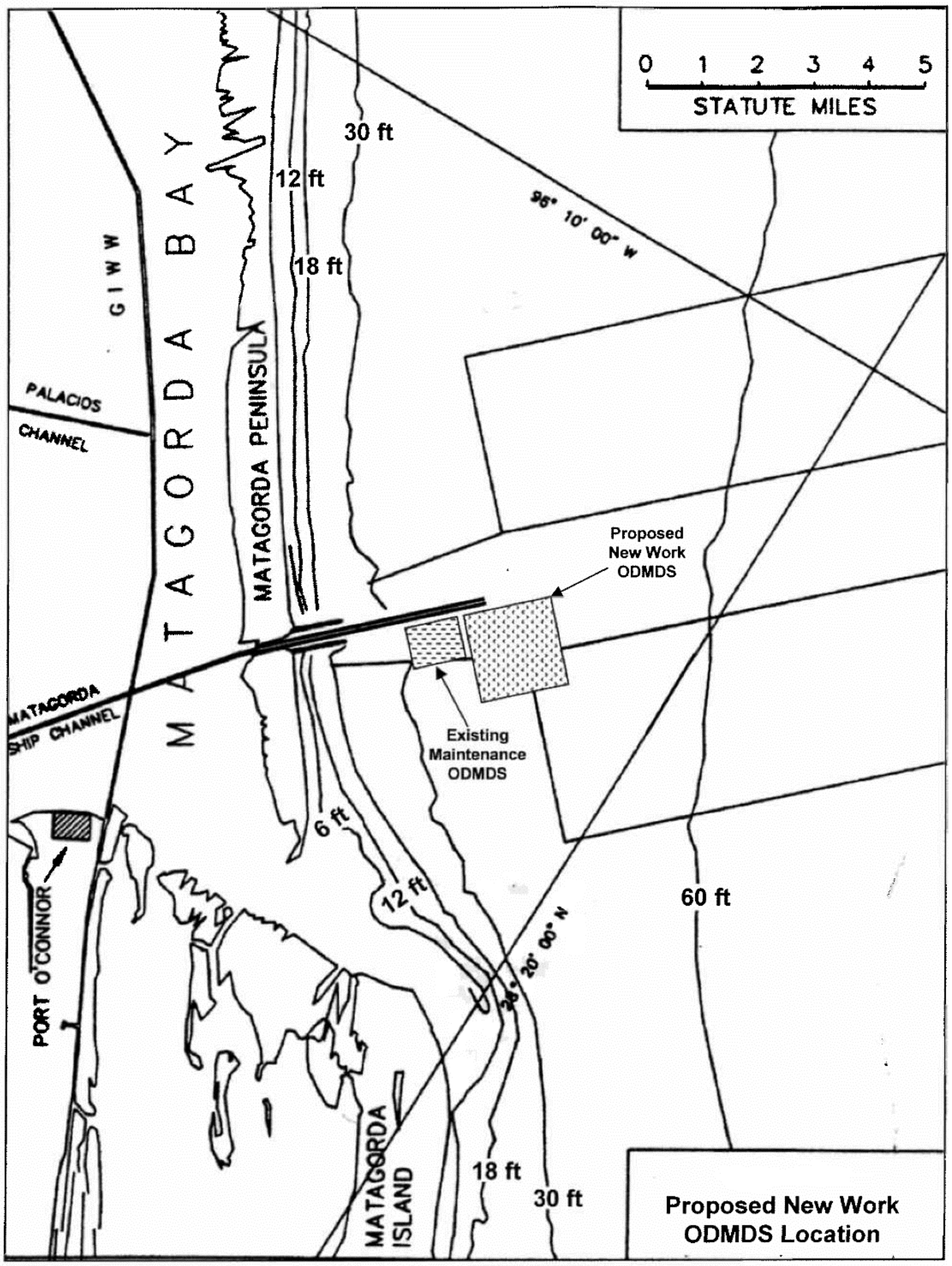

Figure 4. Location of the New Work ODMDS.

2. PROPOSED USE OF THE SITES

2.1 New Work Material ODMDS

The MSCIP proposes to improve the existing MSC by widening and deepening the In-Bay Channel to a width of 400 ft and a depth of –47 ft MLLW and the Entrance Channel to a width of 600 ft and a depth of -47 ft MLLW. A total of 46.5 mcy of new work material will need to be dredged to modify the MSC, of which approximately 12.0 mcy of the new construction dredged material will require transport to and the one-time placement within an ODMDS. The remaining quantity new work material will be placed in an array of dredged material placement areas located within the Matagorda Bay region.

2.2 Maintenance Material ODMDS

The existing ODMDS will continue to receive maintenance material from the routine maintenance dredging of the MSC Entrance Channel. Over the course of the 50-year study approximately 13.6 mcy of the maintenance dredged material will require transport to and placement within an ODMDS. The remaining quantity of maintenance material will be placed in an array of dredged material placement areas located within the Matagorda Bay region.

3. CHARACTERIZATION OF THE DISPOSAL SITES

Table 1 provides dredging dates and volumes dredged from the MSC Entrance Channel from 1966 to 2006. The average time between the beginnings of each dredging operation is approximately 1.55 years (18 months), and the average amount of material dredged per routine maintenance cycle is 682,067 cy. This does not mean that the Entrance Channel is dredged every 1.55 years, on average, but it does indicate the average frequency of use of the maintenance material ODMDS. Based upon the sedimentation study performed for the MSCIP, it is estimated that due to the widening and the deepening of the Entrance Channel, the annual sedimentation rate will be 272,000 cy/year. The increase in sedimentation rate is due primarily to increased channel length to reach project depth. However, due to the increased channel width, the accumulation rate within the Entrance Channel is expected to decrease to approximately 0.35 ft/year. As reported in Section 2.2, the result of this decreased sediment accumulation rate will be a change in the required routine maintenance dredging frequency from an average of once every 1.55 years to once every 4 years. As such, the expected volume of maintenance material to be placed at the existing ODMDS will increase from an average of 682,067 cy to 1,088,000 cy per dredging cycle.

3.1 Maintenance Material ODMDS Characteristics

Sediment and water quality in and near the existing designated ODMDS are within EPA standards (EPA, 1990). Grain-size analysis of the interim ODMDS prior to the designation of the permanent site shows the dredged material closely matches that of the existing ODMDS. Entrance Channel maintenance sediments average over 90% sand in the western portion of the channel. However, the sediments near and offshore of the former interim site are comprised of sand plus silt and sand plus clay fractions, respectively. Therefore EPA (1990) concluded that sediments dredged from the Entrance Channel have, over time, altered the natural sediment composition at the existing ODMDS.

3.2 New Work Material Proposed ODMDS Characteristics

The proposed ODMDS for the new work material is proposed to be located immediately offshore of the existing ODMDS, and generally consists of sand plus clay fractions as its natural bottom sediment characteristic (EPA, 1990). Figure 5 displays the bottom sediment characteristics within the offshore area of the MSC.

Table 1. Historical use of the Maintenance Material ODMDS

Start	Completed	Quantity Dredged (cubic yards)
March 15, 1966	April 17, 1966	536,212

July 2, 1966	December 35, 1966	728,300
March 13, 1967	April 9, 1967	381,500
July 17, 1967	October 31, 1967	985,464
January 29, 1968	March 25, 1968	661,100
July 29, 1968	October 6, 1968	683,664
February 10, 1969	April 13, 1969	711,000
October 3, 1969	November 30, 1969	1,003,000
April 20, 1970	May 17, 1970	492,087
October 11, 1970	November 29, 1970	906,785
July 25, 1971	August 8, 1971	229,040
March 20, 1972	April 16, 1972	484,560
March 26, 1973	April 29, 1973	547,000
December 28, 1974	May 6, 1975	1,463,473
January 21, 1976	February 17, 1976	943,112
December 22, 1977	January 29, 1978	290,000
August 2, 1979	August 31, 1979	624,727
August 28, 1980	December 22, 1980	1,716,288
January 26, 1984	March 7, 1984	908,933
January 30, 1989	February 20, 1989	489,040
August 11, 1993	September 7, 1993	964,186
October 3, 1996	October 21, 1996	488,383
July 16, 1999	August 3, 1999	499,341
October 21, 2001	October 29, 2001	285,594
January 18, 2004	February 6, 2004	365,226
July 31, 2006	August 10, 2006	336,720
Total		17,733,735
Average per cycle		682,067

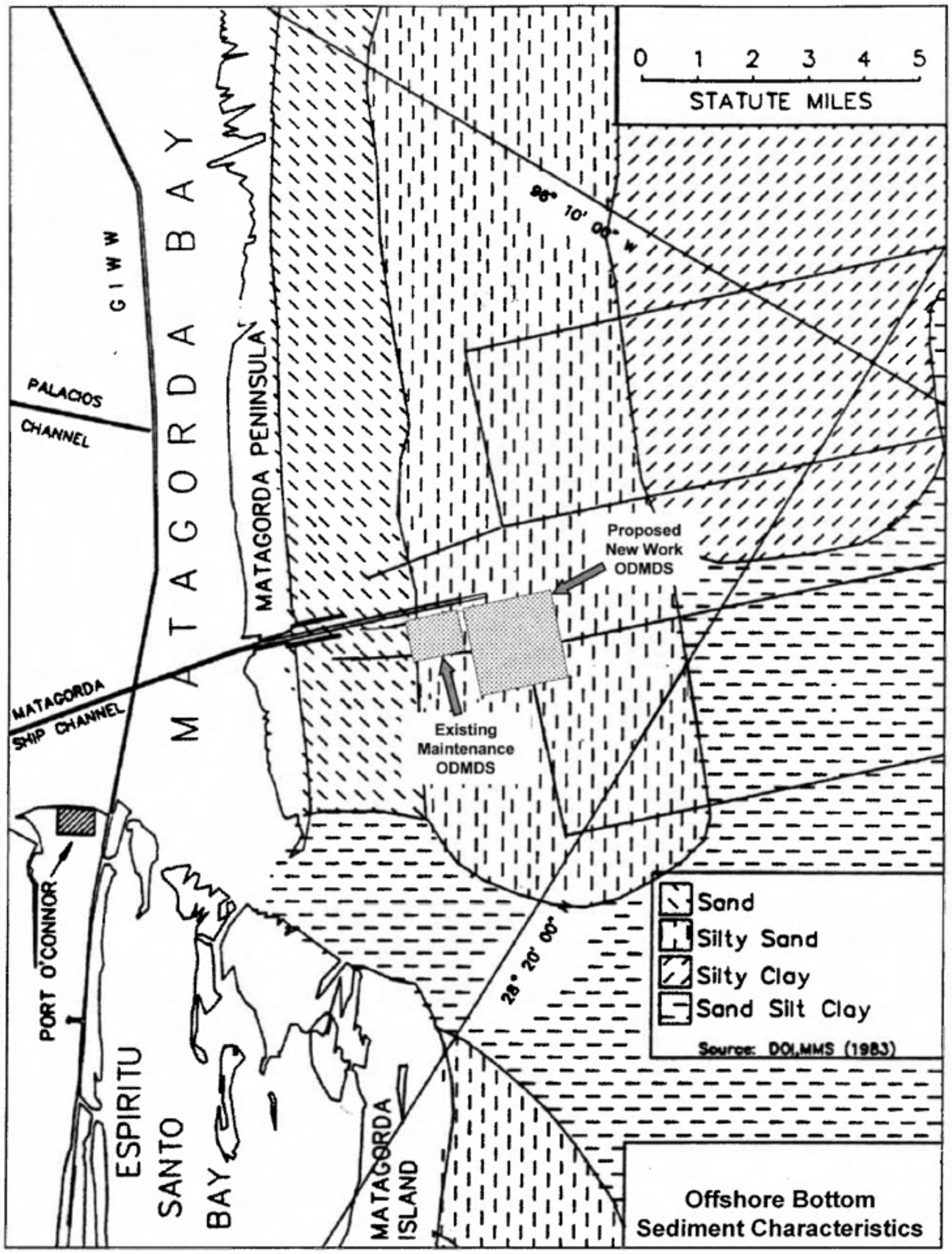

Figure 5. Characteristics of the bottom sediment in the offshore area.

4. CHARACTERIZATION OF THE MATERIAL EXPECTED TO BE DREDGED

4.1 New Work Material

Data collected by the USACE dating back to 1987 were used as the basis to determine the sediment quality of the new work dredged material targeted to be placed in the proposed ODMDS (USACE, 2009). There are two In-Bay Channel reaches (Lavaca Bay Reach and

Matagorda Bay Reach) and there is one Offshore Reach. A portion of the Matagorda Bay Reach and Offshore Reach will generate new work dredged material to be placed in the proposed ODMDS.

The geotechnical characteristics of the new work material within the footprint of the MSCIP was derived by reviewing boring logs for the original MSC project (USACE, 1962). The new work sediments contained within the MSC In-Bay Channel reaches that have been identified for placement within the proposed ODMDS generally consist of soft clay material. The portion of the Matagorda Bay Reach and the Offshore Reach where material will be generated for the ODMDS generally consists of a mixture of sand, silt, and clay for the new work material.

Sediment, water, and elutriate data are available for each reach extending back to 1987, with the water and elutriate data being compared against the Texas Surface Water Quality Standards (TWQS) and EPA's water quality criteria (WQC), and with the sediment data being compared against the Effects Range Low (ERL) values from the National Oceanic and Atmospheric Administration (NOAA) 1999 Screening Quick Reference Tables (Buchman, 1999). However, EPA does not consider data more than 5 years old to be relevant for determining whether there is cause for concern.

4.1.1 In-Bay Channel – Stations 76+000 to 71+000 Characterization

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962) and the M-PC-03 sediment samples collected in April 2003 and MPC-06 sediment samples collected in February 2006 reveal the material within Reach 7 predominantly consists of clay. For Reach 7, samples collected since 2001 did not exceed WQC, TWQS, and ERL values. A total of 1.7 mcy of new work dredged material consisting of clay from this reach is planned to be placed in the proposed ODMDS.

4.1.2 In-Bay Channel – Stations 67+000 to 54+000 Characterizaton

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962), the M-PC-03 sediment samples collected in April 2003, and the M-PC-06 sediment samples collected in February 2006 reveal the material within this reach predominantly consists of clay. Samples collected since 2001 did not exceed WQC, TWQS, and ERL values. A total of 2.8 mcy of new work dredged material consisting of clay from this reach is planned to be placed in the proposed ODMDS.

4.1.3 In-Bay Channel – Stations 54+000 to 46+000 Characterization

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962) and the M-PC-03 sediment samples collected in April 2003 reveal the material within this reach predominantly consists of clay and silt. For this reach, samples collected since 2001 did not exceed WQC, TWQS, and ERL values. A total of 0.9 mcy of new work dredged material consisting of clay from this reach is planned to be placed in the proposed ODMDS.

4.1.4 In-Bay Channel – Stations 46+000 to 40+000 Characterization

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962) and the M-PC-03 samples collected within this reach in April 2003 reveal the material within this reach predominantly consists of a mixture of sand, silts, and clay. For Reach 11, samples collected since 2001 did not exceed WQC, TWQS, and ERL values. A total of approximately 0.2 mcy of new work dredged material consisting of clay from this reach is planned to be placed in the proposed ODMDS.

4.1.5 In-Bay Channel – Stations 40+000 to 6+000 Characterization

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962) and the M-PC-03 sediment samples collected within this reach in April 2003 reveal the material within this reach consists of sand, silt and clay mixture. For this reach, samples collected since 2001 did not exceed WQC, TWQS, and ERL values. A total of 3.2 mcy of new work dredged material consisting of clay from this reach is planned to be placed in the proposed ODMDS.

4.1.6 Entrance Channel – Stations –5+000 to –23+000 Characterization

The grain-size analysis of the MSC 1962 boring logs (USACE, 1962), the MEC-01 sediment samples collected in May 2001, and the MEC-06 sediment samples collected in November 2005 revealed the material within this reach is made up predominantly of medium-sized sand, and the maintenance material has typically been a mixture of silt, clay, and sand. Elutriate test results for mercury exceeded the WQC and the TWQS threshold for elutriate samples MEC-06-01, MEC-06-02, and MEC-06-03. Additionally, even though the mercury in the water samples was below the WQC and the TWQS, it was relatively high compared to concentrations found in the nearshore Gulf water (USACE historic database). However, mercury was not detected in the sediment samples that were used in the elutriate preparation prior to 2005. The samples collected in 2005 were the only time mercury has been detected in either water or elutriate samples. Bioassays were conducted and survival in three of nine Suspended Particulate Phase (SPP) bioassays with these samples was significantly less than survival in the Dilution-Water Control (USACE, 2009). However, survival in no test was less than 82%, and the LC_{50} could not be calculated but would have to be greater than 100%. Therefore, the Limiting Permissible Concentration (LPC) for water column toxicity/SPP was met, and the material is acceptable under the Ocean Dumping Regulations pertaining to water column impacts.

For sediments, the only ERL value exceeded occurring within this reach over the past 5 years was for arsenic from sediment sample MEC-01-02 collected in May 2001. However, the concentration for arsenic only slightly exceeded (8.42 milligrams per kilogram [mg/kg]) the ERL value of 8.20 mg/kg. Solid Phase (SP, or whole mud) bioassays were conducted on the sediments collected in May 2001 with the burrowing amphipod, *Ampelisca abdita*, and the epifaunal shrimp, *Americamysis bahia*. There were no tests in which survival in the Reference Control was greater than survival in the treatments, and the difference exceeded 10% (20% for amphipods), requiring statistical analysis (USACE, 2009). Therefore, the survival data from the SP bioassay indicated no potential for environmentally unacceptable toxic impacts to benthic organisms from the unconfined open-water placement of sediments from the MSC Entrance Channel. Bioaccumulation studies were conducted on the sediments using bentnose clam, *Macoma nasuta*, and the sand worm, *Nereis virens*. No organic chemicals were found above detection limits in test organism tissues. The concentrations of none of the metals in tissues of *N. virens* or *M. nasuta* exposed to test sediments were significantly higher than the respective concentrations in Reference Control organisms. Therefore, there is no indication of bioaccumulation from exposure to these sediments, all LPCs pertaining to sediments are met, and the material is acceptable under the Ocean Dumping Regulations.

A total of 3.2 mcy of new work dredged material consisting of sand, silt, and clay from this reach is planned to be placed in the proposed ODMDS.

5. MODELING OF DREDGED MATERIAL DISTRIBUTION

The disposition of dredged material was simulated using an updated version (EPA/USACE, 1991) of the Dredged Material Fate (DMF) model, developed for the USACE through the Dredged Material Research Program by Tetra Tech., Inc. (Brandsma and Divoky, 1976). The modifications to this model (known as MDFATE) were made under the supervision of Dr. Billy H. Johnson of the WES of the USACE. The purpose of the modeling was to determine the necessary size of any new ODMDSs and to determine whether the existing ODMDS is of sufficient size to contain the future maintenance dredged material from the MSC Entrance Channel following improvement.

The MDFATE model simulates the initial behavior and final disposition of dredge material deposited “instantaneously” at the site of interest through the doors of a hopper dredge or through the split-hull opening of a dump scow. The MDFATE model assumes that this procedure may be broken into three phases: (1) convective descent, during which the discharge cloud falls under the influence of gravity; (2) dynamic collapse, occurring when the descending cloud impacts the bottom or arrives at a level of neutral buoyancy at which point the descent is retarded and horizontal spreading dominates; and (3) long-term passive dispersion, commencing when the material transport and spreading are determined more by ambient currents and turbulence than by the dynamics of the disposal operation (Johnson and Holliday, 1978). The model also includes the settling of suspended solids.

The output from the MDFATE model simulates a subaqueous mound configuration on the ocean floor following the cumulative disposal of the entire volume of dredged material at predetermined grid points. Inputs required to perform the simulation include the dredged sediment characteristics, physical and environmental characteristics of the disposal site, dredge and disposal equipment characteristics, and disposal operations characteristics.

5.1 New Work Dredged Material

The percentage of the various soil particle types anticipated in the new work sediments to be dredged was estimated by using the grain-size analysis results from sediment samples collected in April 2003 from reaches Matagorda Bay Reach and in May 2001 and November 2005 the Offshore Reach.

For the In-Bay Channel reaches, the following assumptions were made with respect to simulating the placement of new work dredged material within the proposed ODMDS: (1) the new work In-Bay Channel dredged material predominantly consists of cohesive clay; (2) the material would be excavated with a clamshell dredge; (3) the dredged material would be transported and placed by a 4,000 cy split-hull dump scow; and (4) the speed during release of the dredge material would be 3.3 feet per second (ft/s).

For the Entrance Channel reach, the following assumptions were made with respect to simulating the placement of the new work dredged material within the proposed ODMDS: (1) the new work Entrance Channel dredged material contains sediments consisting of predominantly medium-sized sand; (2) would be dredged, transported, and placed with a 3,600-cy hopper dredge; and (3) the speed during release of the dredged material would be 6.7 ft/s.

The evolution of the disposal mound was simulated by sequencing in three segments the placement of the new work dredged material at the proposed ODMDS. The first segment entailed the placement of 3.2 mcy of Entrance Channel sediments at the proposed ODMDS. The second and third segments entailed placing 4.3 and 4.5 mcy, respectively, of In-Bay Channel dredged sediments at the proposed ODMDS. The simulations resulted in a cumulative mound configuration for the new work material that was slightly skewed in the current and vessel-heading directions and that formed rounded diamond shapes, slightly elongated in the downcurrent and vessel-travel directions, although this is difficult to see at the scale on the figures in Attachment A. At its thickest, the mound elevation of the new work material in the proposed ODMDS would be 2 ft, and the relief along the inner edges of the placement area does not change following the simulations. Therefore, an examination of Attachment A reveals the dimensions (8,350 ft on each side at depths ranging from 38 to 44 ft) of the proposed

ODMDS is sufficient to contain the new work material from the MSCIP, without excessive mounding.

5.2 Maintenance Material

It is planned to modify the maintenance dredging cycle for the Entrance Channel to once every 4 years following construction of the MSCIP. As a result, approximately 1.088 mcy of future maintenance dredged material would be placed at the existing maintenance ODMDS per dredging cycle. EPA (1989, 1990) concluded the existing maintenance ODMDS could receive 795,000 cy of maintenance dredged material per year. In order to determine whether or not the existing maintenance dredging site would have the capacity to receive a total of 1.088 mcy of future maintenance material per dredging cycle, the MDFATE model was used to simulate the mound configuration for the larger maintenance material volume. For the simulation, the dredged material was assumed: (1) to predominantly consist of sand, equivalent to 63.3% sand, 20.4% silt, and 16.3% clay; (2) would be dredged, transported, and placed with a 3,000-cy hopper dredge; and (3) the speed during release of the maintenance dredged material would be 3.3 ft/s.

6. REGULATORY CHARACTERIZATION OF ENVIRONMENTAL CONSEQUENCES

As required by the Ocean Dumping Regulations (40 CFR 220-229) promulgated to interpret the MPRSA, the proposed new work material ODMDS for one-time use will be examined relative to the 5 general criteria and the 11 specific factors (40 CFR 228.5 and 40 CFR 228.6(a), respectively). Since the maintenance material to be dredged from the proposed widening and deepening of the Entrance Channel should be the same as the existing maintenance material, except for volume, the existing routine maintenance material ODMDS will be examined only to determine whether it is of sufficient size to receive a greater quantity of material per dredging cycle, and is not included in the analysis presented in sections 6.1 and 6.2, unless specifically stated. This information is included in the examination relative to the 5 general criteria and the 11 specific factors, where pertinent. In the following section, the criteria and factors are presented in italics, followed by the statement indicating compliance.

6.1 Five General Criteria

6.1.1 40 CFR 228.5(a)

The dumping of materials into the ocean will be permitted only at sites or in areas selected to minimize the interference of disposal activities with other activities in the marine environment, particularly avoiding areas of existing fisheries or shellfisheries, and regions of heavy commercial or recreational navigation.

The preferred ODMDS, like the other nonexcluded areas, was selected, including appropriate buffer zones, to avoid sport and commercial fishing activities, as well as other areas of biological sensitivity. The excluded areas include the jetties, Pass Cavallo, and several lighted oil platforms. The buffer zones were sized by EPA (1989) on the basis of the physical movement of the maintenance material. Since maintenance material, because of the higher percentage of fines, is transported farther than new work material, those buffer zones should be conservative for the new work ODMDS. The preferred ODMDS is outside the Channel, avoids all known navigation obstructions, and is located a greater distance away than the existing ODMDS from the buffer zones established by EPA (1989).

6.1.2 40 CFR 228.5(b)

Locations and boundaries of disposal sites will be so chosen that temporary perturbations in water quality or other environmental conditions during initial mixing caused by disposal operations anywhere within the site can be expected to be reduced to normal ambient seawater levels or to undetectable contaminant concentrations or effects before reaching any beach, shoreline, marine sanctuary, or known geographically limited fishery or shellfishery.

Testing has been conducted on existing maintenance material for years and those data were examined. There is no evidence that either the new work or maintenance material would not meet the criteria of 40 CFR 227. The appropriate sizes for the buffer zones and for the preferred ODMDS are based on sediment transport modeling and the physical oceanographic characterization of the MSC area. These, combined with the information on the expected quality of the material to be dredged, ensure that perturbations caused by placement would be reduced to ambient conditions at the boundaries of the site.

6.1.3 40 CFR 228.5(c)

If, at any time during or after disposal site evaluation studies, it is determined that existing disposal sites presently approved on an interim basis for ocean dumping do not meet the criteria for site selection set forth in 228.5–228.6, the use of such sites will be terminated as soon as suitable alternative disposal sites can be designated.

This criterion does not apply to the preferred sites because they are not existing sites approved on an interim basis. However, extensive monitoring programs, including bathymetric scans; water, sediment and elutriate chemistry; and benthic infaunal analyses, during construction should provide warning of potential problems. Extensive monitoring programs, including water, sediment, and elutriate chemistry; bioassays; and bioaccumulation studies are routinely conducted under the Regional Implementation Agreement (RIA) among the EPA, Region 6, and the USACE, Galveston and New Orleans districts (EPA/USACE, 2003) on all maintenance material. The results of that monitoring, plus studies conducted prior to designation of the existing ODMDSs (EPA, 1990), indicated no problems at the existing ODMDSs in the past. There is no reason to expect problems with future maintenance material from the MSC Project. However, the alternatives analysis performed by EPA (1990) indicates that, should the preferred ODMDS be found in the future to be not suitable and de-designation of the preferred ODMDS proves desirable, other areas are available and suitable for use as an ODMDS. Monitoring will also be conducted on the new work ODMDS in accordance with Section 7 of this report.

6.1.4 40 CFR 228.5(d)

The sizes of ocean disposal sites will be limited in order to localize for identification and control any immediate adverse impacts and to permit the implementation of effective monitoring and surveillance programs to prevent adverse long-range impacts. The size, configuration, and location of any disposal site will be determined as a part of the disposal site evaluation or designation study.

The sizes of the sites are as small as possible to reasonably meet the criteria stated in 40 CFR 228.5 and 228.6(a). The determined size of proposed new work ODMDS for one-time use is 1,600 acres, as established by the MDFATE Modeling, described in sections 5.0, 5.1, and 5.2. The monitoring program should provide adequate surveillance to prevent adverse long-range impacts.

6.1.5 40 CFR 228.5(e)

EPA will, wherever feasible, designate ocean dumping sites beyond the edge of the continental shelf and other such sites that have been historically used.

The lack of resilience of the deep-ocean benthic community (EPA, 1990) indicates that an off-shelf placement site would cause severe impacts to the off-shelf benthic community. No environmental advantage to an off-shelf site was noted whereas impacts to the human environment were less with a nearshore site for safety reasons. The existing maintenance material ODMDS has been used since it was formally designated in 1990.

6.2 Eleven Specific Factors

40 CFR 228.6(a) states that the factors included below as sections 6.2.1 through 6.2.11 will be considered in the selection process for site designation.

6.2.1 40 CFR 228.6(a)(1)

Geographical position, depth of water, bottom topography, and distance from coast.

The preferred ODMDS is bounded by the following coordinates (NAD 83, see Figure 5):

28° 21' 52" N, 96° 16' 01" W; 28° 23' 01" N, 96° 17' 12" W

28° 22' 08" N, 96° 18' 14" W; 28° 21' 01" N, 96° 17' 04" W

The water depth at the preferred site ranges from 43 to 50 ft, the bottom topography is flat, and the site is approximately 3.5 miles from the coast at its closest point.

6.2.2 40 CFR 228.6(a)(2)

Location in relation to breeding, spawning, nursery, feeding or passage areas of living resources in adult or juvenile phases.

The pass between the jetties and Pass Cavallo, including a buffer zone of 1 mile, are excluded areas of biological sensitivity. Also excluded are lighted platforms and nonsubmerged shipwrecks, which improve fishing.

6.2.3 40 CFR 228.6(a)(3)

Location in relation to beaches or other amenity areas.

The preferred site is located approximately 3.5 miles from beaches and other amenity areas such as the Matagorda Island National Seashore. Since the ODMDSs are located in water depths greater than the depth of closure (approximately 16-ft depth), it is not expected that the deposited material will migrate to the shoreline.

6.2.4 40 CFR 228.6(a)(4)

Types and quantities of wastes proposed to be disposed of and proposed methods of release, including methods of packaging the waste, if any.

Only new work dredged material from the MSC will be disposed. It is estimated a total of 12.0 mcy of new work material will be deposited within the preferred site over a period of approximately 2 years. It is expected that 3.2 mcy of the new work material dredged from the MSC Entrance Channel will be transported by hopper dredges. The remaining 8.8 mcy of new work material dredged from the MSC In-Bay Channel will be transported by dump scows. The material from the In-Bay Channel will consist of soft clay, and the material from the Entrance Channel will contain mostly medium-sized sand. Based on chemical analyses and biological toxicity studies of past maintenance material, which should be more degraded than the underlying new work material, it was concluded for the new work material no special location or precautions would be necessary for the placement of the materials to be dredged.

6.2.5 40 CFR 228.6(a)(5)

Feasibility of surveillance and monitoring.

The preferred site is amenable to surveillance and monitoring. The proposed monitoring and surveillance program consists of: (1) a method for recording the location of each discharge; (2) bathymetric surveys; and (3) grain-size analysis, sediment chemistry characterization, and benthic infaunal analysis at selected stations.

6.2.6 40 CFR 228.6(a)(6)

Dispersal, horizontal transport, and vertical mixing characteristics of the area, including prevailing current velocity, if any.

These physical oceanographic parameters were used to develop the necessary buffer zones for the exclusion analysis (EPA, 1989, 1990) and to determine whether the size of the preferred sites was adequate (Section 5.0). Predominant longshore currents, and thus predominant longshore transport, are to the southwest. Long-term mounding has not historically occurred in the existing ODMDSs. Therefore, steady longshore transport and occasional storms, including hurricanes, remove the placed material from the sites. Long-term accumulation has not been noted at construction material placement areas near Sabine Pass, the Galveston Ship Channel, or Freeport, and is not expected at Matagorda.

6.2.7 40 CFR 228.6(a)(7)

Existence and effects of current and previous discharges and dumping in the area (including cumulative effects).

The discussion of the results of chemical and bioassay testing of samples from the existing maintenance material ODMDS and its surroundings concluded that there were no indications of water or sediment quality problems within the existing ODMDS (EPA, 1990). Testing of past maintenance material indicates that it was acceptable for ocean placement under 40 CFR 227. Based on current direction and modeling of the new work material, the preferred site was situated to prevent discharged material from reentering the Channel and to ensure that any mounding poses no obstruction to navigation. No excessive mounding has been detected at the existing maintenance material ODMDS, and there is no reason to expect any excessive mounding at the proposed new work material ODMDS.

6.2.8 40 CFR 228.6(a)(8)

Interference with shipping, fishing, recreation, mineral extraction, desalination, fish and shellfish culture, areas of special scientific importance and other legitimate uses of the ocean.

The items from the above list that are pertinent to the present situation are: shipping, mineral extraction, commercial and recreational fishing, recreational areas, and historic sites. The preferred site will not interfere with these or other legitimate uses of the ocean because the exclusion process in EPA (1989, 1990) was designed to prevent the selection of sites that would interfere. The proposed new work ODMDS is located in the nonexcluded area of the ZSF as established by EPA (1989, 1990). Placement operations in the past have not interfered with other uses.

6.2.9 40 CFR 228.6(a)(9)

Existing water quality and ecology of the site as determined by available data or by trend assessment or baseline surveys.

Monitoring studies (EPA, 1989) have shown only short-term water-column perturbations of turbidity, and perhaps chemical oxygen demand (COD), which resulted from disposal operations. No short-term sediment quality perturbation, except grain size, could be directly related to disposal operations. In general, the water and sediment quality is good throughout the ZSF, including the existing maintenance material ODMDS. This indicates there have been no long-term impacts on water and sediment quality. However, EPA (1990) noted there appear to be long-term impacts on the grain size, and thus on the benthos at the existing maintenance ODMDS. As such, EPA recommended giving preference to the historically impacted area, against other areas evaluated in the ZSF (EPA, 1989), as the preferred site for the permanent designation of the maintenance ODMDS for the Matagorda Ship Channel. Subsequent monitoring data reveal further changes to the benthos at the maintenance ODMDS have not occurred and have therefore stabilized. Reoccurring disposal at another ocean disposal site most likely will result in impacts. However, since the proposed new work material ODMDS is planned to be designated for the one-time use to receive new work dredged material from the MSCIP, any benthos impacts within the proposed new work ODMDS should be temporary as the mound disperses over time.

6.2.10 40 CFR 228.6(a)(10)

Potentiality for the development or recruitment of nuisance species in the disposal site.

With a disturbance to any benthic community, initial recolonization will be by opportunistic species. However, these species are not nuisance species in the sense that they would interfere with other legitimate uses of the ocean, that they are human pathogens, or that they are nonindigenous, nuisance species. The placement of maintenance material in the past has not attracted or promoted, and the placement of the new work material and future maintenance material should not attract or promote, the development or recruitment of nuisance species.

6.2.11 40 CFR 228.6(a)(11)

Existence of or in close proximity to the site of significant natural or cultural features of historical importance.

The nearest site of historical importance is northeast of the channel, or upcurrent of the preferred site by approximately 1 mile. In addition, the preferred site is roughly 5 miles from a cluster of historic sites to the west. Because of the dispersive nature of the ODMDS, EPA (1989) concluded there would be no long-term accumulation outside the interim disposal site (predecessor to the designated maintenance ODMDS), and that short-term accumulation would be small. Therefore, one-time use of the preferred alternative would not impact sites of historical importance.

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Enclosure 3 – Biological Opinion

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects

Integrated Draft Feasibility Report and Environmental Impact Assessment

July 2019

US Army Corps of Engineers®

Galveston District

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BIOLOGICAL ASSESSMENT FOR IMPACTS TO ENDANGERED AND THREATENED SPECIES RELATIVE TO THE MATAGORDA SHIP CHANNEL, PORT LAVACA, TEXAS PROJECT MATAGORDA AND CALHOUN COUNTIES, TEXAS

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Contents

1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

This Biological Assessment (BA) is being prepared to fulfill the U.S. Army Corps of Engineers' (USACE) requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. The proposed Federal action (project) requiring the assessment is the widening and deepening of the Matagorda Ship Channel (MSC) in Matagorda and Calhoun counties, Texas. Details of the proposed project are provided in Section 1.2; specific details are available in the Draft Environmental Impact Statement (EIS; USACE, 2018). This BA evaluates the potential impacts the project may have on federally listed endangered and threatened species and is being prepared to assist U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) personnel in fulfilling their obligations under the ESA. Table 1 presents a list of federally listed threatened and endangered species that are addressed in this BA, as provided by USFWS and NMFS.

Table 1. Threatened and Endangered Wildlife Species of possible occurrence in Calhoun and Matagorda Counties, Texas

Common Name	Scientific Name	Status
Mammals		
Gulf Coast jaguarondi	*Herpailurus yagouaruondi cacomitli*	Endangered
West Indian manatee	*Trichechus manatus*	Threatened
Blue whale	*Balaenoptera musculus*	Endangered
Finback whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaegnliae*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Birds		
Least tern	*Sterna antiallarum*	Endangered*
Northern aplomado falcon	*Falco femoralis septentrionalis*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Whooping crane	*Grus Americana*	Endangered
Reptiles		
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretomochelys imbricate*	Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta caretta*	Threatened
Corals		
Lobed star	*Orbicella annularis*	Threatened
Mountainous star	*Orbicella faveolata*	Threatened
Boulder star	*Orbicella franksi*	Threatened
Elkhorn coral	*Acropora palmata*	Threatened
Clams		
Golden Orb	Quadrula aurea	Candidate

*This species only needs to be considered for wind related projects within the migratory route.

For the purposes of the BA, we define the “project area” as those areas that will be directly affected by construction and maintenance of the proposed project. This includes the proposed dredging footprint, existing and proposed placement areas (PAs) identified in the Dredged Material Management Plan (DMMP), DMMP restoration and nourishment areas, and mitigation areas (Figure 1).

The “study area” includes a larger area for which environmental effects of the proposed project have been analyzed (Figure 2). The study area encompasses a larger area that contains the smaller project area, and includes a 10-mile radius into the Gulf of Mexico (Gulf) from the end of the entrance channel.

1.2 ALTERNATIVES CONSIDERED

This section discusses alternatives considered during the preparation of the Environmental Impact Statement (EIS). While alternate sites might be considered alternatives for some projects that address a national or statewide need, such is not the case for this project. The alternatives addressed were channel widening alternatives and dredged material placement alternatives at the project location. The No-Action Alternative always remains an alternative to the proposed action. The purpose of the proposed project is to improve the deep-draft transport of commerce on the MSC. The current channel is economically inefficient, with up to 90% of vessels calling at Port of Port Lavaca-Point Comfort (the Port) reported to be light loaded due to draft limitations of the present channel configuration. By expanding the MSC dimensions and associated turning basin and marine slips, cargo vessels could reduce or eliminate light-loading measures, and larger cargo vessels unable to transit the current channel configuration could call on the Port. The channel improvements would reduce transportation costs for existing commodities, which are crucial to the regional economy. Because the existing turning basin at 1,000 feet (ft) by 1,000 ft may be deepened but cannot be expanded to accommodate the larger vessels, the Calhoun Port Authority (CPA) proposes to construct a new turning basin at the intersection of the MSC and Alcoa Channel to accommodate larger vessels that would be able to call on the Port. In addition, a wider channel would potentially allow for two-way traffic of smaller vessels during periods of increased transits.

1.2.1 Channel Improvement Alternatives

Identification of reasonable alternatives for channel improvements began with identifying actions that would meet the stated need for the project and comparing them to one another by assessing the benefits and consequences of each alternative to the human and natural environment. Thus, a set of basic criteria is formulated against which potential project impacts were evaluated. An evaluation framework was developed to measure, quantify, and report impacts from each alternative using the established criteria. These criteria are generally derived from water resource planning guidance of the USACE and are described in terms of technical and environmental perspectives.

Technical criteria developed for alternative formulation and evaluation were based on maximizing the navigational attributes of the waterway for commercial vessel transportation in a manner that would achieve the stated purpose and need of the project and is determined as the least environmentally damaging practicable alternative. The general environmental criteria for navigation projects are to assure that care be taken to preserve and protect significant ecological, aesthetic, and cultural values, and to conserve natural resources. Particular emphasis was placed on the following:

- Protection and preservation of the existing fish and wildlife resources along with the protection and preservation of estuaries and wetland habitats and water quality and improvement of these resources through beneficial use of dredged material;
- Consideration in the project design of the least disruptive construction techniques and methods;
- Mitigation for project-related unavoidable impacts by minimizing, rectifying, reducing or eliminating, compensating, replacing, or substituting resources; and
- Preservation of significant historical and archeological resources through avoidance of effects. This is the preferable action to any other form of mitigation since these are finite, nonrenewable resources.

Two structural channel improvement alternatives were developed and evaluated using the technical and environmental criteria described above (Table 2). The primary difference between Alternative A and Alternative B is the presence/absence of a Passing Lane. Each alternative included multiple depths to be refined during the planning stage.

Table 2. Array of structural alternatives for the Matagorda Ship Channel Project.

Alternative	Depth Main / Entrance	Width Main / Entrance	Turning Basin	Passing Lane
No Action	38' / 40'	200' / 300'	~1,000'	NO
A	41' / 43'	350' / 600'	1,200'	NO
	43' / 45'	350' / 600'	1,200'	NO
	45' / 47'	350' / 600'	1,200'	NO
	47' / 49'	350' / 600'	1,200'	NO
	49' / 51'	350' / 600'	1,200'	NO
	51' / 53'	350' / 600'	1,200'	NO
B	41' / 43'	350' / 600'	1,200'	YES
	43' / 45'	350' / 600'	1,200'	YES
	45' / 47'	350' / 600'	1,200'	YES
	47' / 49'	350' / 600'	1,200'	YES
	49' / 51'	350' / 600'	1,200'	YES
	51' / 53'	350' / 600'	1,200'	YES

The PDT discussed the Final Array of Alternatives with the MSC Pilots. During the discussion, the Pilots indicated that a Passing Lane would not increase port efficiencies. Alternative B was removed from further consideration. Economic analyses indicate that Alternative A – 47' MLLW for the main channel and 49' MLLW for the entrance channel is the preferred alternative.

1.2.2 Dredged Material Placement Alternatives

The proposed action and other alternatives would require placement of construction and maintenance dredged material. The quantity of dredged material removed from the MSC would vary by alternative, and the mix of PAs would primarily distinguish the placement alternatives, along with the types of dredging equipment capable of constructing the improvements.

Thus, a range of dredged material placement alternatives was also considered, including confined upland placement, beneficial use, confined in-water, unconfined in-water, and ocean placement. In the interest of meeting the project purpose and need while minimizing and mitigating for environmental impacts, the project applicant met with representatives of several State and Federal resource agencies to develop a DMMP/Beneficial Use Plan. Work Group participants included representatives from the following State and Federal agencies:

- USACE
- Texas Commission on Environmental Quality (TCEQ)
- Texas Parks and Wildlife Department (TPWD)
- NMFS
- USFWS

A DMMP was identified and evaluated for potential impacts in the DEIS (USACE, 2018).

1.2.3 No-Action Alternative

The No-Action Alternative for this project is one which would result in no construction or improvements to the MSC.

1.2.4 Applicant's Preferred Alternative

Proposed improvements to the MSC would entail deepening the Main Channel from 38' MLLW to 47' MLLW, with 2' of advance maintenance and 2' of allowable overdepth. The Main Channel would be widened from its existing width of 200' to a proposed width of 350'. The Entrance Channel would deepen from 40' MLLW to 49' MLLW, with 3' of advance maintenance and 2' of allowable overdepth. The Entrance Channel width is proposed to be modified from 300 to 600 ft. In addition, a new turning basin would be constructed to allow for a ship-turning circle of 1,200' 47', with 2' of advance maintenance and 2' of allowable overdepth. Approximately 30.2 million cubic yards (mcy) of new work material would be generated upon initial construction, and 167.2 mcy of maintenance material would be generated over a period of 50 years after construction of the improvement project.

The proposed DMMP entails features that will utilize new work and maintenance dredged material to:

1. Cap in situ bottom sediments contaminated with elevated levels of mercury located on the northern edge of Dredge Island (PA ER3) with new work material and future maintenance material;
2. create a terrestrial upland placement site (PA P1) located immediately south of Alamo Beach on agriculture lands with new work material and future maintenance;
3. place future maintenance material in existing in-bay unconfined PAs located northwest of the MSC in Matagorda Bay; and

4. place future maintenance material from the MSC Entrance Channel at the existing Matagorda Ocean Dredged Material Disposal Site (ODMDS) (PA 1) located 2 miles offshore from the Matagorda Peninsula and 1,000 ft south of the MSC Entrance Channel centerline.

The PAs proposed in the DMMP are shown on Figure 1.

1.3 PROJECT AREA HABITAT DESCRIPTION

The study area (see Figure 2) is located in the Gulf Prairies and Marshes Ecological Region as described by Gould et al. (1960). This Eco-region spans the Texas coastline, extending 30 to 80 miles inland. Elevations range from sea level to approximately 250 ft (76.2 m). The Gulf Marshes are low, wet areas with salinities ranging from fresh to saline. Submerged aquatic vegetation, including seagrasses, grow in open-water areas and are also considered special aquatic sites. The Gulf Prairies are primarily uplands, dominated by tallgrass and post oak savannah. However, woody encroachment by trees and scrub species, including Chinese tallow (*Sapium sebiferum*), mesquite (*Prosopis glanduosa*), huisache (*Acacia farnesiana*), and oaks (*Quercus* spp.) (Hatch et al., 1990), plus agricultural and urban development have modified much of the coastline.

The project area is located in the Texan Biotic Province as described by Blair (1950). This province represents a transitional area between the forested Austroriparian Province to the east and grassland provinces to the west. The integration of forests and grasslands results in a mixture of vertebrate species typical of the two habitats. Blair (1950) identifies 23 amphibians known to occur in the Texan province, including 18 anurans (frogs and toads) and 5 caudates (salamanders and newts).

Matagorda Bay is the third largest estuary on the Texas coast, encompassing 420 square miles (1,087.8 square kilometers) and having an average depth of 6.5 ft (2.0 m) (Armstrong et al., 1987; U.S. Environmental Protection Agency [EPA], 1999). The system includes Lavaca, East Matagorda, Keller, Carancahua, and Tres Palacios bays (see Figure 2). Open-water areas include the unvegetated, bottom portion (excluding hard substrates such as oyster reefs) of the subtidal estuarine environment. Open-water habitats support communities of benthic organisms and corresponding fisheries populations.

2.0 STATUS OF THE LISTED SPECIES

To assess the potential impacts of the proposed project on endangered and threatened species, a literature review was performed and other scientific data was researched to determine species distributions, habitat needs, and other biological requirements. Significant literature sources consulted for this report include the USFWS series on endangered species of the seacoast of the U.S. (National Fish and Wildlife Laboratories [NFWL], 1980), Federal status reports and recovery plans, job reports of the TPWD, peer-reviewed journals, and other standard references. Habitat assessments were initially based on aerial photography and National Wetlands Inventory mapping. Input was also solicited from State and Federal Resource Agency personnel and from personnel from Federal National Wildlife refuges (NWRs) and State Wildlife Management areas in the area.

2.1 GULF COAST JAGUARONDI

2.1.1 Reason for Status

USFWS listed the Gulf Coast jaguarondi (*Herpailurus yagouaroundi cacomitli*) as endangered on 14 June 1976 (41 FR 24062). Later it received protection under the ESA of 1973. The primary reason for the decline of the jaguarondi is the loss of habitat. Their primary habitat is in dense brush within fertile regions of the Rio Grande Valley. This habitat has been cleared of brush for agricultural purposes and less than 5% of its habitat remains (Campbell, 1995).

2.1.2 Habitat

The jaguarondi is a secretive cat and it uses dense thorny shrublands of the Rio Grande Valley. They sometimes utilize riparian habitat along rivers or creeks. The optimal habitat is not known due to their secretive nature, though it is believed to be similar to the ocelot (*Leopardus pardalis*). Larger tracts of shrublands (at least five acres) are important to allow adequate range. Little is known about their breeding habitat, and most of what is known is anecdotal (Campbell, 1995).

2.1.3 Range

The jaguarondi is believed to range from southern Texas to Tamaulipas and Veracruz in Mexico (Natureserve, 2018). No sightings of jaguarondi have been made in Texas since 1990 in Brazoria County, though these may have been released individuals (Matthews and Moseley, 1990).

2.1.4 Distribution in Study Area

The historical distribution of the jaguarondi is throughout southern Texas, though no sitings have been made since 1990 (Matthews and Moseley, 1990). The species is believed to be on the verge of extirpation in Texas. While it is possible that a jaguarondi may be present in Calhoun or Matagorda counties, there is no suitable habitat for the species in the study area and it is unlikely to occur there.

2.2 WEST INDIAN MANATEE

2.2.1 Reason for Status

USFWS listed the West Indian manatee (*Trichechus manatus*) as endangered on 11 March 1967 (32 FR 4001). Later it received protection under the ESA of 1973. The largest known human-related cause of manatee mortality is collisions with hulls and/or propellers of boats and ships. The second-largest human-related cause of mortality is entrapment in floodgates and navigation locks. Other known causes of human-related manatee mortality include poaching and vandalism, entrapment in shrimp nets and other fishing gear, entrapment in water pipes, and ingestion of marine debris (USFWS, 2001). Hunting and fishing pressures were responsible for much of its original decline because of the demand for meat, hides, and bones, which resulted in near extirpation of the specie (USFWS, 1995).

A prominent cause of natural mortality in some years is cold stress, and major die-offs associated with the outbreaks of red tide have occurred, where manatees appear to have died because of ingestion of filterfeeding tunicates that had accumulated the neurotoxin-producing dynoflagellates responsible for causing the red tide (USFWS, 2001). The low reproductive rate and habitat loss make it difficult for manatee populations to recover.

2.2.2 Habitat

The West Indian manatee inhabits shallow coastal waters, estuaries, bays, rivers, and lakes. Throughout most of its range, it appears to prefer rivers and estuaries to marine habitats, although manatees inhabit marine habitats in the Greater Antilles (Lefebvre et al., 1989). It is not averse to traveling through dredged canals or using quiet marinas. Manatees are apparently not able to tolerate prolonged exposure to water colder than 68 degrees Fahrenheit (°F) (20 degrees Celsius [°C]). In the northern portions of their range, during October through April, they congregate in warmer water bodies, such as spring-fed rivers and outfalls from power plants. They prefer waters that are at least 3.3 to 6.6 ft (1 to 2 m) in depth; along coasts, they are often in water 9.8 to 16.4 ft (3 to 5 m) deep. They usually avoid areas with strong currents (NatureServe, 2018).

Manatees are primarily dependent upon submergent, emergent, and floating vegetation, with the diet varying according to plant availability. They may opportunistically eat other foods such as acorns in early winter in Florida or fish caught in gill nets in Jamaica (O’Shea and Ludlow, 1992).

2.2.3 Range

The manatee ranges from the southeastern U.S. and coastal regions of the Gulf of Mexico, through the West Indies and Caribbean, to northern South America. U.S. populations occur primarily in Florida (NatureServe, 2018), where they are effectively isolated from other populations by the cooler waters of the northern Gulf of Mexico and the deeper waters of the Straits of Florida (Domning and Hayek, 1986).

2.2.4 Distribution in Study Area

The West Indian manatee historically inhabited the Laguna Madre, Gulf of Mexico, and tidally influenced portions of rivers. It is currently, however, extremely rare in Texas waters, and the most recent sightings are likely individuals migrating or wandering from Mexican waters. Historical records from Texas waters include Cow Bayou, Sabine Lake, Copano Bay, the Bolivar Peninsula, and the mouth of the Rio Grande (Schmidly, 2004). Also, on July 25 and 26, 2005, a manatee was sighted near the Dolphin Point subdivision in Port O’Connor, and on August 13, 2005, a manatee was sighted at the southwest end of Espiritu Santo Bay, near Port O’Connor. In May 2005, a manatee appeared in the Laguna Madre near Port Mansfield. Although the West Indian manatee is chiefly a marine species, its occurrence in the study area is unlikely.

2.3 LEAST TERN

2.3.1 Reason for status

USFWS listed the least tern (*Sterna antillarum*) as endangered on 28 May 1985 (50 FR 21784). There are three subspecies of the least tern, with only the interior least tern

(*Sterna antillarum athalossus*) currently being considered endangered. The largest threats to the least tern are loss of natural nesting habitat, due to changes, such as channelization and damming, in natural river systems. Changes in flow regimes have impacted the timing of tern nesting (Campbell, 1995).

2.3.2 Habitat

The interior least tern is a migratory species. They breed along inland river systems in the US and winter in coastal areas of Central and South America. Their typical nesting habitat includes sparsely vegetated shell, sand or gravel beaches, preferring open areas. The interior least tern feeds in shallow water bodies with an abundance of small fish (Campbell, 1995).

2.3.3 Range

Breeding aged least terns can be found along the Pacific coast from central California down through Baja California and into Chiapas, Mexico. Inland populations can be found along major rivers, such as Red, Colorado, Arkansas, Missouri, Ohio, Mississippi, and Rio Grande. Populations can also be found along the Atlantic and Gulf coasts from Maine through Florida, Texas, the Yucatan Peninsula, and off the coasts of Belize, Honduras and Venezuela. Island populations also exist in the West Indies, Greater and Lesser Antilles, and Bermuda (Natureserve, 2018).

2.3.4 Distribution in Study Area

Calhoun and Matagorda counties are within the least tern migratory corridor along interior rivers to the southern Gulf of Mexico coast. The species may be present in the study area, though the subspecies are not easily distinguishable as fall migrants (Davis and Brewer, 2014).

2.4 NORTHERN APLOMADO FALCON

2.4.1 Reasons for Status

The northern aplomado falcon (*Falco femoralis septentrionalis*) was proposed for endangered status on 20 May 1985 (50 FR 20810). The listing was published as final on 25 February 1986, and the rule became effective on 27 March 1986 (51 FR 6686). Although reasons for the decline of the aplomado falcon are not known (Hector, 1987), habitat degradation due to brush encroachment is probably the main factor in the disappearance of this bird from the U.S. (Hector, 1983). Overcollecting of the falcons and their eggs may have contributed to the decline on a local basis (Hector, 1983, 1987). The NAS (comments published in 51 FR 6686, 25 February 1986) identified the decline as being through the loss of open grassland habitat through overgrazing and other excessive range practices. Currently, the most serious threat is reproductive failure caused by continued use of organochlorine pesticides such as DDT and DDE in Latin America, which affect both the aplomado falcon and its prey species (Hector, 1983).

2.4.2 Habitat

Typical habitat of this species is open country, especially savannah rangeland and open woodland, containing scattered mesquites (*Prosopis* spp.), yuccas (*Yucca* spp.), oaks

(*Quercus* spp.), and acacias (*Acacia* spp.) (AOU, 1998; Hector, 1983; 51 FR 6686, 25 February 1986). Open terrain with scattered trees (for nesting and observation perches), relatively low ground cover (less concealment for prey), an abundance of small to medium-sized birds, and nesting platforms (e.g., stick nests or large bromeliads), particularly in yuccas and mesquites, are the habitat requirements for this bird (Hector, 1981; USFWS, 1995). The preferred habitat of the aplomado falcon in southern Texas was coastal prairie with widely scattered mesquites and yuccas (Hector, 1987).

2.4.3 Range

The aplomado falcon is resident throughout much of Central and South America (AOU, 1998). Three subspecies are recognized: the northern aplomado falcon (*F. f. septentrionalis*) and two others (*F. f. femoralis* and *F. f. pichinchae*) (Hector, 1983). The subspecies *septentrionalis* historically occurred in southeastern Arizona, southern New Mexico, southern Texas, much of Mexico, the Pacific coast of Guatemala, and perhaps Nicaragua where it intergrades with *F. f. femoralis*. Highest nesting densities in the U.S. were formerly in New Mexico and Texas; today this bird is virtually absent from the U.S. (Homerstad, 1990) and nests regularly only in the coastal plains of eastern Mexico (Vera Cruz, Chiapas, Campeche and Tabasco) in the palm and oak savannah and is rarely seen outside this area (Hector, 1981, 1983).

In Texas, the northern aplomado falcon formerly ranged from Cameron County northward to San Patricio County, and west from Ector and Midland counties to El Paso County (Oberholser, 1974). Around the turn of the century, the southeast corner of Cameron County was an important nesting area for the aplomado falcon, with over 100 nests being recorded (Hector, 1983). Other breeding records in Texas have come from Hidalgo, Kenedy, Brooks, Pecos, Ector and Midland counties, with the last nesting pair recorded from Brooks County in 1941 (Oberholser, 1974). Until recently, the last confirmed nesting in the U.S. was near Deming, New Mexico in 1952 (USFWS, 1995). Since 1985, reintroduction efforts have been underway at several sites in south Texas in order to reestablish populations in the U.S. Reintroduction sites have included the Laguna Atascosa NWR and the King Ranch. These birds are hatched in California, flown to Texas at age 3 to 4 weeks, reared in hack boxes, and fed periodically following fledging. In 1995, a pair of these released birds successfully nested on a transmission line pole near Brownsville. In 1996 this same pair nested in a nearby mesquite, but the female and young were subsequently killed by a great horned owl (*Bubo virginianus*) (Anonymous, 1996).

2.4.4 Presence in the Study Area

Suitable habitat may exist further inland within the study area; no suitable habitat exists within the project area and its presence is highly unlikely. Even if this species recovers sufficiently from its present decline and spreads into its former range, lack of suitable nesting habitat in the project area would preclude its occurrence there.

2.5 PIPING PLOVER

2.5.1 Reasons for Status

USFWS listed the piping plover (*Charadrius melodus*) as threatened on 11 December 1985 (50 FR 50726). The piping plover is a federally listed endangered species in the Great Lakes watershed, while the birds breeding on the Atlantic Coast and northern Great Plains are federally listed as threatened. Piping plovers wintering in Texas and Louisiana are part of the northern Great Plains and Great Lakes populations and, therefore, are listed as threatened.

Shorebird hunting during the early 1900s caused the first known major decline of piping plovers (Bent, 1929). Since then, loss or modification of habitat resulting from commercial, residential, and recreational developments, dune stabilization, damming and channelization of rivers (eliminating sandbars, encroachment of vegetation, and altering water flows), and wetland drainage have further contributed to the decline of the species (USFWS, 1995). Additional threats include human disturbances through recreational use of habitat, and predation of eggs by feral pets (USFWS, 1995).

2.5.2 Habitat

General habitat includes shorelines or oceans, rivers, and inland lakes. Within the Great Plains, breeding habitat includes sandy beaches (between dunes and high tide line), spoil islands and sandbars in rivers, and sandy or alkaline shorelines along shallow lakes (AOU, 1998; Haig and Elliot-Smith, 2004). Gravel and sand pits, as well as industrial ponds, are also occasionally used (Haig and Elliot-Smith, 2004). Along the Great Lakes and the Atlantic Coast, piping plovers typically breed on open, sparsely vegetated, sand, gravel, and cobble beaches (Haig and Elliot-Smith, 2004). Beach width appears to be an important factor in nest site selection (Haig and Elliot-Smith, 2004; USFWS, 2003b). Within their wintering range, which includes the Texas Gulf Coast, piping plovers inhabit beaches and bay margins, particularly tidal mudflats and sandflats, algal flats, sandy beaches, and spoil islands (AOU, 1998; Haig and Elliot-Smith, 2004).

2.5.3 Range

The piping plover breeds on the northern Great Plains (Iowa, northwestern Minnesota, Montana, Nebraska, North and South Dakota, Alberta, Manitoba, and Saskatchewan), in the Great Lakes (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario), and along the Atlantic Coast from Newfoundland to Virginia and (formerly) North Carolina. It winters on the Atlantic and Gulf coasts from North Carolina to Mexico, including coastal Texas, and, less commonly, in the Bahamas and West Indies (AOU, 1998; 50 FR 50726, 11 December 1985). Migration occurs both through the interior of North America east of the Rocky Mountains (especially in the Mississippi Valley) and along the Atlantic Coast (AOU, 1998). Few data exist on the migration routes of this species.

2.5.4 Presence in the Study Area

Critical habitat for the piping plover coastal wintering grounds was designated July 10, 2001 (66 FR 36038), and this designation was challenged on March 20, 2006, by the Texas GLO. The court ordered the USFWS to vacate 19 of the 37 designated units in

Texas and reevaluate them for possible redesignation. On May 20, 2008 (73 FR 29294), the Service revised and proposed the redesignation of critical habitat for wintering piping plovers in Texas in 18 units, 4 of which (19, 21, 22, and 23) occur within the proposed project area. Units 24, 25, and 26, which are also in the project area, remain designated critical habitat. Critical habitat includes the land from the seaward boundary of mean lower low water to where densely vegetated habitat, not used by the species, begins and where the constituent elements no longer occur.

Critical Habitat Unit TX-19 occurs on Matagorda Island Beach (976 acres [ac]) in Calhoun County. This stretch of beach occurs along the Gulf side for 36 miles from Cedar Bayou to Pass Cavallo on the northeast. These lands are infrequently inundated by seasonal winds and fall entirely within the boundaries of Matagorda Island NWR (65 FR 41781–41812, 6 July 2000). Unit TX-22 occurs on Decros Point (1,114 ac) at the Matagorda-Calhoun county line. This unit includes about 4.3 miles of beach habitat around the island at the western tip of Matagorda Peninsula between the natural opening to Matagorda Bay and the MSC. This area is a wind tidal flat that is infrequently inundated by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-23 is a 769-ac shoreline along West Matagorda Peninsula in Matagorda County. This unit extends 24 miles along the Gulf from the jetties at the MSC to the old Colorado River channel. This area is also known as a wind tidal flat and is infrequently flooded by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-24 is a 1,868-ac tract on West Matagorda Bay/Western Peninsula Flats in Matagorda County. This unit extends along the bayside of Matagorda Peninsula southwest of Greens Bayou to 1.6 miles north of Greens Bayou. This unit is also considered a wind tidal flat that is infrequently inundated by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-25 is located on West Matagorda Bay/Eastern Peninsula Flats (575 ac) in Matagorda County. This area follows the bayside of Matagorda Peninsula from Maverick Slough southwest for 3 miles. The unit begins at Maverick Slough to the northeast, and extends 3 miles to the southwest, enclosing a series of flats along Matagorda Bay (65 FR 41781–41812, 6 July 2000). Unit TX-26 is located in Matagorda County on the Colorado River Diversion Delta (13 ac). This unit follows the shore of the extreme east-northeast corner of West Matagorda Bay from Culver Cut to Dog Island Reef. The southeastern tidally emergent portion of Dog Island Reef is included with this unit. The upland areas include areas used for roosting for the piping plover (65 FR 41781–41812, 6 July 2000). NDD (2006b) documented records show this species occurring within the project area. These records are located bayside of Matagorda Peninsula approximately 1.7 air miles southwest of Greens Bayou Cut southwesterly to the breakwater just northeast of Matagorda Peninsula airport and extending west-southwest from Decros Point across the Calhoun-Matagorda county line. A review of Christmas Bird Count data (National Audubon Society [NAS], 2002) from 1958 to 2003 did not identify observations of piping plovers at the public beaches along the Magnolia-Indianola shoreline. However, wintering piping plovers are of potential occurrence on beaches and sand and mudflats along the bay margins within the study area.

2.6 RED KNOT

2.6.1 Reasons for Status

The red knot (*Calidris canutus rufa*) was federally listed as endangered on 12 January 2015 (79 FR 73706). The primary factor threatening the red knot is destruction and modification of its habitat, particularly the reduction in key food resources resulting from reductions in horseshoe crabs, which are harvested primarily for use as bait and secondarily to support a biomedical industry.

Counts of red knots within the principal wintering areas in Chile and Argentina declined by nearly 75 percent from 1985 to 2007 and declined by an additional 15 percent in the past year (2007 to 2008).

2.6.2 Habitat

Red knots use marine habitats during their migration through South and North America. They prefer sandy coasts near tidal inlets or at the mouths of bays or estuaries. The beach habitats are preferable due to the higher concentration of benthic bivalves which are an important food source (Harrington and Flowers, 1996). During the northbound migration red knots can be found feeding on clams along the coast of Virginia (Cohen et al, 2009, 2010) and on horseshoe crab eggs on Delaware Bay beaches (Tsipoura and Burger, 1999).

Red knots winter in on the sandy beaches of Texas and Florida, though they may also use peaty bank areas in Georgia or mangroves in Florida. They have been noted to move from the sandy beaches to intertidal mud flats to feed on benthic invertebrates (Rodrigues, 2000).

2.6.3 Range

Red knots of the *rufa* subspecies (*Calidris canutus rufa*) are medium-sized shorebirds that breed only in Arctic Canada and migrate approximately 18,500 miles annually between Arctic breeding grounds and primary wintering areas in Tierra Del Fuego, at the southern tip of South America. They also winter in three other distinct coastal areas of the Western Hemisphere: the southeastern United States (mainly Florida and Georgia, with smaller numbers in South Carolina), the Gulf of Mexico coast of Texas, and Maranhão in northern Brazil (USFWS, 2011).

In South American wintering areas, red knots are found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, or along intertidal earthen shelf formations. The Delaware Bay area (in Delaware and New Jersey) is the largest known spring migration stopover area, with far fewer migrants congregating elsewhere along the Atlantic coast. The concentration in the Delaware Bay area occurs from the middle of May to early June, corresponding to the spawning season of horseshoe crabs. The knots feed on horseshoe crab eggs, rebuilding energy reserves needed to complete migrations to the Arctic. Surveys at wintering areas and at Delaware Bay during spring migration indicate a substantial decline in the red knot in recent years. Research shows that since 1998, a high proportion of red knots leaving the Delaware Bay failed to achieve threshold departure masses needed to fly to breeding grounds and survive an initial few days of snow cover, and this corresponded to reduced annual survival rates (73 FR 75176).

2.6.4 Presence in the Study Area

Along the Texas coast, red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides (NatureServe, 2018). They are believed to use the beaches in Calhoun and Matagorda Countyies near but not in the project area. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. It has been reported that Coquina clams (*Donax variabilis*) serve as a frequent and often important food resource for red knots along Gulf beaches. Reports of the size of flocks of along the Gulf of Mexico coast vary considerably, from highs of about 2,800 to 700 (USFWS, 2011).

2.7 WHOOPING CRANE

2.7.1 Reasons for Status

The whooping crane (*Grus americana*) was federally listed as endangered on 11 March 1967 (32 FR 4001). Critical habitat has been designated in Aransas, Calhoun, and Refugio counties in Texas, and includes the Aransas NWR. An experimentally introduced flock in Florida is listed as an experimental nonessential population (FR, 22 January 1993). The main factors for the decline of the whooping crane were loss of habitat to agriculture, human disturbance of nesting areas, uncontrolled hunting, and collisions with power lines (NatureServe, 2018). Biological factors, such as delayed sexual maturity and small clutch size, prevent rapid population recovery. Drought during the breeding season presents serious hazards to this species (Campbell, 1995). Whooping cranes are vulnerable to loss of habitat along their long migration route (NatureServe, 2018), along which they are still subject to cataclysmic weather events, accidental shooting, collision with power lines, and predators. They are susceptible to avian tuberculosis, avian cholera and lead poisoning (Campbell, 1995). Exposure to disease is a special problem when large numbers of birds are concentrated in limited areas, as often happens during times of drought. While in Texas, the main population is at risk from chemical spills along the Gulf Intracoastal Waterway (GIWW), which passes through the center of their winter range (Campbell, 1995). The presence of contaminants in the food base is another potential problem on their wintering grounds (Oberholser, 1974), and a late season hurricane or other weather event could be disastrous to this concentrated population.

2.7.2 Habitat

Nesting habitat in Canada is freshwater marshes and wet prairies (NatureServe, 2018), interspersed with numerous potholes and narrow wooded ridges. Whooping cranes use a variety of habitats during migration (Campbell, 1995). They feed on grain in croplands (Lewis, 1995), and large wetland areas are used for feeding and roosting. Riverine habitats, such as submerged sandbars, are often used for roosting. The principal winter habitat in Texas is brackish bays, marshes, and salt flats, although whooping cranes sometimes feed in upland sites characterized by oak mottes, grassland swales, and ponds on gently rolling sandy soils (Campbell, 1995).

Summer foods include large insect nymphs or larvae, frogs, rodents, small birds, minnows, and berries. During the winter in Texas, they eat a wide variety of plant and animal foods. Blue crabs, clams, and berries of Carolina wolfberry (*Lycium carolinianum*) comprise the diet. Foods taken at upland sites include acorns, snails, crayfish, and insects (Campbell, 1995).

2.7.3 Range

Whooping cranes were originally found throughout most of North America. In the nineteenth century, the main breeding area was from the Northwest Territories to the prairie provinces in Canada, and the northern prairie states to Illinois. A nonmigratory flock existed in Louisiana, but is now extirpated. Whooping cranes wintered from Florida to New Jersey along the Atlantic Coast, along the Texas Gulf Coast, and in the high plateaus of central Mexico. They now breed in isolated, marshy areas of Wood Buffalo National Park, Northwest Territories, Canada. They winter primarily in the Aransas NWR and adjacent areas of the central Texas Gulf Coast (USFWS, 1995). During migration they use various stopover areas in western Canada and the American Midwest.

Two experimental flocks have been established by incubating eggs and rearing the young in captivity before releasing them into the wild. Cranes were introduced in Grays Lake NWR in Idaho in 1975; these birds winter at Bosque del Apache NWR in central New Mexico. This population was not successful and is now extirpated. Introduction of another flock to Kissimmee Prairie in Florida began in 1993. The Florida population will be nonmigratory (NatureServe, 2018).

The natural wild population of whooping cranes spends its winters at the Aransas NWR, Matagorda Island, Isla San Jose, portions of the Lamar Peninsula, and Welder Point on the east side of San Antonio Bay (NatureServe, 2018). The main stopover points in Texas for migrating birds are in the central and eastern panhandle (USFWS, 1995).

2.7.4 Presence in the Study Area

According to USFWS (1995), Matagorda and Calhoun counties are within the species' migration corridor; therefore, the species may occur in the study area because of the close proximity to suitable wintering habitat. According to NDD records, the whooping crane has been recorded from Aransas County in St. Charles Bay (Aransas Wildlife Refuge, Matagorda Island, and nearby wetlands). Also, one documented occurrence of a single whooping crane was recorded on marsh area between Keller Bay and Matagorda Bay approximately 11 air miles east of Port Lavaca and 3 air miles south of Olivia. Critical habitat for the whooping crane has been documented adjacent to the study area to the southwest.

2.8 GREEN SEA TURTLE

2.8.1 Reasons for Status

The green sea turtle (*Chelonia mydas*) was listed on 28 July 1978 as threatened except for Florida and the Pacific Coast of Mexico (including the Gulf of California) where it was listed as endangered (43 FR 32808). The greatest cause of decline in green turtle populations is commercial harvest for eggs and food. Other turtle parts are used for leather and jewelry, and small turtles are sometimes stuffed for curios. Incidental catch during commercial shrimp trawling is a continued source of mortality that adversely affects recovery. It is estimated that before the implementation of TED requirements, the offshore commercial shrimp fleet captured about 925 green turtles a year, of which approximately 225 would die. Most turtles killed are juveniles and subadults. Various other fishing operations also negatively affect this species (NMFS, 2006). Epidemic outbreaks of fibropapilloma or “tumor” infections recently have occurred on green sea turtles, especially in Hawaii and Florida, posing a severe threat. The cause of these outbreaks is largely unknown, but it could be caused by a viral infection (Barrett, 1996). This species is also subject to various negative impacts shared by sea turtles in general.

2.8.2 Habitat

The green sea turtle primarily utilizes shallow habitats such as lagoons, bays, inlets, shoals, estuaries, and other areas with an abundance of marine algae and seagrasses. Individuals observed in the open ocean are believed to be migrants en route to feeding grounds or nesting beaches (Meylan, 1982). Hatchlings often float in masses of sea plants (e.g., rafts of sargassum) in convergence zones. Coral reefs and rocky outcrops near feeding pastures often are used as resting areas. The adults are primarily herbivorous, while the juveniles consume more invertebrates. Foods consumed include seagrasses, macroalgae, and other marine plants, mollusks, sponges, crustaceans, and jellyfish (Mortimer, 1982).

Terrestrial habitat is typically limited to nesting activities, although in some areas, such as Hawaii and the Galápagos Islands, they will bask on beaches (Balazs, 1980;). They prefer high-energy beaches with deep sand, which may be coarse to fine, with little organic content. At least in some regions, they generally nest consistently at the same beach, which is apparently their natal beach (Allard et al., 1994; Meylan et al., 1990), although an individual might switch to a different nesting beach within a single nesting season.

2.8.3 Range

The green sea turtle is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, it occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Major nesting activity occurs on Ascension Island, Aves Island (Venezuela), Costa Rica, and in Surinam. Relatively small numbers nest in Florida, with even smaller numbers in Georgia, North Carolina, and Texas (Hirth, 1997; NMFS and USFWS, 1991).

2.8.4 Distribution in Texas

The green sea turtle in Texas inhabits shallow bays and estuaries where its principal foods, the various marine grasses, grow (Bartlett and Bartlett, 1999). Its population in

Texas has suffered a decline similar to that of its world population. In the mid- to late nineteenth century, Texas waters supported a green sea turtle fishery. Most of the turtles were caught in Matagorda Bay, Aransas Bay, and the lower Laguna Madre, although a few also came from Galveston Bay. Many live turtles were shipped to places such as New Orleans or New York and from there to other areas. Others were processed into canned products such as meat or soup prior to shipment. By 1900, however, the fishery had virtually ceased to exist. Turtles continued to be hunted sporadically for a while, the last Texas turtler hanging up his nets in 1935. Incidental catches by anglers and shrimpers were sometimes marked prior to 1963, when it became illegal to do so (Hildebrand, 1982).

Green sea turtles still occur in these same bays today but in much-reduced numbers (Hildebrand, 1982). While green turtles prefer to inhabit bays with seagrass meadows, they may also be found in bays that are devoid of seagrasses. The green sea turtles in these Texas bays are mainly small juveniles. Adults, juveniles, and even hatchlings are occasionally caught on trotlines or by offshore shrimpers or are washed ashore in a moribund condition (Shaver, 2000; STSSN, 2018).

Green sea turtle nests are rare in Texas. One nest was recorded at the Padre Island National Seashore in 1987, five in 1998, none in 1999, and one in 2000 (NPS, 2007; Shaver, 2000). Between 2001 and 2005, up to five nests per year have been recorded from the Texas coast. In 2006, two green sea turtle nests were recorded at Padre Island National Seashore (NPS, 2007). Green sea turtles, however, nest more in Florida and in Mexico. Since long migrations of green sea turtles from their nesting beaches to distant feeding grounds are well documented (Green, 1984; Meylan, 1982), the adult green sea turtles occurring in Texas may be either at their feeding grounds or in the process of migrating to or from their nesting beaches. The juveniles frequenting the seagrass meadows of the bay areas may remain there until they move to other feeding grounds or, perhaps, once having attained sexual maturity, return to their natal beaches outside of Texas to nest.

2.8.5 Presence in the Study Area

Four juvenile/subadult green sea turtles were captured during netting operations conducted by TAMUG at Magnolia Beach from May to October 1996 (Williams and Renaud, 1998). These four turtles were outfitted with radio satellite transmitters and tracked between May 1996 and March 1997. Subsequent locations included western Matagorda Bay, Lavaca Bay, and Powderhorn Bayou. The two green sea turtles that were fitted with satellite transmitters remained in the central Texas coast until a cold front on 11 January 1997 caused them to move approximately 112 miles to the south. One of them began moving north again in mid-February and had returned to the Matagorda Bay area by late March (Williams and Renaud, 1998).

In addition to the netting records, a green sea turtle was taken in the entrance channel of the MSC during dredging operations in 2004 (USACE, 2007), and a green sea turtle was recorded in the MSC southeast of Matagorda Peninsula (NDD, 2006a). However, this may have been the same individual. No green sea turtle nests have been recorded from the study area (NPS; 2007). Of the four green sea turtle nests observed during the 2008 nesting season, three occurred on Padre Island National Seashore, and one occurred on South Padre Island (NPS, 2008).

2.9 HAWKSBILL SEA TURTLE

2.9.1 Reasons for Status

The hawksbill sea turtle (*Eretmochelys imbricata*) was federally listed as endangered on 2 June 1970 (35 FR 8495) with critical habitat designated in Puerto Rico on 24 May 1978 (43 FR 22224). The greatest threat to this species is harvest to supply the market for tortoiseshell and stuffed turtle curios (Meylan and Donnelly, 1999). Hawksbill shell (bekko) commands high prices. Japanese imports of raw bekko between 1970 and 1989 totaled 1,573,770 pounds (713,850 kilograms), representing more than 670,000 turtles. The hawksbill is also used in the manufacture of leather, oil, perfume, and cosmetics (NMFS, 2006).

Other threats include destruction of breeding locations by beach development, incidental take in lobster and Caribbean reef fish fisheries, pollution by petroleum products (especially oil tanker discharges), entanglement in persistent marine debris (Meylan, 1992), and predation on eggs and hatchlings. See USFWS (1998) for detailed information on certain threats, including beach erosion, beach armoring, beach nourishment, sand mining, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, predation, and poaching.

In 1998, NMFS designated critical habitat near Mona Island and Isla Monito, Puerto Rico, seaward to 3.5 miles (63 FR 46693–46701).

2.9.2 Habitat

Hawksbills generally inhabit coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, where they occur at depths of less than 70 ft (21.5 m). Like some other sea turtle species, hatchlings are sometimes found floating in masses of marine plants (e.g., sargassum rafts) in the open ocean (NFWL, 1980). Hawksbills reenter coastal waters when they reach a carapace length of approximately 7.9 to 9.8 inches (20 to 25 centimeters). Coral reefs are widely recognized as the resident foraging habitat of juveniles, subadults, and adults. This habitat association is undoubtedly related to their diet of sponges, which need solid substrate for attachment. Hawksbills also occur around rocky outcrops and high-energy shoals, which are also optimum sites for sponge growth. In Texas, juvenile hawksbills are associated with stone jetties (NMFS, 2006).

While this species is omnivorous, it prefers invertebrates, especially encrusting organisms, such as sponges, tunicates, bryozoans, mollusks, corals, barnacles, and sea urchins. Pelagic species consumed include jellyfish and fish, and plant material such as algae, sea grasses and mangroves have been reported as food items for this turtle (Carr, 1952; Mortimer, 1982; Musick, 1979; Pritchard, 1977; Rebel, 1974). The young are reported to be somewhat more herbivorous than adults (Ernst and Barbour, 1972).

Terrestrial habitat is typically limited to nesting activities. The hawksbill, which is typically a solitary nester, nests on undisturbed, deep-sand beaches, from high-energy ocean beaches to tiny pocket beaches several meters wide bounded by crevices of cliff walls. Typically, the sand beaches are low energy, with woody vegetation, such as sea grape (*Coccoloba uvifera*), near the waterline (NRC, 1990).

2.9.3 Range

The hawksbill is circumtropical, occurring in tropical and subtropical seas of the Atlantic, Pacific, and Indian oceans (Witzell, 1983). This species is probably the most tropical of all marine turtles, although it does occur in many temperate regions. The hawksbill sea turtle is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf (especially Texas), south to Brazil (NMFS, 2006). In the continental U.S., the hawksbill largely nests in Florida where it is sporadic at best (NFWL, 1980). However, a major nesting beach exists on Mona Island, Puerto Rico. Elsewhere in the western Atlantic, hawksbills nest in small numbers along the Gulf Coast of Mexico, the West Indies, and along the Caribbean coasts of Central and South America (Musick, 1979).

2.9.4 Distribution in Texas

Texas is the only state outside of Florida where hawksbills are sighted with any regularity. Most of these sightings involve posthatchlings and juveniles, and are primarily associated with stone jetties. These small turtles are believed to originate from nesting beaches in Mexico (NMFS, 2006). On 13 June 1998, the first hawksbill nest recorded on the Texas coast was found at Padre Island National Seashore. This nest remains the only documented hawksbill nest on the Texas coast (NPS, 2007).

2.9.5 Presence in the Study Area

As previously noted, the hawksbill sea turtle occurs along the Texas coast. However, this species has not been recorded from the study area and no hawksbills have been taken during hopper dredging activities in Texas (USACE, 2007). Nevertheless, this species is of potential occurrence in the study area.

2.10 KEMP’S RIDLEY SEA TURTLE

2.10.1 Reasons for Status

Kemp’s ridley sea turtle (*Lepidochelys kempii*) was listed as endangered throughout its range on 2 December 1970 (35 FR 18320). Populations of this species have declined since 1947, when an estimated 42,000 females nested in one day (Hildebrand, 1963), to a total nesting population of approximately 1,000 in the mid-1980s. The decline of this species was primarily the result of human activities including collection of eggs, fishing for juveniles and adults, killing adults for meat and other products, and direct take for indigenous use. In addition to these sources of mortality, Kemp’s ridleys have been subject to high levels of incidental take by shrimp trawlers (NMFS, 2006; USFWS and NMFS, 1992). The National Research Council’s (NRC) Committee on Sea Turtle Conservation estimated in 1990 that 86% of the human-caused deaths of juvenile and adult loggerheads and Kemp’s ridleys resulted from shrimp trawling (Campbell, 1995). It is estimated that before the implementation of turtle excluder devices (TED), the commercial shrimp fleet killed between 500 and 5,000 Kemp's ridleys each year (NMFS, 2006). Kemp's ridleys have also been taken by pound nets, gill nets, hook and line, crab traps, and longlines.

Another problem shared by adult and juvenile sea turtles is the ingestion of manmade debris and garbage. Postmortem examinations of sea turtles found stranded on the south Texas coast from 1986 through 1988 revealed 54% (60 of the 111 examined) of the sea turtles had eaten some type of marine debris. Plastic materials were most frequently ingested and included pieces of plastic bags, Styrofoam, plastic pellets, balloons, rope, and fishing line. Nonplastic debris such as glass, tar, and aluminum foil were also ingested by the sea turtles examined. Much of this debris comes from offshore oil rigs, cargo ships, commercial and recreational fishing boats, research vessels, naval ships, and other vessels operating in the Gulf. Laws enacted during the late 1980s to regulate this dumping are difficult to enforce over vast expanses of water. In addition to trash, pollution from heavy spills of oil or waste products poses additional threats (Campbell, 1995).

Further threats to this species include collisions with boats, explosives used to remove oil rigs, and entrapment in coastal power plant intake pipes (Campbell, 1995). Dredging operations affect Kemp's ridley turtles through incidental take and by degrading the habitat. Incidental take of ridleys has been documented with hopper dredges. In addition to direct take, channelization of the inshore and nearshore areas can degrade foraging and migratory habitat through dredged material placement, degraded water quality/clarity, and altered current flow (USFWS and NMFS, 1992).

Sea turtles are especially subject to human impacts during the time the females come ashore for nesting. Modifications to nesting areas can have a devastating effect on sea turtle populations. In many cases, prime sea turtle nesting sites are also prime real estate. If a nesting site has been disturbed or destroyed, female turtles may nest in inferior locations where the hatchlings are less likely to survive, or they may not lay any eggs at all. Artificial lighting from developed beachfront areas often disorients nesting females and hatchling sea turtles, causing them to head inland by mistake, often with fatal results. Adult females also may avoid brightly lit areas that would otherwise provide suitable nesting sites.

Kemp's ridley appears to be in the earliest stages of recovery. Approximately 6,000 Kemp's ridley nests were recorded on Mexican beaches during the 2000 nesting season; just over 10,000 nests were recorded there during the 2005 nesting season. Similarly, increased nesting activity has been recorded on the Texas beaches in the last decade or so from four nests in 1995 to 51nests in 2005 (NPS, 2007). Some of these nests were from head-started ridleys. Of 46 Kemp's ridley nests encountered in the continental U.S. during 2004, 42 were on Texas beaches (NPS, 2006). The increase likely can be attributed to two primary factors: full protection of nesting females and their nests in Mexico, and the requirement to use TEDs in shrimp trawls both in the U.S. and in Mexico (NMFS, 2006).

2.10.2 Habitat

Kemp's ridleys inhabit shallow coastal and estuarine waters, usually over sand or mud bottoms. Adults are primarily shallow-water benthic feeders that specialize on crabs, especially portunid crabs, while juveniles feed on sargassum and associated infauna, and other epipelagic species of the Gulf (USFWS and NMFS, 1992). In some regions, the blue crab (*Callinectes sapidus*) is the most common food item of adults and juveniles. Other food items include shrimp, snails, bivalves, sea urchins, jellyfish, sea stars, fish, and occasional marine plants (Campbell, 1995, Pritchard and Marquez, 1973; Shaver, 1991).

2.10.3 Range

Adults are primarily restricted to the Gulf, although juveniles may range throughout the Atlantic Ocean since they have been observed as far north as Nova Scotia (Musick, 1979) and in coastal waters of Europe (Brongersma, 1972). Important foraging areas include Campeche Bay, Mexico, and Louisiana coastal waters.

Almost the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles south of the Rio Grande. A secondary nesting area occurs at Tuxpan, Veracruz, and sporadic nesting has been reported from Mustang Island, Texas, southward to Isla Aquada, Campeche. Several scattered isolated nesting attempts have occurred from North Carolina to Colombia.

Because of the dangerous population decline at the time, a head-starting program was carried out from 1978 to 1988. Eggs were collected from Rancho Nuevo and placed into polystyrene foam boxes containing Padre Island sand so that the eggs never touched the Rancho Nuevo sand. The eggs were flown to the U.S. and placed in a hatchery on Padre Island and incubated. The resulting hatchlings were allowed to crawl over the Padre Island beaches into the surf for imprinting purposes before being recovered from the surf and taken to Galveston for rearing. They were fed a diet of high-protein commercial floating pellets for 7 to 15 months before being released into Texas (mainly) or Florida waters (Caillouet et al., 1995). This program has shown some results. The first nesting from one of these head-started individuals occurred at Padre Island in 1996, and more nesting has occurred since.

2.10.4 Distribution in Texas

Kemp's ridley occurs in Texas in small numbers and in many cases may well be in transit between crustacean-rich feeding areas in the northern Gulf and breeding grounds in Mexico. It has nested sporadically in Texas in the last 50 years. Nests were found near Yarborough Pass in 1948 and 1950, and in 1960 a single nest was located at Port Aransas. The number of nestings, however, has increased in recent years: 1995 (4 nests); 1996 (6 nests); 1997 (9 nests); 1998 (13 nests); 1999 (16 nests); 2000 (12 nests); 2001 (8 nests); 2002 (38 nests); 2003 (19 nests); 2004 (42 nests); 2005 (51 nests); 2006 (102 nests); and 2008 (195 nests) (NPS, 2008). As noted above, some of these nests were from head-started ridleys. Such nestings, together with the proximity of the Rancho Nuevo rookery, probably account for the occurrence of hatchlings and subadults in Texas.

According to Hildebrand (1982, 1987), sporadic ridley nesting in Texas has always been the case.

2.10.5 Presence in the Study Area

Seven Kemp's ridleys were captured during netting operations conducted by Texas A&M University at Galveston (TAMUG) near Magnolia Beach in Matagorda Bay from May to October 1996 (Williams and Renaud, 1998). These seven turtles were outfitted with radio or satellite transmitters and tracked between May and November 1996. Most of the subsequent locations were within 4 miles of the western shoreline of Matagorda Bay. Other locations included Lavaca Bay, Carancahua Bay, Tres Palacios Bay, and Powderhorn Lake (Williams and Renaud, 1998). In addition to the netting records, a Kemp's ridley nested on Matagorda Peninsula in 2002, four Kemp's ridleys nested on Matagorda Island in 2006 (NPS, 2007), and two Kemp's ridleys were taken in the entrance channel of the MSC in 2006 (USACE, 2007). During the 2008 nesting season, 195 nests were observed; 13 of these occurred on Matagorda Island. No Kemp's ridley nests were observed on Matagorda Peninsula in 2008 (NPS, 2008).

2.11 LEATHERBACK SEA TURTLE

2.11.1 Reasons for Status

The leatherback sea turtle (*Dermochelys coriacea*) was listed as endangered throughout its range on 2 June 1970 (35 FR 8495), with critical habitat designated in the U.S. Virgin Islands on 26 September 1978 and 23 March 1979 (43 FR 43688–43689 and 44 FR 17710–17712, respectively). Its decline is attributable to overexploitation by man and incidental mortality associated with commercial shrimping and fishing activities. Use of turtle meat for fish bait and the consumption of litter by turtles are also causes of mortality, the latter phenomenon apparently occurring when plastic is mistaken for jellyfish (Rebel, 1974). Nesting populations of leatherback sea turtles are especially difficult to estimate because the females frequently change nesting beaches; however, Spotila et al. (1996) estimated the 1995 worldwide population of nesting female leatherbacks at 26,000 to 42,000. The major threat is egg collecting, although they are jeopardized to some extent by destruction or degradation of nesting habitat (NatureServe, 2018). This species is probably more susceptible than other turtles to drowning in shrimp trawlers equipped with TEDs because adult leatherbacks are too large to pass through the TED exit opening. Because leatherbacks nest in the tropics during hurricane season, a potential exists for storm generated waves and wind to erode nesting beaches, resulting in nest loss (NMFS and USFWS, 1992).

Critical Habitat: St. Croix, Virgin Islands; Santa Rosa NP., Costa Rica; sites in Mexico. NMFS (*Federal Register*, 12 May 1995) established a leatherback conservation zone extending from Cape Canaveral to the Virginia-North Carolina border and including all inshore and offshore waters; this zone is subject to shrimping closures when high abundance of leatherbacks is documented. Mortality associated with the swordfish gillnet fisheries in Peru and Chile represents the single largest source of mortality for East Pacific leatherbacks (Eckert and Sarti, 1997).

2.11.2 Habitat

The leatherback sea turtle is mainly pelagic, inhabiting the open ocean, and seldom approaches land except for nesting (Eckert, 1992). It is most often found in coastal waters only when nesting or when following concentrations of jellyfish (TPWD, 2006), when it can be found in inshore waters, bays, and estuaries. It dives almost continuously, often to great depths.

Despite their large size, the diet of leatherbacks consists largely of jellyfish and sea squirts. They also consume sea urchins, squid, crustaceans, fish, blue-green algae, and floating seaweed (NFWL, 1980). The leatherback typically nests on beaches with a deepwater approach (Pritchard, 1971).

2.11.3 Range

The leatherback is probably the most wide-ranging of all sea turtle species. It occurs in the Atlantic, Pacific, and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain, and Norway; as far south as Australia, the Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (NFWL, 1980). Leatherbacks nest primarily in tropical regions; major nesting beaches include Malaysia, Mexico, French Guiana, Surinam, Costa Rica, and Trinidad (Ross, 1982). Leatherbacks nest only sporadically in some of the Atlantic and Gulf states of the continental U.S., with one nesting reported as far north as North Carolina (Schwartz, 1976). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS, 2006).

The leatherback migrates farther and ventures into colder water than any other marine reptile. Adults appear to engage in routine migrations between boreal, temperate, and tropical waters, presumably to optimize both foraging and nesting opportunities. The longest-known movement is that of an adult female that traveled 3,666 miles to Ghana, West Africa, after nesting in Surinam (NMFS and USFWS, 1992). During the summer, leatherbacks tend to occur along the east coast of the U.S. from the Gulf of Maine south to the middle of Florida.

2.11.4 Distribution in Texas

Apart from occasional feeding aggregations such as the large one of 100 animals reported by Leary (1957) off Port Aransas in December 1956, or possible concentrations in the Brownsville Eddy in winter (Hildebrand, 1983), leatherbacks are rare along the Texas coast, tending to keep to deeper offshore waters where their primary food source, jellyfish, occurs. In the Gulf, the leatherback is often associated with two species of jellyfish: the cabbagehead (*Stomolophus* sp.) and the moon jellyfish (*Aurelia* sp.) (NMFS and USFWS, 1992). According to USFWS (1981), leatherbacks never have been common in Texas waters. No nests of this species have been recorded in Texas for at least 70 years (NPS, 2007). The last two, one from the late 1920s and one from the mid-1930s, were both from Padre Island (Hildebrand, 1982).

2.11.5 Presence in the Study Area

A leatherback was caught by a trawler in a shipping channel approximately 1.5 miles north of Aransas Pass (NMFS, 2003). No leatherbacks have been taken by dredging activities in Texas (USACE, 2007). One leatherback nest was observed during the 2008 nesting season on the Padre Island National Seashore (NPS, 2008). This species is unlikely to occur in the study area.

2.12 LOGGERHEAD SEA TURTLE

2.12.1 Reasons for Status

USFWS listed the loggerhead turtle (*Caretta caretta*) as threatened throughout its range on 28 July 1978 (43 *Federal Register* [FR] 32808). The decline of the loggerhead, like that of most sea turtles, is the result of overexploitation by man, inadvertent mortality associated with fishing and trawling activities, and natural predation. The most significant threats to its population are coastal development, commercial fisheries, and pollution (NMFS, 2006).

2.12.2 Habitat

The loggerhead occurs in the open seas as far as 500 miles from shore, but mainly over the continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers. It favors warm-temperate and subtropical regions not far from shorelines. The adults occupy various habitats, from turbid bays to clear waters of reefs. Subadults occur mainly in nearshore and estuarine waters. Hatchlings move directly to sea after hatching, and often float in masses of sargassum (*Sargassum* sp.). They may remain associated with sargassum for perhaps 3 to 5 years (NMFS and USFWS, 1991a).

Commensurate with their use of varied habitats, loggerheads consume a wide variety of both benthic and pelagic food items, which they crush before swallowing. Conches, shellfish, horseshoe crabs, prawns and other crustacea, squid, sponges, jellyfish, basket starts, fish (carrion or slow-moving species), and even hatchling loggerheads have all been recorded as loggerhead prey (Hughes, 1974; Mortimer, 1982; Rebel, 1974). Adults forage primarily on the bottom, but also take jellyfish from the surface. The young feed on prey concentrated at the surface, such as gastropods, fragments of crustaceans, and sargassum.

Nesting occurs usually on open sandy beaches above the high-tide mark and seaward of well-developed dunes. They nest primarily on high-energy beaches on barrier islands adjacent to continental land masses in warm-temperate and subtropical regions. Steeply sloped beaches with gradually sloped offshore approaches are favored. In Florida, nesting on urban beaches was strongly correlated with the presence of tall objects (trees or buildings), which apparently shield the beach from city lights (Salmon et al., 1995).

2.12.3 Range

The loggerhead is widely distributed in tropical and subtropical seas, being found in the Atlantic Ocean from Nova Scotia to Argentina, the Gulf, Indian and Pacific oceans (although it is rare in the eastern and central Pacific), and the Mediterranean Sea (Iverson, 1986, Rebel, 1974; Ross, 1982). In the continental U.S., loggerheads nest along the Atlantic coast from Florida to as far north as New Jersey (Musick, 1979) and sporadically along the Gulf Coast. In recent years, a few have nested on barrier islands along the Texas coast. The loggerhead is the most abundant sea turtle species in U.S. coastal waters (NMFS, 2006).

2.12.4 Distribution in Texas

The loggerhead is the most abundant turtle in Texas marine waters, preferring shallow inner continental shelf waters and occurring only very infrequently in the bays. It often occurs near offshore oil rig platforms, reefs, and jetties. Loggerheads are probably present year-round but are most noticeable in the spring when a favored food item, the Portuguese man-of-war (*Physalia physalis*), is abundant. Loggerheads constitute a major portion of the dead or moribund turtles washed ashore (stranded) on the Texas coast each year (Sea Turtle Stranding and Salvage Network [STSSN], 2018). A large proportion of these deaths are the result of accidental capture by shrimp trawlers, where caught turtles drown and then are thrown overboard. Before 1977, no positive documentation of loggerhead nests in Texas existed (Hildebrand, 1982). Since that time, several nests have been recorded along the Texas coast. In 1999, two loggerhead nests were confirmed in Texas, while in 2000, five loggerhead nests were confirmed. Between 2001 and 2005, up to five loggerhead nests per year have been recorded from the Texas coast. Two loggerhead nests were recorded in 2006: one on Padre Island National Seashore and the other on South Padre Island (National Park Service [NPS], 2007). During the 2008 nesting season, four loggerheads were observed nesting on Texas beaches, two on Padre Island National Seashore, one on Bolivar Peninsula, and one on Mustang Island (NPS, 2008). Like the worldwide population, the population of loggerheads in Texas has declined. Prior to World War I, the species was taken in Texas for local consumption and a few were marketed (Hildebrand, 1982). Today, even with protection, insufficient loggerheads exist to support a fishery.

2.12.5 Presence in the Study Area

Critical habitat for the loggerhead turtle was designated on 10 July 2014 (79 FR 39856). Critical habitat was designated for areas of breeding, migration, and feeding (*Sargassum* habitat). Only the *Sargassum* habitat is present off the Texas coast. This habitat is described as “developmental and foraging habitat for young loggerheads where surface waters form accumulations of floating material, especially *Sargassum*.” The areas identified as *Sargassum* habitat include the western Gulf of Mexico to the eastern edge of the Loop Current and the Atlantic ocean from the Gulf of Mexico along the northern/western boundary of the Gulf Stream and east to the outer edge of the U.S. Exclusive Economic Zone (EEZ) (79 FR 39881).

“Specifically, the Gulf of Mexico area has as its northern and western boundaries the 10 m depth contour starting at the mouth of South Pass of the Mississippi River and proceeding west and south to the outer boundary of the U.S. EEZ. The southern boundary of the area is the U.S. EEZ from the 10 m depth contour off of Texas to the Gulf of Mexico-Atlantic border (83° W. long.). The eastern boundary follows the 10 m depth contour from the mouth of South Pass of the Mississippi River at 28.97° N. lat., 89.15° W. long., in a straight line to the northernmost boundary of the Loop Current (28° N. lat., 89° W. long.) and along the eastern edge of the Loop Current roughly following the velocity of 0.101–0.20 m/second as depicted by Love *et al.* (2013) using the Gulf of Mexico summer mean sea surface currents from 1993–2011, to the Gulf of Mexico Atlantic border (24.58° N. lat., 83° W. long.). The delineation between the Gulf of Mexico and the Atlantic Ocean starts at 24.58° N. lat., 83° W. long. (near the Dry Tortugas), and proceeds southward along 83° W. long. to the outer boundary of the EEZ (23.82° N. lat.) (79 FR 39882-39883).

This species has been recorded from the study area. A loggerhead turtle was killed in 1996 during dredging operations in the entrance channel of the MSC, and two loggerheads were taken in the entrance channel of the MSC during dredging operations in 2006 (USACE, 2018).

2.13 WHALES

NMFS identifies five whale species of potential occurrence in the Gulf. These are the sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), fin (or finback) whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*). These species are generally restricted to deeper offshore waters; therefore, it is unlikely that any of these five species would regularly occur in the study area (NMFS, 2003).

2.14 CORALS

NMFS identifies four invertebrate coral species of potential occurrence in the Gulf. These are the lobed star (*Orbicella annularis*), mountainous star (*Orbicella faveolata*), boulder star (*Orbicella franksi*), and elkhorn coral (*Acropora palmata*). These species are generally restricted to deeper offshore waters; therefore, it is unlikely that any of these four species would regularly occur in the study area.

2.15 GOLDEN ORB

2.15.1 Reasons for Status

USFWS announced a 90-day finding on the golden orb (*Quadrula aurea*) on 15 December 2009 (74 FR 66261). The species was added to the list of candidate species on 6 October 2011 (76 FR 62166). The primary threat to the species is the degradation and loss of habitat (Neves, 1991). Impoundments, sedimentation of rivers, dewatering of rivers, sand and gravel mining, and chemical contamination are some of the leading causes of habitat loss and degradation (Neck, 1982; Howells et al., 1996; Winemiller et al.,2010).

Candidate species are not protected under the ESA, but would be subject to all the protections of the ESA were it to be listed prior to, or during, the construction of the project.

2.15.2 Habitat

The golden orb is found almost exclusively in the flowing waters of medium sized rivers (Howells, 2002a). They prefer mud, sand, and gravel substrates and does not tolerate looser packed substrates, such as loose sand or silt (Howells, 2002b).

2.15.3 Range

The golden orb is endemic to the Guadalupe, San Antonio, and Nueces-Frio river basins in central Texas. Their distribution has shrunk significantly and has currently only been reported in Lake Corpus Christi, the Guadalupe, the lower San Marcos, and the lower San Antonio Rivers (76 FR 62166).

2.15.4 Presence in the Study Area

The golden orb has not been noted in the study area. Because the project is located in estuarine and open Gulf waters the species is not expected to be found within the project area.

3.0 EFFECTS ANALYSIS AND AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

In this document, the USACE presents their determinations about each species potentially occurring within the affected area of the MSC Improvement Project, using language recommended by USFWS:

- *No effect* – USACE determines that its proposed action will not affect a federally listed species or critical habitat;
- *May affect, but not likely to adversely affect* – USACE determines that the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial; or
- *Likely to adversely affect* – USACE determines adverse effects to listed species and/or critical habitat may occur as a direct result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or completely beneficial. Under this determination, an additional determination is made whether the action is likely to jeopardize the continued survival and eventual recovery of the species.

Following USACE effect determinations for the project on federally listed species, USFWS and NMFS will review the information and complete the Section 7 consultation process under the ESA. Because a Biological Opinion (BO) has already been received from NMFS, they will be notified of changes to this BA to ensure that the BO is still appropriate.

The following sections provide the USACE's findings and species-specific avoidance, minimization, and conservation measures that support the effect determinations.

3.1 Gulf Coast Jaguarundi

Because this jaguarundi is not expected at present to occur in the project area, no impacts and no effects are anticipated as a result of the proposed project.

3.2 West Indian Manatee

This species is highly unlikely to occur in the project area; therefore, the project may affect, but is not likely to adversely affect, manatees. Several measures will be taken to ensure avoidance and pertain to dissemination of appropriate information to the project construction and operations employees. These employees will be 1) advised that manatees may be in the proposed project area; 2) provided materials, such as a poster, to assist in identification; 3) instructed not to feed or water the animal; and 4) provided the appropriate contact numbers for USFWS or NMFS in case a manatee is sighted.

3.3 Least Tern

The USFWS states that this species only needs to be considered for wind related projects within its migratory route. Therefore, no impacts and no effects are anticipated as a result of the proposed project.

3.4 Northern Aplomado Falcon

This falcon is not expected at present to occur in the project area, though noise from dredging and impacts to upland placement areas may affect, but are not likely to adversely affect the species as a result of the proposed project.

3.5 Piping Plover

Proposed designated and designated critical habitat occurs in the vicinity of the project area in Texas Units 19 through 27; the study area includes CH TX-24 and a portion of TX-21. Designation of critical habitat for the piping plover has been temporarily vacated for units TX-22 and TX-23 within the project area; however, these areas continue to be valuable habitat for wintering piping plovers. The primary constituent elements (PCEs) for the piping plover wintering habitat are those components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these PCEs within the designated boundaries are considered critical habitat. The PCEs are found in coastal areas that support intertidal beaches and flats (between annual low and high tide) and associated dune systems and flats above annual high tide (65 FR 41781–41812, 6 July 2000).

No placement of dredged material will occur within areas of designated critical habitat or in areas that include PCEs for this species. The designated critical habitat for the piping plover would not be directly affected by construction or dredging activities. The piping plover has been recorded at several places in the vicinity of the project area, according to NDD (2006b); however, several decades (1958–2003) of Christmas Bird Count data (NAS, 2002) were reviewed, and piping plovers were not observed along shorelines planned for beach nourishment. Habitat created by the nourishment efforts could increase potential suitability as plover habitat. The proposed project may affect, but is not likely to adversely affect, this species.

3.6 Red Knot

This red knot is not expected at present to occur in the project area, though noise from dredging and impacts to upland placement areas may affect, but are not likely to adversely affect the species as a result of the proposed project.

3.7 Whooping Crane

Critical habitat for the whooping crane has been documented adjacent to the project area to the southwest, but no critical habitat will be affected by this project. The greatest concern of impacts to whooping cranes involves collisions with structures that are greater than 15 ft in height and smaller than 1 inch in diameter. Research provided in the USFWS Recovery Plan for the whooping crane illustrates that "tests of line marking devices, using sandhill cranes as a surrogate research species, have identified techniques effective in reducing collisions by up to 61%" (Brown and Drewien, 1995; Morkill, 1990; Morkill and Anderson, 1991, 1993; Canadian Wildlife Service and USFWS, 2007). To adopt these recommendations into the MSC Project best management practices (BMPs), project equipment that may be a collision hazard to the whooping crane (guy wires that support the dredging equipment, telecommunications towers on the dredges, and antenna or similar items located on the dredges) will be marked using red plastic balls or other suitable marking devices sized and spaced, as directed by USFWS, and lighted during inclement weather conditions when low light and/or fog is present. This BMP would be implemented at the beginning of October through April when whooping cranes are known to be present within the project vicinity. In the event of an unanticipated spill, a project-specific Spill Response Plan will be prepared and implemented prior to the onset of construction activities. With the implementation of the above listed BMPs, this project may affect but is unlikely to adversely affect this species.

Potential beneficial results of the project include the creation of suitable foraging grounds (i.e., low and high marsh), which would also provide indirect benefits through production of forage items (e.g., blue crabs and Carolina wolfberry) for the whooping crane (Chavez-Ramirez, 1996) via estuarine nursery effects.

3.8 Marine (Sea) Turtles

The responsibility for agency consultation on marine reptiles is divided between two federal agencies: the NMFS for sea turtles in the water, and the USFWS for nesting sea turtles.

Sea turtles may be present in the water within the project dredging sites during certain times of the year. Thus, construction and post-construction maintenance activities could result in impacts to sea turtles. Five species of sea turtle occur in Texas waters: Kemp's ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle, and green sea turtle. Since October 1996, three loggerheads, two Kemp's ridleys, and one green sea turtle have been taken during maintenance dredging of the entrance channel of the MSC (USACE, 2007). During the 2008 nesting season, a total of 204 sea turtle nests were observed on Texas beaches: 195 Kemp's ridley, 1 leatherback, 4 loggerhead, and 4 green turtles (NPS, 2008). NPS reports that 13 of the 195 Kemp's ridleys nested on Matagorda Island, but no nests were observed on Matagorda Peninsula. No leatherback, loggerhead, or green sea turtle nests were observed on Matagorda Island or Matagorda Peninsula (NPS, 2008).

3.8.1 Channel Construction Dredging (New Work) and Maintenance

The proposed project calls for the use of pipeline, mechanical, and hopper dredges. It has been well documented that hopper dredging activities occasionally result in sea turtle entrainment and death, even with seasonal dredging windows, V-shaped turtle-deflector dragheads, and concurrent relocation trawling (NMFS, 2003, 2005). Between February 1995 and November 2006, hopper dredging activities within the USACE, Galveston District resulted in 60 lethal takes of sea turtles: 26 loggerheads, 21 green turtles, and 13 Kemp's ridleys (USACE, 2007). Sea turtles easily avoid pipeline dredges due to the slow movement of the dredge. Apart from direct mortality, dredging activities could have an impact on sea turtles through an increase in sedimentation, turbidity, and resuspension of toxic sediments.

The sedimentation resulting from dredging activities may affect food sources for the turtles, and the turbidity could affect primary productivity. This would be short term, however. The increased possibility of chemical or oil spills could pose a threat to turtles both directly and indirectly through their food source. While adult sea turtles may be mobile enough to avoid areas of high oil or chemical concentrations, hatchlings, posthatchlings, and juveniles in the area would be more susceptible. An increase in marine traffic may result in a higher incidence of collision with sea turtles. Other potential impacts as a result of the project include disorientation because of lighting on vessels, and increased accumulation of plastic detritus.

As noted above, hopper dredging may result in mortality of individual Kemp's ridleys. Since October 1996, two Kemp's ridleys have been taken during maintenance dredging of the MSC (USACE, 2007). This species is seasonal in nearshore waters of Texas. During the onset of colder waters in December, Kemp's ridley will move away from inshore waters into deeper waters, returning in March with warmer waters, ready to nest on the Texas coast and to forage in tidal passes and bays (NMFS, 2003). Restriction of hopper dredging activities to between December 1 and March 31, whenever possible, would reduce the likelihood of direct mortality. Hopper dredging impacts on sea turtles will be minimized by following the reasonable and prudent measures included in the BO prepared by the NMFS for construction and the most recent BO for maintenance dredging in the Gulf of Mexico.

Since October 1996, three loggerhead sea turtles and one green sea turtle have been taken during maintenance dredging of the MSC (USACE, 2007). As with the Kemp's ridley sea turtle, these two species could be negatively impacted by dredging activities. The green sea turtle is known to move into warmer waters during the winter (Shaver, 2000). Two green sea turtles captured at Magnolia Beach in the study area and tracked using satellite telemetry moved 112 miles south into south Texas offshore waters during the winter (Williams and Renaud, 1998). Working within similar windows as described for Kemp's ridleys, and having relocation trawlers working ahead of the dredges, would help to reduce these impacts.

The hawksbill sea turtle has not been recorded from the study area, and no hawksbills have been taken during hopper dredging activities in Texas (USACE, 2007).

Nevertheless, the proposed hopper dredging activity can be considered as causing potential adverse effects to hawksbill sea turtle.

Of the five species of sea turtles occurring in Texas waters, the leatherback is the species least likely to be affected by the proposed project because of its rare occurrence and pelagic nature. It is unlikely to occur in the action area and has not been caught in hopper dredges.

3.8.2 Placement of Dredged Materials

The sedimentation resulting from placement of dredged material may affect food sources for turtles, and turbidity could affect primary productivity. PAs would result in the direct loss of bay bottom over the course of the project. This bay bottom may be foraging or resting habitat for sea turtles. If sea turtles are present at disposal sites, they may be affected by sedimentation and turbidity. They could also be exposed to trash and debris; however, turtles should be easily able to overcome a descending plume, and available food sources should not be seriously reduced.

A Kemp's ridley nested on Gulf beaches of Matagorda Peninsula in 2002 and four Kemp's ridleys nested on Gulf beaches on Matagorda Island in 2006 (NPS, 2007). No material would be placed on Gulf beaches as part of the proposed project. Because Kemp's ridleys nest during daylight hours, no disorientation for adults from boat lighting would occur. Hatchlings, however, emerge from the nest at night and may be adversely affected by lighting on the boats. Under natural conditions, hatchlings typically take the shortest route to the water's edge. Bright lights on a nearshore hopper dredge may cause the hatchlings to move toward the lights, resulting in a more circuitous route to the water or open ocean, thereby exposing them to more danger. While nesting in the project area is uncommon, dredging outside of the nesting/emergence season (which occurs between April 1 and September 30), turning off/lowering/ shielding unessential lighting, and use of shielded, low-sodium vapor lights for those that cannot be safely eliminated would reduce this potential disorientation impact.

3.8.3 Additional Effects

Eastward expansion of oil and gas exploration and extraction in the Gulf and within the study area may be the major future change that could combine with other marine activities (commercial fishing, increased marine transport) and their effects (oil spills, accumulated plastic debris, fishing gear, contaminants, vessel collisions with turtles) to adversely impact marine turtles (NMFS, 2007). These activities, in addition to natural predation and habitat loss/activity disruption due to land development and increases in human density near turtle nesting areas, result in a cumulative adverse effect on sea turtles. The proposed channel improvement activities were considered with other impacts to determine whether or not the proposed project could reduce these species' survival and/or potential recovery. USACE has determined that these combined impacts may affect but are not likely to adversely affect these species.

3.8.4 Avoidance, Minimization, and Conservation Measures

Avoidance measures would include an avoidance plan for hopper dredge impacts to sea turtles. This avoidance plan includes reasonable and prudent measures that have largely been incorporated in USACE civil works projects throughout the Gulf for more than a decade. These measures include use of temporal dredging windows, when possible; intake and overflow screening; use of sea turtle deflector dragheads; observer reporting requirements; and sea turtle relocation/abundance trawling:

- *Hopper Dredging*: hopper dredging activities in Gulf waters from the Mexico-Texas border to Key West, Florida, up to 1 mile into rivers shall be completed, whenever possible, between 1 December and 31 March, when sea turtle abundance is lowest throughout Gulf coastal waters. National Oceanic and Atmospheric Administration (NOAA) should be contacted should dredging need to occur outside of this window.
- *Nonhopper-type Dredging*: pipeline or hydraulic dredges, which are not known to take turtles, must be used whenever possible between 1 April and 30 November in Gulf waters up to 1 mile into rivers.
- *Observers*: Arrangements shall be made for NOAA Fisheries–approved observers to be aboard the hopper dredges to monitor the hopper soil, screening, and dragheads for sea turtles and their remains. Observer coverage sufficient for 100% monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges in Texas waters between 1 April and 30 November, and whenever surface water temperatures are 51.8°F (11°C) or greater.
- *Screening*: When observers are required on hopper dredges, 100% inflow screening of dredged material is required and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, screening may be reduced gradually, but 100% overflow screening is then required.
- *Sea Turtle Deflecting Draghead*: A state-of-the-art rigid deflector draghead must be used on all hopper dredges in all Gulf channels and sand-mining sites at all times of the year.
- *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be reported to NOAA Fisheries by onboard endangered species observers within 24 hours of any observed sea turtle take. A preliminary report summarizing the results of the hopper dredging and any documented sea turtle takes must be submitted to NOAA Fisheries within 30 working days of completion of any dredging project. In addition, an annual report (based on fiscal year) must be submitted to NOAA Fisheries summarizing hopper dredging projects and documented incidental takes.
- *Relocation Trawling*: Relocation trawling shall be undertaken if two or more turtles are taken in a 24-hour period in the project or if other conditions outlined in the BO are met. Handling of sea turtles captured during relocation trawling in association with a hopper dredging project in Gulf navigation channels shall be conducted by NOAA Fisheries–approved endangered species observers.

3.8.5 Effect Determinations

Project activities may affect, but are not likely to adversely affect, nesting sea turtles (Kemp’s ridley, loggerhead, green, and hawksbill) in the project area. The project area is approximately 16 miles from known nesting locations. No effect is anticipated for nesting leatherback sea turtles; however, the placement of dredged material may affect, but is not likely to adversely affect, leatherback sea turtles because of secondary impacts potentially associated with the placement of dredged material in the bay. Effect determinations due to hopper dredging activities are likely to adversely affect Kemp's ridley, loggerhead, green, hawksbill, and leatherback sea turtles. Dredging and placement activities are not expected to have an effect on the critical *Sargassum* habitat of loggerhead turtles. Effect determinations, based on the information presented in this document and in the EIS, are presented in Table 3.

In summary, construction and post-construction maintenance hopper dredging activities may result in incidental take of individual sea turtles, although upland and ocean placement of dredged materials are not expected to impact sea turtles. Feeding opportunities within the proposed channel and nearby nesting beaches could attract sea turtles, where they might be exposed to additional cumulative risks from boat traffic, contaminants, fishing and fishing gear, and accumulated plastic debris. The likelihood of adverse effects, including incidental take, during construction and maintenance are greatly reduced by full implementation of the avoidance, minimization, and conservation measures outlined above. Incidental take, if it occurs, may effect but is not likely to adversely affect these species.

3.9 Golden Orb

Because there is no suitable habitat for the golden orb within the project area, no impacts and no effects are anticipated as a result of the proposed project.

3.10 Whales

None of the five whale species are expected to occur in the project area; therefore, no effects to the five whale species are anticipated from the proposed action.

3.11 Corals

None of the four coral species are expected to occur in the project area; therefore, no effects to the four coral species are anticipated from the proposed action.

4.0 SUMMARY

The proposed project may affect a few federally listed endangered or threatened species. While interior least tern may be present in the project area, the species only needs to be considered under ESA for wind related projects along its migratory route. The golden orb, listed whale species, and listed coral species are unlikely to occur in the project area, and therefore, no effects are expected for these species. The project may affect, but is not likely adversely affect, the following species: Gulf coast jaguarondi, West Indian manatee, northern aplomado falcon, piping plover, red knot, and whooping crane. Placement of dredged material may affect, but not likely adversely affect sea turtle species (green, hawksbill, Kemp's ridley, leatherback and loggerhead). Dredging activities may affect, but not likely adversely affect some sea turtle species (green, hawksbill, Kemp's ridley, and leatherback). Dredging activities are likely to adversely affect loggerhead sea turtles, but it is unlikely to jeopardize the continued survival or eventual recovery of these species. The project is unlikely to jeopardize/destroy or adversely modify critical habitat for any listed species. Species effect determinations are summarized in Table 3.

Table 3. Effect determinations for threatened and endangered wildlife species of possible occurrence in Calhoun and Matagorda Counties, Texas

Common Name	Dredging Activities	Placement Activities
Mammals		
Gulf Coast jaguarondi	May affect, not likely to adversely affect	May affect, not likely to adversely affect
West Indian manatee	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Blue whale	No effect	No effect
Finback whale	No effect	No effect
Humpback whale	No effect	No effect
Sei whale	No effect	No effect
Sperm whale	No effect	No effect
Birds		
Least tern*	No effect	No effect
Northern aplomado falcon	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Piping plover	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Red knot	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Whooping crane	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Reptiles**		
Green sea turtle	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Hawksbill sea turtle	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Kemp’s Ridley sea turtle	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Leatherback sea turtle	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Loggerhead sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Corals		
Lobed star	No effect	No effect
Mountainous star	No effect	No effect
Boulder star	No effect	No effect
Elkhorn coral	No effect	No effect
Clams		
Golden Orb	No effect	No effect

*This species only needs to be considered for wind related projects within the migratory route.
** The likelihood of adverse effects (incidental take) of sea turtles due to dredging activities is greatly reduced by implementation and adherence to the conservation measures. Adverse effects are not expected to jeopardize the continued survival or recovery of the species.

5.0 REFERENCES

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OCT 24 2007

F/SER31:MCB

Fred L. Anthamatten
Galveston District, U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, TX 77553

Dear Mr. Anthamatten:

This constitutes the National Marine Fisheries Service's (NMFS') biological opinion (opinion) based on our review of the U.S. Army Corps of Engineers' (COE) proposed action to widen and deepen the Matagorda Ship Channel involving a combination of mechanical, pipeline, and hopper dredges. The opinion analyzes the project's effects on loggerhead (*Caretta caretta*), Kemp's ridley (*Lepidochelys kempii*), hawksbill (*Eretmochelys imbricata*), leatherback (*Dermochelys coriacea*), and green *(Chelonia mydas)* sea turtles, in accordance with section 7 of the Endangered Species Act (ESA) of 1973. It is NMFS' biological opinion that the action, as proposed, is likely to adversely affect but is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, hawksbill, leatherback, or green sea turtles.

This opinion is based on information provided in your May 16, 2007, letter and environmental assessment received by NMFS' Protected Resources Division on May 23, 2007, and information from previous NMFS consultations conducted on the use of hopper dredges.

We look forward to further cooperation with you on other COE projects to ensure the conservation and recovery of our threatened and endangered marine species. If you have any questions regarding this consultation, please contact Michael Barnette, fishery biologist, at the number listed above, or by e-mail at michael.barnette@noaa.gov.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

Enclosure

File: 1514-22.F.1.TX
Ref: F/SER/2006/03167

Endangered Species Act - Section 7 Consultation
Biological Opinion

Action Agency: U.S. Army Corps of Engineers, Galveston District (GDCOE)

Activity: Matagorda Ship Channel Improvement Project (Consultation Number F/SER/2006/03167)

Consulting Agency: National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NMFS), Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida

Approved By: Roy C Crabtree

Roy E. Crabtree, Ph.D., Regional Administrator
NMFS, Southeast Regional Office
St. Petersburg, Florida

Date Issued: 10/24/07

Table of Contents

Background

Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1531 *et seq.*), requires that each federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat of such species; section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any such action. NMFS and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA.

Consultation is required when a federal action agency determines that a proposed action "may affect" listed species or designated critical habitat. Consultation is concluded after NMFS determines that the action is not likely to adversely affect listed species or critical habitat or issues a biological opinion (opinion) that identifies whether a proposed action is likely to jeopardize the continued existence of a listed species, or destroy or adversely modify critical habitat. The opinion states the amount or extent of incidental take of the listed species that may occur, develops measures (i.e., reasonable and prudent measures - RPMs) to reduce the effect of take, and recommends conservation measures to further conserve the species. Notably, no incidental destruction or adverse modification of critical habitat can be authorized, and thus there are no reasonable and prudent measures, only reasonable and prudent alternatives that must avoid destruction or adverse modification.

This document represents NMFS' opinion based on our review of impacts associated with the proposed widening and deepening of the Matagorda Ship Channel. The proposed widening and deepening will involve a combination of mechanical, pipeline, and hopper dredges along approximately 28 miles of channel.

The GDCOE will perform the proposed action. This opinion analyzes project effects on loggerhead, Kemp's ridley, and green sea turtles, in accordance with section 7 of the ESA, and is based on project information provided by GDCOE and other sources of information including the published literature cited herein.

BIOLOGICAL OPINION

1 CONSULTATION HISTORY

The GDCOE provided NMFS a draft environmental impact statement, which included a biological assessment for the proposed project on May 23, 2007. This submission also requested ESA section 7 consultation for listed species. The biological assessment concluded the proposed action could potentially impact sea turtles. Additional information was requested by NMFS, which GDCOE provided on July 13, 2007.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The proposed widening of the Matagorda Ship Channel will involve a combination of mechanical, pipeline, and hopper dredges. Specifically, the proposed work would include the deepening of the In-Bay Channel from -36 ft mean low tide (MLT) to -44 ft MLT, with 2 ft of advance maintenance and 2 ft of allowable overdepth; the widening of the In-Bay Channel from its existing width of 200 ft to a proposed width of 400 ft; the deepening of the Entrance Channel from -38 ft MLT to -46 ft MLT, with 3 ft of advance maintenance and 2 ft of allowable overdepth, and the widening of the Entrance Channel from 300 to 600 ft. Additionally, a new turning basin would be constructed to allow for a ship turning circle of 1,650 ft, at a depth of -44 ft MLT, with 2 ft of advance maintenance and 2 ft of allowable overdepth. Approximately 46.5 million cubic yards (mcy) of new work material would be generated by the proposed project.

According to the GDCOE, hydraulic dredges will be used in Lavaca and Matagorda Bays, and account for approximately 34.5 mcy (i.e., 74 percent) of the new work material. Clamshell dredges will also be utilized in Matagorda Bay, an area expected to produce approximately 8.8 mcy (i.e., 19 percent) of the new work material. Hopper dredges will be largely utilized in the offshore areas, producing 3.2 mcy (i.e., 7 percent) of new work material. However, a hopper dredge may also do the work tentatively assigned to the clamshell dredge, resulting in a total of 12 mcy (i.e., 26 percent) of new work material. Bed-leveling may be used in the proposed project.

While some of the dredged material will be transported to upland sites, the GDCOE also proposes to utilize new work dredged material to:

1. Create a combination upland and marsh site (Figure 1: PA A2) along the northern shore of Cox Bay to eliminate future erosion in this area with 6.3 mcy of new work material;
2. Create a clay core oyster reef (Figure 1: PAs OR1 and OR2) within Lavaca Bay with approximately 1.0 mcy of new work material;
3. Provide nourishment (Figure 1: PAs BN1, BN2, and BN3) on public beaches along the Magnolia-Indianola shoreline with 1.9 mcy of new work material;

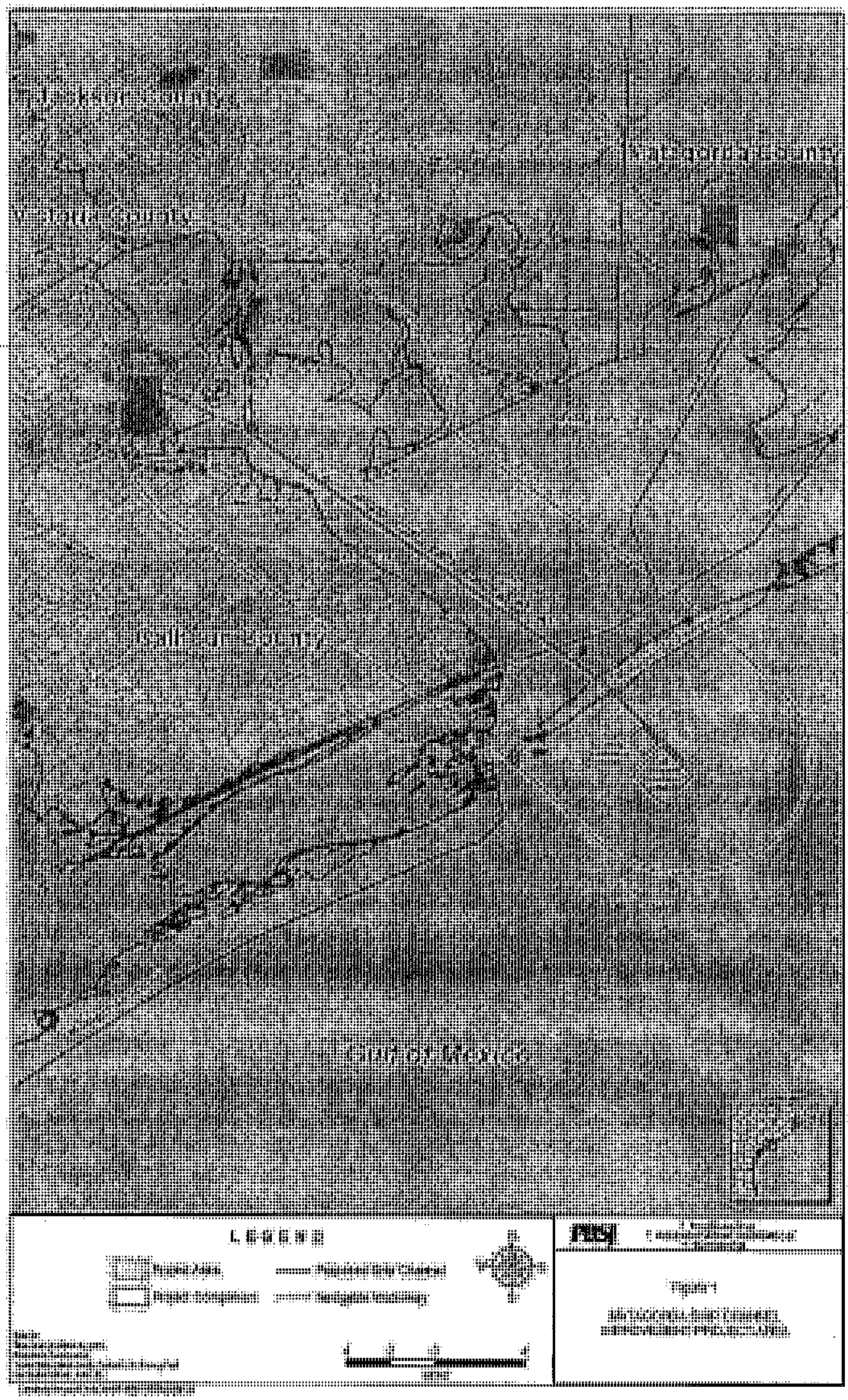

Figure 1: Matagorda Ship Channel material placement areas

4. Place submerged cap on (Figure 1: PA ER1) bottom sediments contaminated with elevated levels of mercury within Lavaca Bay southwest of Dredge Island with 0.4 mcy of new work stiff clay material, creating oyster reefs on the mounded caps;
5. Cap in situ bottom sediments contaminated with elevated levels of mercury located in shallow waters along SH 35 and then create an upland site (Figure 1: PA ER2) with 2.1 mcy of new work material;
6. Cap in situ bottom sediments contaminated with elevated levels of mercury located on the northern edge of Dredge Island and then create a transitional marsh and upland site (Figure 1: PA ER3) with 2.3 mcy of new work material;
7. Protect the eroding shoreline at Sand Point by constructing armored earthen levees and ~~in-bay marshes (Figure 1: PA G) with 4.7 mcy of new work material;~~
8. Create a multi-use habitat site (Figure 1: PA H4) located north of Port O'Conner along the Matagorda Ship Channel to include marshes, submerged aquatic platforms, and bird island with 10.0 mcy of new work material; and
9. Place 8.8 mcy of new work soft clay material from the In-Bay Channel and 3.2 mcy of new work mixed material from the Entrance Channel at a proposed Ocean Dredged Material Disposal Site (ODMDS; Figure 1: PA O5) located approximately 3 miles offshore from the Matagorda Peninsula and 1,000 ft south of the Entrance Channel centerline.

The proposed project is expected to take two years to complete. Future maintenance dredging of the Matagorda Ship Channel will be covered under the revised regional biological opinion for Gulf of Mexico navigation channels (NMFS 2007).

2.2 Action Area

50 CFR 404.02 defines action area as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area for this activity includes the Matagorda Ship Channel bounded by a one-mile buffer area, existing and proposed dredged material placement, restoration, and nourishment areas, and the associated ODMDS in Calhoun County, Texas.

3 STATUS OF LISTED SPECIES AND CRITICAL HABITAT

The following endangered (E) and threatened (T) species under the jurisdiction of NMFS may occur in or near the action area:

Common Name	Scientific Name	Status
Sea Turtles		
Loggerhead sea turtle	*Caretta caretta*	T
Hawksbill sea turtle	*Eretmochelys imbricata*	E
Leatherback sea turtle	*Dermochelys coriacea*	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E

Green sea turtle	*Chelonia mydas*[1]	E/T

There is no NMFS-designated critical habitat within the action area.

3.1 Species Likely to Be Affected

Pipeline and mechanical dredges (i.e., non-hopper dredges) are not known to adversely affect sea turtles. While these dredges have the potential to impact habitat, which could adversely affect sea turtles, proposed dredging work will be confined to existing channels devoid of preferred sea turtle foraging habitat, and, therefore, pipeline and mechanical dredges are not expected to introduce any indirect effects to sea turtles. Additionally, while they may be in the area, hawksbill and leatherback sea turtles are fairly rare. No hawksbill or leatherback sea turtles have ever been taken by GDCOE hopper dredge projects. While GDCOE relocation trawlers have only captured one leatherback sea turtle (in 2003, Corpus Christi Ship Channel), both leatherback and hawksbill sea turtles have been captured in shrimp trawls off Texas. Therefore, the two species are included due to the potential impacts associated with relocation trawling in the proposed project. However, loggerhead, Kemp's ridley, and green sea turtles are all vulnerable to being taken as a result of the use of hopper dredges. NMFS believes these species may be incidentally captured in the course of the proposed action.

3.2 Status of Species

The sea turtle subsections focus primarily on the Atlantic Ocean populations of these species since these are the populations that may be directly affected by the proposed action; as sea turtles are highly migratory, potentially affected species in the action area may make migrations in other areas of the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. Therefore, the range-wide status of the species described below also best reflects each species' status within the action area. Furthermore, these species are listed as global populations (with the exception of Kemp's ridley and Florida green sea turtles, whose distribution is entirely in the Atlantic including the Gulf of Mexico), and the global status and trends of these species are included as well, in order to provide a basis for our final determination of the effects of the proposed action on the species as listed under the ESA.

3.2.1 Loggerhead Sea Turtle

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. It was listed because of direct take, incidental capture in various fisheries, and the alteration and destruction of its habitat. Loggerhead sea turtles inhabit the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. In the Atlantic, developmental habitat for small juveniles is the pelagic waters of the North Atlantic and the Mediterranean Sea (NMFS and USFWS 1991b). Within the continental United States, loggerhead sea turtles nest from Texas to New Jersey. Major nesting areas include coastal

[1] Green turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between these populations away from the nesting beach, green turtles are considered endangered wherever they occur in U.S. waters.

islands of Georgia, South Carolina, and North Carolina, and the Atlantic and Gulf of Mexico coasts of Florida, with the bulk of the nesting occurring on the Atlantic coast of Florida.

3.2.1.1 Pacific Ocean

In the Pacific Ocean, major loggerhead nesting grounds are generally located in temperate and subtropical regions with scattered nesting in the tropics. Within the Pacific Ocean, loggerhead sea turtles are represented by a northwestern nesting aggregation located in Japan and a smaller southwestern nesting aggregation, which occurs in eastern Australia (Great Barrier Reef and Queensland) and New Caledonia (NMFS 2001a). There are no reported loggerhead nesting sites in the eastern or central Pacific Ocean basin. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996). Recent genetic analyses on female loggerheads nesting in Japan suggest that this "subpopulation" is comprised of genetically distinct nesting colonies (Hatase et al. 2002) with precise natal homing of individual females. As a result, Hatase et al. (2002) indicate that loss of one of these colonies would decrease the genetic diversity of Japanese loggerheads; recolonization of the site would not be expected on an ecological time scale. In Australia, long-term census data has been collected at some rookeries since the late 1960s and early 1970s, and nearly all the data show marked declines in nesting populations since the mid-1980s (Limpus and Limpus 2003). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

Pacific loggerhead turtles are captured, injured, or killed in numerous Pacific fisheries including Japanese longline fisheries in the western Pacific Ocean and South China Seas; direct harvest and commercial fisheries off Baja California, Mexico; commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru; purse seine fisheries for tuna in the eastern tropical Pacific Ocean; and California/Oregon drift gillnet fisheries. In addition, the abundance of loggerhead turtles on nesting colonies throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Loggerhead turtle colonies in the western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females and reduced the reproductive success of females that manage to nest (e.g., due to egg poaching).

3.2.1.2 Atlantic Ocean

In the western Atlantic, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. There are at least five western Atlantic subpopulations, divided geographically as follows: (1) A northern nesting subpopulation, occurring from North Carolina to northeast Florida at about 29°N; (2) a south Florida nesting subpopulation, occurring from 29°N on the east coast to Sarasota on the west coast; (3) a Florida Panhandle nesting subpopulation, occurring at Eglin Air Force Base and the beaches near Panama City, Florida; (4) a Yucatán nesting subpopulation, occurring on the eastern Yucatán Peninsula, Mexico (Márquez 1990; TEWG 2000); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS 2001a). Additionally, there is evidence of at least several other genetically distinct stocks, including a Cay Sal Bank, Western Bahamas stock; a Quintana Roo, Mexico stock, including all loggerhead rookeries on Mexico's Yucatan Peninsula; a Brazilian stock; and a Cape Verde stock (SWOT Report, Volume II, The State of the World's Sea Turtles, 2007). The fidelity of nesting females to their nesting beach is the reason these subpopulations can be differentiated from one another. Fidelity for nesting beaches makes recolonization of nesting beaches with sea turtles from other subpopulations unlikely.

Life History and Distribution
Past literature gave an estimated age at maturity of 21-35 years (Frazer and Ehrhart 1985; Frazer et al. 1994), with the benthic immature stage lasting at least 10-25 years. However, based on data from tag returns, strandings, and nesting surveys (NMFS 2001a), NMFS estimates ages of maturity ranging from 20-38 years with the benthic immature stage lasting from 14-32 years.

Mating takes place in late March through early June, and eggs are laid throughout the summer, with a mean clutch size of 100-126 eggs in the southeastern United States. Individual females nest multiple times during a nesting season, with a mean of 4.1 nests/individual (Murphy and Hopkins 1984). Nesting migrations for an individual female loggerhead are usually on an interval of 2-3 years, but can vary from 1-7 years (Dodd 1988). Generally, loggerhead sea turtles originating from the western Atlantic nesting aggregations are believed to lead a pelagic existence in the North Atlantic Gyre for as long as 7-12 years or more. Stranding records indicate that when pelagic immature loggerheads reach 40-60 cm straight-line carapace length they begin to live in coastal inshore and nearshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico, although some loggerheads may move back and forth between the pelagic and benthic environment (Witzell 2002). Benthic immature loggerheads (sea turtles that have come back to inshore and nearshore waters), the life stage following the pelagic immature stage, have been found from Cape Cod, Massachusetts, to southern Texas, and occasionally strand on beaches in Northeastern Mexico.

Tagging studies have shown loggerheads that have entered the benthic environment undertake routine migrations along the coast that are limited by seasonal water temperatures. Loggerhead sea turtles occur year round in offshore waters off North Carolina where water temperature is influenced by the Gulf Stream. As coastal water temperatures warm in the spring, loggerheads begin to immigrate to North Carolina inshore waters (e.g., Pamlico and Core Sounds) and also move up the coast (Epperly et al. 1995a; Epperly et al. 1995b; Epperly et al. 1995c), occurring in Virginia foraging areas as early as April and on the most northern foraging grounds in the Gulf of Maine in June. The trend is reversed in the fall as water temperatures cool. The large majority leave the Gulf of Maine by mid-September but some may remain in mid-Atlantic and Northeast areas until late fall. By December loggerheads have emigrated from inshore North Carolina waters and coastal waters to the north to waters offshore North Carolina, particularly off Cape Hatteras, and waters further south where the influence of the Gulf Stream provides temperatures favorable to sea turtles ($\geq 11°C$) (Epperly et al. 1995a; Epperly et al. 1995b; Epperly et al. 1995c). Loggerhead sea turtles are year-round residents of central and south Florida.

Pelagic and benthic juveniles are omnivorous and forage on crabs, mollusks, jellyfish, and vegetation at or near the surface (Dodd 1988). Sub-adult and adult loggerheads are primarily coastal dwelling and typically prey on benthic invertebrates such as mollusks and decapod crustaceans in hard bottom habitats.

Population Dynamics and Status

A number of stock assessments (TEWG 1998; TEWG 2000; NMFS 2001a; Heppell et al. 2003) have examined the stock status of loggerheads in the waters of the United States, but have been unable to develop any reliable estimates of absolute population size. Based on nesting data of the five western Atlantic subpopulations, the south Florida-nesting and the northern-nesting subpopulations are the most abundant (TEWG 2000; NMFS 2001a). Between 1989 and 1998, the total number of nests laid along the U.S. Atlantic and Gulf coasts ranged from 53,014 to 92,182, annually with a mean of 73,751 (TEWG 2000). On average, 90.7 percent of these nests were of the south Florida subpopulation and 8.5 percent were from the northern subpopulation (TEWG 2000). The TEWG (2000) assessment of the status of these two better-studied populations concluded that the south Florida subpopulation was increasing at that time, while no ~~trend was evident (may be stable but possibly declining) for the northern subpopulation.~~ A more recent, yet-to-be-published analysis of nesting data from 1989-2005 by the Florida Wildlife Research Institute indicates there is a declining trend in nesting at beaches utilized by the south Florida nesting subpopulation (McRae letter to NMFS, October 25, 2006). Nesting data obtained for the 2006 nesting season is also consistent with the decline in loggerhead nests (Meylan pers. comm. 2006). It is unclear at this time whether the nesting decline reflects a decline in population, or is indicative of a failure to nest by the reproductively mature females as a result of other factors (resource depletion, nesting beach problems, oceanographic conditions, etc.). NMFS has convened a new Turtle Expert Working Group for loggerhead sea turtles that will gather available data and examine the potential causes of the nesting decline and what the decline means in terms of population status. A final report by the loggerhead TEWG is expected by the end of summer 2007.

For the northern subpopulations, recent estimates of loggerhead nesting trends in Georgia from standardized daily beach surveys showed significant declines ranging from 1.5 to 1.9 percent annually (Mark Dodd, Georgia Department of Natural Resources, pers. comm., 2006). Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 3.3 percent annual decline in nesting since 1980. Another consideration that may add to the importance and vulnerability of the northern subpopulation is the sex ratios of this subpopulation. NMFS scientists have estimated that the northern subpopulation produces 65 percent males (NMFS 2001a). However, new research conducted over a limited time frame has found opposing sex ratios (Wyneken et al. 2004) so further information is needed to clarify the issue. Since nesting female loggerhead sea turtles exhibit nest fidelity, the continued existence of the northern subpopulation is related to the number of female hatchlings that are produced. Producing fewer females will limit the number of subsequent offspring produced by the subpopulation.

The remaining three subpopulations – Dry Tortugas, Florida Panhandle, and Yucatán – are much smaller, but also relevant to the continued existence of the species. Nesting surveys for the Dry Tortugas subpopulation are conducted as part of Florida's statewide survey program. Survey effort has been relatively stable during the 9-year period from 1995-2003 (although the 2002 year was missed). Nest counts ranged from 168-270 but with no detectable trend during this period (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Statewide Nesting Beach Survey Data). Nest counts for the Florida Panhandle subpopulation are focused on index beaches rather than all beaches where nesting occurs. Currently, there is not enough information to detect a trend for the subpopulation (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute, Index Nesting Beach Survey Database). Similarly, nesting survey effort has been inconsistent among the Yucatán nesting beaches and no trend can be determined for this subpopulation. However, there is some optimistic news. Zurita et al. (2003) found a statistically significant increase in the number of nests on seven of the beaches on Quintana Roo, Mexico, from 1987-2001 where survey effort was consistent during the period.

Threats

The diversity of a sea turtle's life history leaves them susceptible to many natural and human impacts, including impacts while they are on land, in the benthic environment, and in the pelagic environment. Hurricanes are particularly destructive to sea turtle nests. Sand accretion and rainfall that result from these storms as well as wave action can appreciably reduce hatchling success. For example, in 1992, all of the eggs over a 90-mile length of coastal Florida were destroyed by storm surges on beaches that were closest to the eye of Hurricane Andrew (Milton et al. 1994). Also, many nests were destroyed during the 2004 hurricane season. Other sources of natural mortality include cold stunning and biotoxin exposure.

Anthropogenic factors that impact hatchlings and adult female turtles on land, or the success of nesting and hatching include: beach erosion, beach armoring and nourishment, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, beach driving, coastal construction and fishing piers, exotic dune and beach vegetation, and poaching. An increase in human presence at some nesting beaches or close to nesting beaches has led to secondary threats such as the introduction of exotic fire ants, feral hogs, dogs and an increased presence of native species (e.g., raccoons, armadillos, and opossums) which raid and feed on turtle eggs. Although sea turtle nesting beaches are protected along large expanses of the northwest Atlantic coast (e.g., Merritt Island, Archie Carr, and Hobe Sound National Wildlife Refuges), other areas along these coasts have limited or no protection. Sea turtle nesting and hatching success on unprotected high density east Florida nesting beaches from Indian River to Broward County are affected by all of the above threats.

Loggerhead sea turtles are affected by a completely different set of anthropogenic threats in the marine environment. These include oil and gas exploration, coastal development, and transportation, marine pollution, underwater explosions, hopper dredging, offshore artificial lighting, power plant entrainment and/or impingement, entanglement in debris, ingestion of marine debris, marina and dock construction and operation, boat collisions, poaching, and fishery interactions. Loggerheads in the pelagic environment are exposed to a series of longline fisheries, which include the Atlantic highly migratory species (HMS) pelagic longline fisheries, an Azorean longline fleet, a Spanish longline fleet, and various longline fleets in the Mediterranean Sea (Aguilar et al. 1995; Bolten et al. 1996). Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of fisheries in federal and state waters including trawl, purse seine, hook and line, gillnet, pound net, longline, and trap fisheries (see further discussion in Section 4.2, Environmental Baseline).

3.2.1.3 Summary of Status for Loggerhead Sea Turtles

The abundance of loggerhead turtles on nesting beaches throughout the Pacific basin has declined dramatically over the past 10 to 20 years. Data from 1995 estimated the Japanese nesting aggregation at 1,000 female loggerhead turtles (Bolten et al. 1996), but it has probably declined since 1995 and continues to decline (Tillman 2000). The nesting aggregation in Queensland, Australia, was as low as 300 females in 1997.

In the Atlantic Ocean, absolute population size is not known, but based on extrapolation of nesting information, loggerheads are likely much more numerous than in the Pacific Ocean. NMFS recognizes five subpopulations of loggerhead sea turtles in the western north Atlantic based on genetic studies. Cohorts from all of these are known to occur within the action area of this consultation. The South Florida subpopulation may be critical to the survival of the species in the Atlantic Ocean because of its size (over 90 percent of all U.S. loggerhead nests are from this subpopulation). In the past, this nesting aggregation was considered second in size only to the nesting aggregation on islands in the Arabian Sea off Oman (Ross 1979; Ehrhart 1989; NMFS and USFWS 1991b). However, the status of the Oman colony has not been evaluated recently and it is located in an area of the world where it is highly vulnerable to disruptive events such as political upheavals, wars, catastrophic oil spills, and lack of strong protections for sea turtles (Meylan et al. 1995). Given the lack of updated information on this population, the status of loggerheads in the Indian Ocean basin overall is essentially unknown.

All loggerhead subpopulations are faced with a multitude of natural and anthropogenic effects that negatively influence the status of the species. Many anthropogenic effects occur as a result of activities outside of U.S. jurisdiction (i.e., fisheries in international waters).

3.2.2 Kemp's Ridley Sea Turtle

The Kemp's ridley was listed as endangered on December 2, 1970. Internationally, the Kemp's ridley has been considered the most endangered sea turtle (Zwinenberg 1977; Groombridge 1982; TEWG 2000). Kemp's ridleys nest primarily at Rancho Nuevo, a stretch of beach in Mexico, Tamaulipas State. This species occurs mainly in coastal areas of the Gulf of Mexico and the northwestern Atlantic Ocean. Occasional individuals reach European waters (Brongersma 1972). Adults of this species are usually confined to the Gulf of Mexico, although adult-sized individuals sometimes are found on the east coast of the United States.

3.2.2.1 Atlantic Ocean

Life History and Distribution
The TEWG (1998) estimates age at maturity from 7-15 years. Females return to their nesting beach about every 2 years (TEWG 1998). Nesting occurs from April into July and is essentially limited to the beaches of the western Gulf of Mexico, near Rancho Nuevo in southern Tamaulipas, Mexico. The mean clutch size for Kemp's ridleys is 100 eggs/nest, with an average of 2.5 nests/female/season.

Little is known of the movements of the post-hatchling stage (pelagic stage) within the Gulf of Mexico. Studies have shown the post-hatchling pelagic stage varies from 1-4 or more years, and the benthic immature stage lasts 7-9 years (Schmid and Witzell 1997). Benthic immature Kemp's ridleys have been found along the eastern seaboard of the United States and in the Gulf of Mexico. Atlantic benthic immature sea turtles travel northward as the water warms to feed in the productive, coastal waters off Georgia through New England, returning southward with the onset of winter (Lutcavage and Musick 1985; Henwood and Ogren 1987; Ogren 1989). Studies suggest that benthic immature Kemp's ridleys stay in shallow, warm, nearshore waters in the northern Gulf of Mexico until cooling waters force them offshore or south along the Florida coast (Renaud 1995).

Stomach contents of Kemp's ridleys along the lower Texas coast consisted of nearshore crabs and mollusks, as well as fish, shrimp, and other foods considered to be shrimp fishery discards (Shaver 1991). Pelagic stage Kemp's ridleys presumably feed on the available *Sargassum* and associated infauna or other epipelagic species found in the Gulf of Mexico.

Population Dynamics and Status

Of the seven extant species of sea turtles in the world, the Kemp's ridley has declined to the lowest population level. Most of the population of adult females nest on the Rancho Nuevo beaches (Pritchard 1969). When nesting aggregations at Rancho Nuevo were discovered in 1947, adult female populations were estimated to be in excess of 40,000 individuals (Hildebrand 1963). By the mid-1980s nest numbers were below 1,000 (with a low of 702 nests in 1985). However, observations of increased nesting with 6,277 nests recorded in 2000, 10,000 nests in 2005, and 12,143 nests recorded during the 2006 nesting season (Gladys Porter Zoo nesting database) show the decline in the ridley population has stopped and the population is now increasing.

A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets and Mexican beach protection efforts. As demonstrated by nesting increases at the main nesting sites in Mexico, adult ridley numbers have increased over the last decade. The population model used by TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015.

Next to loggerheads, Kemp's ridleys are the second most abundant sea turtle in Virginia and Maryland waters, arriving in these areas during May and June (Keinath et al. 1987; Musick and Limpus 1997). The juvenile population of Kemp's ridley sea turtles in Chesapeake Bay is estimated to be 211 to 1,083 turtles (Musick and Limpus 1997). These juveniles frequently forage in submerged aquatic grass beds for crabs (Musick and Limpus 1997). Kemp's ridleys consume a variety of crab species, including *Callinectes spp.*, *Ovalipes spp.*, *Libinia sp.*, and *Cancer spp.* Mollusks, shrimp, and fish are consumed less frequently (Bjorndal 1997). Upon leaving Chesapeake Bay in autumn, juvenile ridleys migrate down the coast, passing Cape Hatteras in December and January (Musick and Limpus 1997). These larger juveniles are joined there by juveniles of the same size from North Carolina sounds, as well as smaller juveniles from

New York and New England, to form one of the densest concentrations of Kemp's ridleys outside of the Gulf of Mexico (Musick and Limpus 1997; Epperly et al. 1995a; Epperly et al. 1995b).

Threats

Kemp's ridleys face many of the same natural threats as loggerheads, including destruction of nesting habitat from storm events, natural predators at sea, and oceanic events such as cold stunning. Although cold stunning can occur throughout the range of the species, it may be a greater risk for sea turtles that utilize the more northern habitats of Cape Cod Bay and Long Island Sound. For example, in the winter of 1999-2000, there was a major cold-stunning event where 218 Kemp's ridleys, 54 loggerheads, and 5 green turtles were found on Cape Cod beaches ~~(R. Prescott, pers. comm., 2001). Annual cold-stunning events do not always occur at this~~ magnitude; the extent of episodic major cold-stunning events may be associated with numbers of turtles utilizing Northeast waters in a given year, oceanographic conditions, and the occurrence of storm events in the late fall. Many cold-stunned turtles can survive if found early enough, but cold-stunning events can still represent a significant cause of natural mortality.

Although changes in the use of shrimp trawls and other trawl gear have helped to reduce mortality of Kemp's ridleys, this species is also affected by other sources of anthropogenic impacts similar to those discussed above. For example, in the spring of 2000, five Kemp's ridley carcasses were recovered from the same North Carolina beaches where 275 loggerhead carcasses were found. Cause of death for most of the turtles recovered was unknown, but the mass mortality event was suspected to have been from a large-mesh gillnet fishery operating offshore in the preceding weeks. The five ridley carcasses that were found are likely to have been only a minimum count of the number of Kemp's ridleys that were killed or seriously injured as a result of the fishery interaction because it is unlikely that all of the carcasses washed ashore.

3.2.2.2 Summary of Kemp's Ridley Status

The only major nesting site for ridleys is a single stretch of beach near Rancho Nuevo, Tamaulipas, Mexico (Carr 1963). The number of nests observed at Rancho Nuevo and nearby beaches increased at a mean rate of 11.3 percent per year from 1985 to 1999. Current totals are 12,059 nests in Mexico in 2006 (August 8, 2006, e-mail from Luis Jaime Peña - Conservation Biologist, Gladys Porter Zoo). Kemp's ridleys mature at an earlier age (7-15 years) than other chelonids, thus "lag effects" as a result of unknown impacts to the non-breeding life stages would likely have been seen in the increasing nest trend beginning in 1985 (USFWS and NMFS 1992).

The largest contributors to the decline of Kemp's ridleys in the past were commercial and local exploitation, especially poaching of nests at the Rancho Nuevo site, as well as the Gulf of Mexico trawl fisheries. The advent of TED regulations for trawlers and protections for the nesting beaches has allowed the species to begin to rebound. Many threats to the future of the species remain, including interactions with fishery gear, marine pollution, foraging habitat destruction, illegal poaching of nests and potential threats to the nesting beaches from such sources as global climate change, development, and tourism pressures.

3.2.3 Hawksbill Sea Turtle

The hawksbill turtle was listed as endangered under the precursor of the ESA on June 2, 1970, and is considered Critically Endangered by the International Union for the Conservation of Nature (IUCN). The hawksbill is a medium-sized sea turtle, with adults in the Caribbean ranging in size from approximately 62.5 to 94.0 cm straight carapace length. The species occurs in all ocean basins, although it is relatively rare in the Eastern Atlantic and Eastern Pacific, and absent from the Mediterranean Sea. Hawksbills are the most tropical of the marine turtles, ranging from approximately 30°N to 30°S latitude. They are closely associated with coral reefs and other hard-bottom habitats, but they are also found in other habitats including inlets, bays and coastal lagoons (NMFS and USFWS 1993). There are five regional nesting populations with ~~more than 1,000 females nesting annually. These populations are in the~~ Seychelles, Mexico, Indonesia, and two in Australia (Meylan and Donnelly 1999). There has been a global population decline of over 80 percent during the last three generations (105 years) (Meylan and Donnelly 1999).

3.2.3.1 Pacific Ocean

Anecdotal reports throughout the Pacific indicate that the current Pacific hawksbill population is well below historical levels (NMFS 2004b). It is believed that this species is rapidly approaching extinction in the Pacific because of harvesting for its meat, shell, and eggs as well as destruction of nesting habitat (NMFS 2001). Hawksbill sea turtles nest in the Hawaiian Islands as well as the islands and mainland of southeast Asia, from China to Japan, and throughout the Philippines, Malaysia, Indonesia, Papua New Guinea, the Solomon Islands, and Australia (NMFS 2004b). However, along the eastern Pacific Rim where nesting was common in the 1930s, hawksbills are now rare or absent (NMFS 2004b).

3.2.3.2 Atlantic Ocean

In the Western Atlantic, the largest hawksbill nesting population occurs in the Yucatán Peninsula of Mexico (Garduño-Andrade et al. 1999). With respect to the United States, nesting occurs in Puerto Rico, the USVI, and the southeast coast of Florida. Nesting also occurs outside of the United States and its territories in Antigua, Barbados, Costa Rica, Cuba, and Jamaica (Meylan 1999a). Outside of the nesting areas, hawksbills have been seen off of the U.S. Gulf of Mexico states and along the eastern seaboard as far north as Massachusetts, although sightings north of Florida are rare (NMFS and USFWS 1993).

The best estimate of age at sexual maturity for hawksbill sea turtles is about 20-40 years (NMFS 2004b). Reproductive females undertake periodic (usually non-annual) migrations to their natal beach to nest. Movements of reproductive males are less well known, but are presumed to involve migrations to their nesting beach or to courtship stations along the migratory corridor (Meylan 1999b). Females nest an average of 3-5 times per season (Meylan and Donnelly 1999). Clutch size is larger on average (up to 250 eggs) than that of other turtles (Hirth 1980). Reproductive females may exhibit a high degree of fidelity to their nest sites.

The life history of hawksbills consists of a pelagic stage that lasts from the time they leave the nesting beach as hatchlings until they are approximately 22-25 cm in straight carapace length (Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where juveniles reside and grow) in coastal waters. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and occasionally mangrove-fringed bays may be occupied. Hawksbills show fidelity to their foraging areas over several years (van Dam and Díez 1998).

The hawksbill's diet is highly specialized and consists primarily of sponges (Meylan 1988). Other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (Leon and Díez 2000).

Estimates of the annual number of nests at hawksbill sea turtle nesting sites are of the order of hundreds to a few thousand. Nesting within the southeastern United States and U.S. Caribbean is restricted to Puerto Rico (>650 nests/yr), the USVI (~400 nests/yr), and, rarely, Florida (0-4 nests/yr) (Meylan 1999a; Florida Fish and Wildlife Conservation Commission; Florida Marine Research Institute's Statewide Nesting Beach Survey data 2002). At the two principal nesting beaches in the U.S. Caribbean where long-term monitoring has been carried out, populations appear to be increasing (Mona Island, Puerto Rico) or stable (Buck Island Reef National Monument, St. Croix, USVI) (Meylan 1999a).

As described for other sea turtle species, hawksbill sea turtles are affected by habitat loss, habitat degradation, fishery interactions, and poaching in some parts of their range. There continues to be a black market for hawksbill shell products ("tortoiseshell"), which likely contributes to the harvest of this species.

3.2.3.3 Summary of Status for Hawksbill Sea Turtles

Worldwide, hawksbill sea turtle populations are declining. They face many of the same threats affecting other sea turtle species. In addition, there continues to be a commercial market for hawksbill shell products, despite protections afforded to the species under U.S. law and international conventions.

3.2.4 Leatherback Sea Turtle

The leatherback sea turtle was listed as endangered throughout its global range on June 2, 1970. Leatherbacks are widely distributed throughout the oceans of the world, and are found in waters of the Atlantic, Pacific, and Indian Oceans (Ernst and Barbour 1972). Leatherback sea turtles are the largest living turtles and range farther than any other sea turtle species. The large size of adult leatherbacks and their tolerance to relatively low temperatures allows them to occur in northern waters such as off Labrador and in the Barents Sea (NMFS and USFWS 1995). Adult leatherbacks forage in temperate and subpolar regions from 71°N to 47°S latitude in all oceans and undergo extensive migrations to and from their tropical nesting beaches. In 1980, the leatherback population was estimated at approximately 115,000 adult females globally (Pritchard 1982). That number, however, is probably an overestimation as it was based on a particularly good nesting year in 1980 (Pritchard 1996). By 1995, the global population of adult females had declined to 34,500 (Spotila et al. 1996). Pritchard (1996) also called into question the population estimates from Spotila et al. (1996), and felt they may be somewhat low, because it ended the modeling on data from a particularly bad nesting year (1994) while excluding nesting data from 1995, which was a good nesting year. However, Spotila et al. (1996) represents the best overall estimate of adult female leatherback population size.

3.2.4.1 Pacific Ocean

Based on published estimates of nesting female abundance, leatherback populations have collapsed or have been declining at all major Pacific basin nesting beaches for the last two decades (Spotila et al. 1996, NMFS and USFWS 1998, Sarti et al. 2000, Spotila et al. 2000). For example, the nesting assemblage on Terengganu, Malaysia – which was one of the most significant nesting sites in the western Pacific Ocean – has declined severely from an estimated 3,103 females in 1968 to two nesting females in 1994 (Chan and Liew 1996). Nesting assemblages of leatherback turtles are in decline along the coasts of the Solomon Islands, a historically important nesting area (D. Broderick, pers. comm., in Dutton et al. 1999). In Fiji, Thailand, Australia, and Papua New Guinea (East Papua), leatherback turtles have only been known to nest in low densities and scattered colonies.

Only an Indonesian nesting assemblage has remained relatively abundant in the Pacific basin. The largest extant leatherback nesting assemblage in the Indo-Pacific lies on the north Vogelkop coast of Irian Jaya (West Papua), Indonesia, with over 3,000 nests recorded annually (Putrawidjaja 2000, Suarez et al. 2000). During the early-to-mid 1980s, the number of female leatherback turtles nesting on the two primary beaches of Irian Jaya appeared to be stable. More recently, this population has come under increasing threats that could cause this population to experience a collapse that is similar to what occurred at Terengganu, Malaysia. In 1999, for example, local Indonesian villagers started reporting dramatic declines in sea turtle populations near their villages (Suarez 1999). Unless hatchling and adult turtles on nesting beaches receive more protection, this population will continue to decline. Declines in nesting assemblages of leatherback turtles have been reported throughout the western Pacific region, with nesting assemblages well below abundance levels observed several decades ago (e.g., Suarez 1999).

In the western Pacific Ocean and South China Seas, leatherback turtles are captured, injured, or killed in numerous fisheries, including Japanese longline fisheries. The poaching of eggs, killing of nesting females, human encroachment on nesting beaches, beach erosion, and egg predation by animals also threaten leatherback turtles in the western Pacific.

In the eastern Pacific Ocean, nesting populations of leatherback turtles are declining along the Pacific coast of Mexico and Costa Rica. According to reports from the late 1970s and early 1980s, three beaches on the Pacific coast of Mexico supported as many as half of all leatherback turtle nests for the eastern Pacific. Since the early 1980s, the eastern Pacific Mexican population of adult female leatherback turtles has declined to slightly more than 200 individuals during 1998-99 and 1999-2000 (Sarti et al. 2000). Spotila et al. (2000) reported the decline of the leatherback turtle population at Playa Grande, Costa Rica, which had been the fourth largest nesting colony in the world. Between 1988 and 1999, the nesting colony declined from 1,367 to 117 female leatherback turtles. Based on their models, Spotila et al. (2000) estimated that the colony could fall to less than 50 females by 2003-2004. Leatherback turtles in the eastern Pacific Ocean are captured, injured, or killed in commercial and artisanal swordfish fisheries off Chile, Columbia, Ecuador, and Peru, and purse seine fisheries for tuna in the eastern tropical Pacific Ocean, and California/Oregon drift gillnet fisheries. Because of the limited data, we cannot provide high-certainty estimates of the number of leatherback turtles captured, injured, or killed through interactions with these fisheries. However, between 8-17 leatherback turtles were estimated to have died annually between 1990 and 2000 in interactions with the California/Oregon drift gillnet fishery; 500 leatherback turtles are estimated to die annually in Chilean and Peruvian fisheries; 200 leatherback turtles are estimated to die in direct harvests in Indonesia; and before 1992, the North Pacific driftnet fisheries for squid, tuna, and billfish captured an estimated 1,000 leatherback turtles each year, killing about 111 of them each year.

Although all causes of the declines in leatherback turtle colonies in the eastern Pacific have not been documented, Sarti et al. (1998) suggest that the declines result from egg poaching, adult and sub-adult mortalities incidental to high seas fisheries, and natural fluctuations due to changing environmental conditions. Some published reports support this suggestion. Sarti et al. (2000) reported that female leatherback turtles have been killed for meat on nesting beaches like Píedra de Tiacoyunque, Guerrero, Mexico. Eckert (1997) reported that swordfish gillnet fisheries in Peru and Chile contributed to the decline of leatherback turtles in the eastern Pacific. The decline in the nesting population at Mexiquillo, Mexico, occurred at the same time that effort doubled in the Chilean driftnet fishery. In response to these effects, the eastern Pacific population has continued to decline, leading some researchers to conclude that the leatherback is on the verge of extinction in the Pacific Ocean (e.g., Spotila et al. 1996, Spotila et al. 2000). The NMFS assessment of three nesting aggregations in its February 23, 2004, opinion supports this conclusion: If no action is taken to reverse their decline, leatherback sea turtles nesting in the Pacific Ocean either have high risks of extinction in a single human generation (for example, nesting aggregations at Terrenganu and Costa Rica) or they have a high risk of declining to levels where more precipitous declines become almost certain (e.g., Irian Jaya) (NMFS 2004a).

3.2.4.2 Atlantic Ocean

In the Atlantic Ocean, leatherbacks have been recorded as far north as Newfoundland, Canada, and Norway, and as far south as Uruguay, Argentina, and South Africa (NMFS SEFSC 2001). Female leatherbacks nest from the southeastern United States to southern Brazil in the western Atlantic and from Mauritania to Angola in the eastern Atlantic. The most significant nesting beaches in the Atlantic, and perhaps in the world, are in French Guiana and Suriname (NMFS SEFSC 2001). Genetic analyses of leatherbacks to date indicate that within the Atlantic basin there are genetically different nesting populations; the St. Croix nesting population (U.S. Virgin Islands), the mainland nesting Caribbean population (Florida, Costa Rica, Suriname/French Guiana), and the Trinidad nesting population (Dutton et al. 1999). When the hatchlings leave the nesting beaches, they move offshore but eventually utilize both coastal and pelagic waters. Very little is known about the pelagic habits of the hatchlings and juveniles, and they have not been documented to be associated with the *Sargassum* areas as are other species. Leatherbacks are deep divers, with recorded dives to depths in excess of 1,000 m (Eckert et al. 1999, Hayes et al. 2004).

Life History and Distribution

Leatherbacks are a long-lived species, living for over 30 years. They reach sexual maturity somewhat faster than other sea turtles (except Kemp's ridley), with an estimated range from 3-6 years (Rhodin 1985) to 13-14 years (Zug and Parham 1996). They nest frequently (up to 10 nests per year) during a nesting season and nest about every 2-3 years. During each nesting, they produce 100 eggs or more in each clutch and, thus, can produce 700 eggs or more per nesting season (Schultz 1975). However, a significant portion (up to approximately 30 percent) of the eggs can be infertile. Thus, the actual proportion of eggs that can result in hatchlings is less than this seasonal estimate. The eggs incubate for 55-75 days before hatching. Based on a review of all sightings of leatherback sea turtles of <145 cm curved carapace length (ccl), Eckert (1999) found that leatherback juveniles remain in waters warmer than 26°C until they exceed 100 cm ccl.

Although leatherbacks are the most pelagic of the sea turtles, they enter coastal waters on a seasonal basis to feed in areas where jellyfish are concentrated. Leatherback sea turtles feed primarily on cnidarians (medusae, siphonophores) and tunicates.

Evidence from tag returns and strandings in the western Atlantic suggests that adult leatherback sea turtles engage in routine migrations between boreal, temperate, and tropical waters (NMFS and USFWS 1992). A 1979 aerial survey of the outer continental shelf from Cape Hatteras, North Carolina, to Cape Sable, Nova Scotia showed leatherbacks to be present throughout the area with the most numerous sightings made from the Gulf of Maine south to Long Island. Leatherbacks were sighted in waters where depths ranged from 1-4,151 m, but 84.4 percent of sightings were in areas where the water was less than 180 m deep (Shoop and Kenney 1992). Leatherbacks were sighted in waters of a similar sea surface temperature as loggerheads; from 7-27.2°C (Shoop and Kenney 1992). However, this species appears to have a greater tolerance for colder waters because more leatherbacks were found at the lower temperatures (Shoop and Kenney 1992). This aerial survey estimated the in-water leatherback population from near Nova Scotia, Canada to Cape Hatteras, North Carolina at approximately 300-600 animals.

Population Dynamics and Status

The status of the Atlantic leatherback population is less clear than the Pacific population. The total Atlantic population size is undoubtedly larger than in the Pacific, but overall population trends are unclear. In 1996, the entire western Atlantic population was characterized as stable at best (Spotila et al. 1996), with numbers of nesting females reported to be on the order of 18,800. A subsequent analysis by Spotila (pers. comm.) indicated that by 2000, the western Atlantic nesting population had decreased to about 15,000 nesting females. The nesting aggregation in French Guiana has been declining at about 15 percent per year since 1987 (NMFS SEFSC 2001). However, from 1979-1986, the number of nests was increasing at about 15 percent annually which could mean that the current 15 percent decline could be part of a nesting cycle which coincides with the erosion cycle of Guiana beaches described by Schultz (1975). In Suriname, leatherback nest numbers have shown large recent increases (with more than 10,000 nests per year since 1999 and a peak of 30,000 nests in 2001), and the long-term trend for the overall Suriname and French Guiana population may show an increase (Girondot 2002 in Hilterman and Goverse 2003). The number of nests in Florida and the U.S. Caribbean has been increasing at about 10.3 percent and 7.5 percent, respectively, per year since the early 1980s, but the magnitude of nesting is much smaller than that along the French Guiana coast (NMFS SEFSC 2001). Also, because leatherback females can lay 10 nests per season, the recent increases to 400 nests per year in Florida may represent as few as 40 individual female nesters per year.

In summary, the conflicting information regarding the status of Atlantic leatherbacks makes it difficult to characterize the current status. Numbers at some nesting sites are increasing, but are decreasing at other sites. Tag return data emphasize the wide-ranging nature of the leatherback and the link between South American nesters and animals found in U.S. waters. For example, a nesting female tagged May 29, 1990, in French Guiana was later recovered and released alive from the York River, Virginia. Another nester tagged in French Guiana on June 21, 1990, was later found dead in Palm Beach, Florida (STSSN database). Genetic studies performed within the Northeast Distant Fishery Experiment indicate that the leatherbacks captured in the Atlantic highly migratory species pelagic longline fishery were primarily from the French Guiana and Trinidad nesting stocks (over 95 percent). Individuals from West African stocks were surprisingly absent (Roden et al. In press).

There are a number of problems contributing to the uncertainty of the leatherback nest counts and population assessments. The nesting beaches of the Guianas (Guyana, French Guiana, and Suriname) and Trinidad are by far the most important in the western Atlantic. However, beaches in this region undergo cycles of erosion and reformation, so that the nesting beaches are not consistent over time. Additionally, leatherback sea turtles do not exhibit the same degree of nest-site fidelity demonstrated by loggerhead and other hardshell sea turtles, further confounding analysis of population trends using nesting data. Reported declines in one country and reported increases in another may be the result of migration and beach changes, not true population changes. Nesting surveys, as well as being hampered by the inconsistency of the nesting beaches, are themselves inconsistent throughout the region. Survey effort varies widely in the seasonal coverage, aerial coverage, and actual surveyed sites. Surveys have not been conducted consistently throughout time, or have even been dropped entirely as the result of wars, political turmoil, funding vagaries, etc. The methods vary in assessing total numbers of nests and total numbers of females. Many sea turtle scientists agree that the Guianas (and some would include Trinidad) should be viewed as one population and that a synoptic evaluation of nesting at all beaches in the region is necessary to develop a true picture of population status (Reichart et al. 2001). No such region-wide assessment has been conducted recently.

The most recent, complete estimates of regional leatherback populations are in Spotila et al. (1996).. As discussed above, nesting in the Guianas may have been declining in the late 1990s but may have increased again in the early 2000s. Spotila et al. estimated that the leatherback population for the Atlantic basin, including all nesting beaches in the Americas, the Caribbean, and West Africa totaled approximately 27,600 nesting females, with an estimated range of 20,082-35,133. We believe that the current population probably still lies within this range, taking into account the reported nesting declines and increases and the uncertainty surrounding them. We therefore choose to rely on Spotila et al.'s (1996) published total Atlantic population estimates, rather than attempt to construct a new population estimate here, based on our interpretation of the various, confusing nesting reports from areas within the region.

Threats

Zug and Parham (1996) pointed out that the main threat to leatherback populations in the Atlantic is the combination of fishery-related mortality (especially entanglement in gear and drowning in trawls) and the intense egg harvesting on the main nesting beaches. Other important ongoing threats to the population include pollution, loss of nesting habitat, and boat strikes.

Of sea turtle species, leatherbacks seem to be the most vulnerable to entanglement in fishing gear. This susceptibility may be the result of their body type (large size, long pectoral flippers, and lack of a hard shell), their attraction to gelatinous organisms and algae that collect on buoys and buoy lines at or near the surface, possibly their method of locomotion, and perhaps their attraction to the lightsticks used to attract target species in longline fisheries. They are also susceptible to entanglement in gillnets and pot/trap lines (used in various fisheries) and capture in trawl gear (e.g., shrimp trawls).

Leatherbacks are exposed to pelagic longline fisheries in many areas of their range. Unlike loggerhead turtle interactions with longline gear, leatherback turtles do not usually ingest longline bait. Instead, leatherbacks are foul hooked by longline gear (e.g., on the flipper or shoulder area) rather than getting mouth hooked or swallowing the hook (NMFS SEFSC 2001). According to observer records, an estimated 6,363 leatherback sea turtles were caught by the U.S. Atlantic tuna and swordfish longline fisheries between 1992-1999, of which 88 were released dead (NMFS SEFSC 2001). The U.S. fleet accounts for only 5 to 8 percent of the hooks fished in the Atlantic Ocean, and adding up the under-represented observed takes of the other 23 countries that actively fish in the area would lead to annual take estimates of thousands of leatherbacks over different life stages. Basin-wide, Lewison et al. (2004) estimated that 30,000-60,000 leatherback sea turtle captures occurred in Atlantic pelagic longline fisheries in the year 2000 alone (note that multiple captures of the same individual are known to occur, so the actual number of individuals captured may not be as high).

Leatherbacks are also susceptible to entanglement in the lines associated with trap/pot gear used in several fisheries. From 1990-2000, 92 entangled leatherbacks were reported from New York through Maine (Dwyer et al. 2002). Additional leatherbacks stranded wrapped in line of unknown origin or with evidence of a past entanglement (Dwyer et al. 2002). Fixed gear fisheries in the mid-Atlantic have also contributed to leatherback entanglements. In North Carolina, two leatherback sea turtles were reported entangled in a crab pot buoy inside Hatteras Inlet (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). A third leatherback was reported entangled in a crab pot buoy in Pamlico Sound near Ocracoke. This turtle was disentangled and released alive; however, lacerations on the front flippers from the lines were evident (D. Fletcher, pers. comm. to S. Epperly in NMFS SEFSC 2001). In the Southeast, leatherbacks are vulnerable to entanglement in Florida's lobster pot and stone crab fisheries. In the U.S. Virgin Islands, where one of five leatherback strandings from 1982 to 1997 was due to entanglement (Boulon 2000), leatherbacks have been observed with their flippers wrapped in the line of West Indian fish traps (R. Boulon, pers. comm. to J. Braun-McNeill in NMFS SEFSC 2001). Because many entanglements of this typically pelagic species likely go unnoticed, entanglements in fishing gear may be much higher.

Leatherback interactions with the southeast Atlantic shrimp fishery, which operates predominately from North Carolina through southeast Florida (NMFS 2002), have also been a common occurrence. Leatherbacks, which migrate north annually, are likely to encounter shrimp trawls working in the coastal waters off the Atlantic coast from Cape Canaveral, Florida, to the Virginia/North Carolina border. Leatherbacks also interact with the Gulf of Mexico shrimp fishery. For many years, TEDs required for use in these fisheries were less effective at excluding leatherbacks than the smaller, hard-shelled turtle species. To address this problem, on February 21, 2003, the NMFS issued a final rule to amend the TED regulations. Modifications to the design of TEDs are now required in order to exclude leatherbacks and large and sexually mature loggerhead and green turtles.

Other trawl fisheries are also known to interact with leatherback sea turtles. In October 2001, a Northeast Fisheries Science Center observer documented the take of a leatherback in a bottom otter trawl fishing for Loligo squid off of Delaware; TEDs are not required in this fishery. The winter trawl flounder fishery, which did not come under the revised TED regulations, may also interact with leatherback sea turtles.

Gillnet fisheries operating in the nearshore waters of the mid-Atlantic states are also suspected of capturing, injuring, and/or killing leatherbacks when these fisheries and leatherbacks co-occur. Data collected by the NEFSC Fisheries Observer Program from 1994 through 1998 (excluding 1997) indicate that a total of 37 leatherbacks were incidentally captured (16 lethally) in drift gillnets set in offshore waters from Maine to Florida during this period. Observer coverage for this period ranged from 54 to 92 percent.

Poaching is not known to be a problem for nesting populations in the continental U.S. However, in 2001 the NMFS Southeast Fishery Science Center (SEFSC) noted that poaching of juveniles and adults was still occurring in the U.S. Virgin Islands and the Guianas. In all, four of the five strandings in St. Croix were the result of poaching (Boulon 2000). A few cases of fishermen poaching leatherbacks have been reported from Puerto Rico, but most of the poaching is on eggs.

Leatherback sea turtles may be more susceptible to marine debris ingestion than other species due to their pelagic existence and the tendency of floating debris to concentrate in convergence zones that adults and juveniles use for feeding areas and migratory routes (Lutcavage et al. 1997, Shoop and Kenney 1992). Investigations of the stomach contents of leatherback sea turtles revealed that a substantial percentage (44 percent of the 16 cases examined) contained plastic (Mrosovsky 1981). Along the coast of Peru, intestinal contents of 19 of 140 (13 percent) leatherback carcasses were found to contain plastic bags and film (Fritts 1982). The presence of plastic debris in the digestive tract suggests that leatherbacks might not be able to distinguish between prey items and plastic debris (Mrosovsky 1981). Balazs (1985) speculated that the object might resemble a food item by its shape, color, size or even movement as it drifts about, and induce a feeding response in leatherbacks.

It is important to note that, like marine debris, fishing gear interactions and poaching are problems for leatherbacks throughout their range. Entanglements are common in Canadian waters where Goff and Lien (1988) reported that 14 of 20 leatherbacks encountered off the coast of Newfoundland/Labrador were entangled in fishing gear including salmon net, herring net, gillnet, trawl line and crab pot line. Leatherbacks are reported taken by many other nations that participate in Atlantic pelagic longline fisheries, including Taipei, Brazil, Trinidad, Morocco, Cyprus, Venezuela, Korea, Mexico, Cuba, U.K., Bermuda, People's Republic of China, Grenada, Canada, Belize, France, and Ireland (see NMFS SEFSC 2001, for a description of take records). Leatherbacks are known to drown in fish nets set in coastal waters of Sao Tome, West Africa (Castroviejo et al. 1994, Graff 1995). Gillnets are one of the suspected causes for the decline in the leatherback sea turtle population in French Guiana (Chevalier et al. 1999), and gillnets targeting green and hawksbill turtles in the waters of coastal Nicaragua also incidentally catch leatherback turtles (Lagueux et al. 1998). Observers on shrimp trawlers operating in the northeastern region of Venezuela documented the capture of six leatherbacks from 13,600 trawls (Marcano and Alio-M 2000). An estimated 1,000 mature female leatherback sea turtles are caught annually in fishing nets off of Trinidad and Tobago with mortality estimated to be between 50 to 95 percent (Eckert and Lien 1999). However, many of the turtles do not die as a result of drowning, but rather because the fishermen butcher them in order to get them out of their nets (NMFS SEFSC 2001).

3.2.4.3 Summary of Leatherback Status

In the Pacific Ocean, the abundance of leatherback turtle nesting individuals and colonies has declined dramatically over the past 10 to 20 years. Nesting colonies throughout the eastern and western Pacific Ocean have been reduced to a fraction of their former abundance by the combined effects of human activities that have reduced the number of nesting females. In addition, egg poaching has reduced the reproductive success of the remaining nesting females. At current rates of decline, leatherback turtles in the Pacific basin are a critically endangered species with a low probability of surviving and recovering in the wild.

In the Atlantic Ocean, our understanding of the status and trends of leatherback turtles is much more confounded, although the picture does not appear nearly as bleak as in the Pacific. The number of female leatherbacks reported at some nesting sites in the Atlantic Ocean has increased, while at others they have decreased. Some of the same factors that led to precipitous declines of leatherbacks in the Pacific also affect leatherbacks in the Atlantic: leatherbacks are captured and killed in many kinds of fishing gear and interact with fisheries in state, federal, and international waters. Poaching is a problem and affects leatherbacks that occur in U.S. waters. Leatherbacks also appear to be more susceptible to death or injury from ingesting marine debris than other turtle species.

3.2.5 Green Sea Turtle

Federal listing of the green sea turtle occurred on July 28, 1978, with all populations listed as threatened except for the Florida and Pacific coast of Mexico breeding populations, which are endangered. The nesting range of the green sea turtles in the southeastern United States includes sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands between Texas and North Carolina, the U.S. Virgin Islands (USVI) and Puerto Rico (NMFS and USFWS 1991a). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties (Ehrhart and Witherington 1992). Green sea turtle nesting also occurs regularly on St. Croix, USVI, and on Vieques, Culebra, Mona, and the main island of Puerto Rico (Mackay and Rebholz 1996).

3.2.5.1 Pacific Ocean

Green turtles are thought to be declining throughout the Pacific Ocean, with the exception of Hawaii, from a combination of overexploitation and habitat loss (Seminoff 2002). In the western Pacific, the only major (>2,000 nesting females) populations of green turtles occur in Australia and Malaysia, with smaller colonies throughout the area. Indonesia has a widespread distribution of green turtles, but has experienced large declines over the past 50 years. Hawaii green turtles are genetically distinct and geographically isolated, and the population appears to be increasing in size despite the prevalence of fibropapilloma and spirochidiasis (Aguirre et al. 1998 in Balazs and Chaloupka 2003). In the eastern Pacific, mitochondrial DNA analysis has indicated that there are three key nesting populations: Michoacan, Mexico; Galapagos Islands, Ecuador; and Islas Revillagigedos, Mexico (Dutton 2003). There is also sporadic green turtle nesting along the Pacific coast of Costa Rica.

3.2.5.2 Atlantic Ocean

Life History and Distribution
The estimated age at sexual maturity for green sea turtles is between 20-50 years (Balazs 1982; Frazer and Ehrhart 1985). Green sea turtle mating occurs in the waters off the nesting beaches. Each female deposits 1-7 clutches (usually 2-3) during the breeding season at 12-14 day intervals. Mean clutch size is highly variable among populations, but averages 110-115 eggs/nest. Females usually have 2-4 or more years between breeding seasons, whereas males may mate every year (Balazs 1983). After hatching, green sea turtles go through a post-hatchling pelagic stage where they are associated with drift lines of algae and other debris. At approximately 20 to 25 cm carapace length, juveniles leave pelagic habitats and enter benthic foraging areas (Bjorndal 1997).

Green sea turtles are primarily herbivorous, feeding on algae and sea grasses, but also occasionally consume jellyfish and sponges. The post-hatchling, pelagic-stage individuals are assumed to be omnivorous, but little data are available.

Green sea turtle foraging areas in the southeastern United States include any coastal shallow waters having macroalgae or sea grasses. This includes areas near mainland coastlines, islands, reefs, or shelves, and any open-ocean surface waters, especially where advection from wind and currents concentrates pelagic organisms (Hirth 1997; NMFS and USFWS 1991a). Principal benthic foraging areas in the southeastern United States include Aransas Bay, Matagorda Bay, Laguna Madre, and the Gulf inlets of Texas (Doughty 1984; Hildebrand 1982; Shaver 1994), the Gulf of Mexico off Florida from Yankeetown to Tarpon Springs (Caldwell and Carr 1957; Carr 1984), Florida Bay and the Florida Keys (Schroeder and Foley 1995), the Indian River Lagoon System, Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward counties (Wershoven and Wershoven 1992; Guseman and Ehrhart 1992). Adults of both sexes are presumed to migrate between nesting and foraging habitats along corridors adjacent to coastlines and reefs.

Population Dynamics and Status

The vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Meylan et al. 1995; Johnson and Ehrhart 1994). Green sea turtle nesting in Florida has been increasing since 1989 (Florida Fish and Wildlife Conservation Commission, Florida Marine Research Institute Index Nesting Beach Survey Database). Current nesting levels in Florida are reduced compared to historical levels, reported by Dodd (1981). However, total nest counts and trends at index beach sites during the past decade suggest the numbers of green sea turtles that nest within the southeastern United States are increasing.

Although nesting activity is obviously important in determining population distributions, the remaining portion of the green turtle's life is spent on the foraging and developmental grounds. Some of the principal feeding pastures in the western Atlantic Ocean include the upper west coast of Florida and the northwestern coast of the Yucatán Peninsula. Additional important foraging areas in the western Atlantic include the Mosquito and Indian River Lagoon systems and nearshore wormrock reefs between Sebastian and Ft. Pierce Inlets in Florida, Florida Bay, the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito Coast of Nicaragua, the Caribbean Coast of Panama, and scattered areas along Colombia and Brazil (Hirth 1997). The summer developmental habitat for green turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997).

There are no reliable estimates of the number of immature green sea turtles that inhabit coastal areas (where they come to forage) of the southeastern United States. However, information on incidental captures of immature green sea turtles at the St. Lucie Power Plant (they have averaged 215 green sea turtle captures per year since 1977) in St. Lucie County, Florida (on the Atlantic coast of Florida) show that the annual number of immature green sea turtles captured has increased significantly in the past 26 years (FPL 2002).

It is likely that immature green sea turtles foraging in the southeastern United States come from multiple genetic stocks; therefore, the status of immature green sea turtles in the southeastern United States might also be assessed from trends at all of the main regional nesting beaches, principally Florida, Yucatán, and Tortuguero. Trends at Florida beaches were previously discussed. Trends in nesting at Yucatán beaches cannot be assessed because of a lack of consistent beach surveys over time. Trends at Tortuguero (ca. 20,000-50,000 nests/year) showed a significant increase in nesting during the period 1971-1996 (Bjorndal et al. 1999), and more recent information continues to show increasing nest counts (Troëng and Rankin 2004). Therefore, it seems reasonable that there is an increase in immature green sea turtles inhabiting coastal areas of the southeastern United States; however, the magnitude of this increase is unknown.

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the over-exploitation of green sea turtles for food and other products. Although intentional take of green sea turtles and their eggs is not extensive within the southeastern United States, green sea turtles that nest and forage in the region may spend large portions of their life history outside the region and outside U.S. jurisdiction, where exploitation is still a threat. However, there are still significant and ongoing threats to green sea turtles from human-related causes in the United States. These threats include beach armoring, erosion control, artificial lighting, beach disturbance (e.g., driving on the beach), pollution, foraging habitat loss as a result of direct destruction by dredging, siltation, boat damage, other human activities, and interactions with fishing gear. Sea sampling coverage in the pelagic driftnet, pelagic longline, southeast shrimp trawl, and summer flounder bottom trawl fisheries has recorded takes of green turtles. There is also the increasing threat from green sea turtle fibropapillomatosis disease. Presently, this disease is cosmopolitan and has been found to affect large numbers of animals in some areas, including Hawaii and Florida (Herbst 1994; Jacobson, 1990; Jacobson et al. 1991).

3.2.5.3 Summary of Status for Atlantic Green Sea Turtles

Green turtles range in the western Atlantic from Massachusetts to Argentina, including the Gulf of Mexico and Caribbean, but are considered rare in benthic areas north of Cape Hatteras (Wynne and Schwartz 1999). Green turtles face many of the same natural and anthropogenic threats as for loggerhead sea turtles described above. In addition, green turtles are also susceptible to fibropapillomatosis, which can result in death. In the continental United States, green turtle nesting occurs on the Atlantic coast of Florida (Ehrhart 1979). Recent population estimates for the western Atlantic area are not available. The pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in Florida in 1989. However, given the species' late sexual maturity, caution is warranted about over-interpreting nesting trend data collected for less than 15 years.

4 ENVIRONMENTAL BASELINE

This section contains a description of the effects of past and ongoing human activities leading to the current status of the species, their habitat, and the ecosystem, within the action area. The environmental baseline is a snapshot of the factors affecting the species and includes federal, state, tribal, local, and private actions already affecting the species, or that will occur contemporaneously with the consultation in progress. Unrelated, future federal actions affecting the same species that have completed formal or informal consultation are also part of the environmental baseline, as are implemented and ongoing federal and other actions within the action area that may benefit listed species.

4.1 Status of Sea Turtles in the Action Area

Sea turtles found in the immediate project area may travel widely throughout the Atlantic, Gulf of Mexico, and Caribbean Sea, and individuals found in the action area can potentially be affected by activities anywhere within this wide range. Thus, the status of the species in the action area is the same as the species' range-wide status discussed in section 3 above.

4.1.2 Federal Actions

In recent years, NMFS has undertaken numerous ESA section 7 consultations to address the effects of federally-permitted fisheries and other federal actions on threatened and endangered sea turtle species. Each of those consultations sought to develop ways of reducing the probability of adverse effects of the action on sea turtles. Similarly, recovery actions NMFS has undertaken under the ESA are addressing the problem of take of sea turtles in the fishing and shipping industries and other activities such as COE dredging operations. The summary below of anticipated sources of incidental take of sea turtles from federal actions includes only those actions which have already concluded or are currently undergoing formal section 7 consultation.

Fisheries
Adverse effects on threatened and endangered sea turtles from several types of fishing gear occur in the action area. These gears, including gillnet, hook-and-line (i.e., vertical line), and trawl gear; have all been documented as interacting with sea turtles. For all fisheries for which there is a fishery management plan (FMP) or for which any federal action is taken to manage that fishery, the impacts have been evaluated via section 7 consultation. Formal section 7 consultations have been conducted on the Southeast shrimp trawl fishery, which is the only federally-managed fishery operating in the action area.

The Southeast shrimp trawl fishery affects more sea turtles than all other activities combined (NRC 1990). On December 2, 2002, NMFS completed the opinion for shrimp trawling in the southeastern United States under proposed revisions to the TED regulations (68 FR 8456, February 21, 2003). This opinion determined that the shrimp trawl fishery under the revised TED regulations would not jeopardize the continued existence of any sea turtle species. This determination was based, in part, on the opinion's analysis that shows the revised TED regulations are expected to reduce shrimp trawl related mortality by 94 percent for loggerheads and 97 percent for leatherbacks. An incidental take statement (ITS) has been issued for the take of sea turtles in this fishery. More detailed information can be found in the opinion (NMFS 2002).

Formal section 7 consultations have also been conducted for the issuance of several exempted fishing permits (EFP). These opinions have concluded the proposed activities may adversely affect but were not likely to jeopardize the continued existence of any sea turtles. ITSs for each EFP issued were provided.

Vessel and Military Operations
Potential sources of adverse effects from federal vessel operations in the action area include operations of the U.S. Department of Defense (DOD), Navy (USN), Air Force and Coast Guard (USCG), the Environmental Protection Agency, the National Oceanic and Atmospheric Administration (NOAA), and the COE. NMFS has conducted formal consultations with the USCG, the USN, and NOAA on some of their vessel operations. Through the section 7 process, where applicable, NMFS has and will continue to establish conservation measures for all these agency vessel operations to avoid or minimize adverse effects to listed species. At the present time, however, they present the potential for some level of interaction. Refer to the Biological Opinions for the USCG (NMFS 1995; NMFS 1996; NMFS 1998) and the USN (NMFS 1997a) for details on the scope of vessel operations for these agencies and conservation measures being implemented as standard operating procedures.

Since the USN consultation only covered operations out of Mayport, Florida, potential still remains for USN vessels to adversely affect sea turtles within the action area. Similarly, operations of vessels by other federal agencies within the action area (NOAA, EPA, COE) may adversely affect sea turtles. However, the in-water activities of those agencies are limited in scope, as they operate a limited number of vessels or are engaged in research/operational activities that are unlikely to contribute a large amount of risk.

Dredging
The construction and maintenance of federal navigation channels and sand mining ("borrow") areas has also been identified as a source of sea turtle mortality. Hopper dredges move relatively rapidly (compared to sea turtle swimming speeds) and can entrain and kill sea turtles as the drag arm of the moving dredge overtakes the slower moving sea turtle. On September 22, 1995, NMFS completed the Regional Biological Opinion (RBO) issued to the COE, New Orleans and Galveston Districts, on hopper dredging of channels in Texas and Louisiana. NMFS reinitiated consultation with all Gulf of Mexico COE districts (i.e., Galveston, New Orleans, Mobile, and Jacksonville) on November 19, 2003, and issued an ITS for the entire Gulf of Mexico from the U.S.-Mexico border to Key West. This opinion determined that all channel dredging (i.e., maintenance dredging) and sand mining by hopper dredges in the Gulf of Mexico under the purview of the COE's Gulf districts would not jeopardize the continued existence of any sea turtle species. NMFS amended the GRBO on June 24, 2005 (Revision 1), and subsequently amended it a second time on January 9, 2007 (Revision 2).

ESA Permits
The ESA allows the issuance of permits to take ESA-listed species for the purposes of scientific research (section 10(a)(1)(a)). In addition, the ESA allows for the NMFS to enter into cooperative agreements with states developed under section 6 of the ESA, to assist in recovery actions of listed species. Prior to issuance of these authorizations, the proposal must be reviewed for compliance with section 7 of the ESA.

Sea turtles are the focus of research activities authorized by a section 10 permit under the ESA. There are currently 31 active scientific research permits (NMFS unpublished data) directed toward sea turtles that are applicable to the action area of this opinion. Authorized activities range from photographing, weighing, and tagging sea turtles incidentally taken in fisheries, blood sampling, tissue sampling (biopsy), and performing laparoscopy on intentionally captured turtles. The number of authorized takes varies widely depending on the research and species involved but may involve the taking of hundreds of turtles annually. Most takes authorized under these permits are expected to be non-lethal. Before any research permit is issued, the proposal must be reviewed under the permit regulations (i.e., must show a benefit to the species). In addition, since issuance of the permit is a federal activity, issuance of the permit by the NMFS must also be reviewed for compliance with section 7(a)(2) of the ESA to ensure that issuance of the permit does not result in jeopardy to the species.

4.1.3 State or Private Actions

Vessel Traffic

Commercial traffic and recreational pursuits can have an adverse effect on sea turtles through propeller and boat strike damage. Private vessels participate in high-speed marine events concentrated in the southeastern United States and are a particular threat to sea turtles, and occasionally to marine mammals as well. The magnitude of these marine events is not currently known. NMFS and the USCG (who permit these events) have consulted on some of these events, but a complete analysis has not been completed. NMFS has also consulted with other agencies, such as MMS and FERC, on vessel transit interactions with listed species.

State Fisheries

Several coastal state fisheries are known to incidentally take listed species, but information on these fisheries is sparse (NMFS 2001a). Various fishing methods used in these commercial and recreational fisheries, including trawling, pot fisheries, gillnets, and vertical line are all known to incidentally take sea turtles, but information on these fisheries is sparse (NMFS 2001a). Most state data are based on extremely low observer coverage or sea turtles were not part of data collection; thus, these data provide insight into gear interactions that could occur but are not indicative of the magnitude of the overall problem. The 2001 HMS Biological Opinion (NMFS 2001b) has an excellent summary of turtles taken in state fisheries throughout the action area.

To address data gaps, several state agencies have initiated observer programs to collect information on interactions between listed species and certain gear types. Other states have closed nearshore waters to gear-types known to have high encounter rates with listed species. Depending on the fishery in question, many state permit holders also hold federal permits; therefore, existing section 7 consultations on federal fisheries may address some of the state fishery impacts.

Additional information on impact of take (i.e., associated mortality) is also needed for analysis of impacts to sea turtles from these fisheries. Certain gear types may have high levels of sea turtle takes, but very low rates of serious injury or mortality. For example, hook-and-line takes rarely are dead upon retrieval of gear, but trawls and gillnets frequently result in immediate mortality. Leatherbacks seem to be susceptible to a more restricted list of fisheries, while hardshell turtles, particularly loggerheads, seem to appear in data from almost all state fisheries. The HMS opinion also summarizes sea turtle interactions with flynets and various trawl techniques that occur within the action area.

Texas, Louisiana, Mississippi, and Florida have placed restrictions on gillnet fisheries within state waters such that very little commercial gillnetting takes place in southeastern waters.

Observations of state recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to bite baited hooks, and loggerheads frequently ingest the hooks. Hooked turtles have been reported by the public fishing from boats, piers, and beach, banks, and jetties and from commercial fishermen fishing for reef fish and for sharks with both single rigs and bottom longlines (NMFS 2001b). A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

4.1.4 Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may indirectly affect listed species in the action area of this consultation include ocean dumping and disposal, aquaculture, and anthropogenic marine debris. The impacts from these activities are difficult to measure. Where possible, conservation actions are being implemented to monitor or study impacts from these sources. Close coordination is occurring through the section 7 process on both dredging and disposal sites to develop monitoring programs and ensure that vessel operators do not contribute to vessel-related impacts.

Marine Pollution

Sources of pollutants in the Gulf of Mexico coastal regions include atmospheric loading of pollutants such as PCBs, stormwater runoff from coastal towns, cities and villages, runoff into rivers emptying into the bays, groundwater and other discharges, and river input and runoff. Nutrient loading from land-based sources such as coastal community discharges is known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. Although pathological effects of oil spills have been documented in laboratory studies of marine mammals and sea turtles (Vargo et al. 1986), the impacts of many other anthropogenic toxins have not been investigated.

Acoustic Impacts

Acoustic impacts can include temporary or permanent injury, habitat exclusion, habituation, and disruption of other normal behavior patterns. Although focused on marine mammals, sea turtles may benefit from increased research on acoustics and reduction in noise levels.

4.1.5 Conservation and Recovery Actions Shaping the Environmental Baseline

NMFS has implemented a series of regulations aimed at reducing potential for incidental mortality of sea turtles in commercial fisheries. In particular, NMFS has required the use of TEDs in southeast U.S. shrimp trawls since 1989. It has been estimated that TEDs exclude 97 percent of the sea turtles caught in such trawls. These regulations have been refined over the years to ensure that TED effectiveness is maximized through proper placement and installation, configuration (e.g., width of bar spacing), floatation, and more widespread use. Analyses by Epperly and Teas (2002) indicated that the minimum requirements for the escape opening dimensions in TEDs in use at that time were too small, and that as many as 47 percent of the loggerheads stranding annually along the Atlantic Seaboard and Gulf of Mexico were too large to fit through existing openings. On February 21, 2003, NMFS published a final rule to require larger escape openings in TEDs used in the Southeast shrimp trawl fishery (68 FR 8456, February 21, 2003). Based upon the analyses in Epperly et al. (2002), leatherback and loggerhead sea turtles will greatly benefit from the new regulations, with expected reductions of 97 percent and 94 percent, respectively, in mortality from shrimp trawling. Several states (e.g., Florida, Georgia, South Carolina, Texas) have regulations requiring the use of TEDs in state-regulated shrimp trawl fisheries, and the federal regulations also apply in state waters.

NMFS has also been active in public outreach efforts to educate fishermen regarding sea turtle handling and resuscitation techniques. There is also an extensive network of Sea Turtle Stranding and Salvage Network (STSSN) participants along the Atlantic and Gulf of Mexico coasts who not only collect data on dead sea turtles, but also rescue and rehabilitate any live stranded sea turtles.

Loggerheads, leatherbacks, greens, and Kemp's ridleys are known to bite a baited hook, frequently ingesting the hook. Hooked turtles have been reported by the public fishing from boats, piers, beaches, banks, and jetties. Necropsies have revealed hooks internally, which often were the cause of death. In 2006, the Marine Recreational Fishery Statistics Survey (MRFSS) added a survey question regarding sea turtle interactions within recreational fisheries; NMFS is exploring potential revisions to MRFSS to quantify recreational encounters with sea turtles on a permanent basis. Detailed summaries of the impact of hook-and-line incidental captures on loggerhead sea turtles can be found in the TEWG reports (1998; 2000).

The Recovery Plans for loggerhead and Kemp's ridley sea turtles are in the process of being updated. Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising these plans based upon the latest and best available information.

5 EFFECTS OF THE ACTION

In this section of the opinion, we assess the direct and indirect effects of the proposed action on listed species within the action area (i.e., Matagorda Ship Channel bounded by a one-mile buffer area, existing and proposed dredged material placement, restoration, and nourishment areas, and the associated ODMDS in Calhoun County, Texas). The analysis in this section forms the foundation for our jeopardy analysis in section 7. A jeopardy determination is reached if we would reasonably expect a proposed action to cause reductions in numbers, reproduction, or distribution that would appreciably reduce a listed species' likelihood of surviving and recovering in the wild. The status of each listed sea turtle species likely to be adversely affected by the proposed action is reviewed in Section 3. Sea turtle species are listed because of their global status; a jeopardy determination must therefore find the proposed action will appreciably reduce the likelihood of survival and recovery of each species globally.

The quantitative and qualitative analyses in this section are based upon the best scientific and commercial data available on sea turtle biology and the effects of the proposed action. When analyzing the effects of any action, it is important to consider indirect effects as well as the direct effects. Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects include aspects such as habitat degradation, reduction of prey/foraging base, etc.

Previous biological opinions have documented that hopper dredging occasionally results in sea turtle entrainment and death, even with seasonal dredging windows, turtle deflector dragheads in place, and concurrent relocation trawling. For example, in the western Gulf of Mexico from February 1995 through March 2007, a total of 66 lethal takes (13 Kemp's ridleys, 27 loggerheads, and 26 greens) by GDCOE hopper dredging activities were documented during the dredging of 90.49 million cubic yards of material (U.S. Army Corps of Engineers Sea Turtle Data Warehouse, http://el.erdc.usace.army.mil/seaturtles/index.cfm). Of that total, one green, two Kemp's ridley, and three loggerhead sea turtle takes occurred during maintenance dredging specifically in the Matagorda Ship Channel area (*Ibid*).

Satellite telemetry work funded by COE and conducted by the NMFS Galveston Laboratory demonstrates the nearshore occurrence of Kemp's ridleys near northern Gulf channels. Kemp's ridleys remained within 10 NM of shore for greater than 95 percent of the observed time, with 90 percent of the observed locations within 5 NM (M. Renaud, NMFS Galveston Laboratory, pers. comm.). Movements out of northern Gulf waters in response to cooling temperatures occurred during December, and Kemp's ridleys returned with warming waters in March.

Seasonal abundance of sea turtles utilizing nearshore waters of the northwest Gulf of Mexico varies with species and location. Green turtles within subtropical habitats of the Laguna Madre are the region's only year-round, inshore occupants. Other species, especially the Kemp's ridley, are transient users of the coastal zone that venture toward tidal passes and into bays during May-August when food sources and other environmental factors are favorable. The May-August period has yielded over 80 percent of the sea turtle captures (n=516) recorded by Texas A&M researchers (Landry et al. 1994). Based on strandings, reported incidental captures, observer data, aerial surveys, and telemetry tracks, loggerheads are distributed ubiquitously in the Gulf, generally occurring in all areas, both inshore and offshore.

Habitat Effects of Hopper Dredging

The proposed dredging of Matagorda Ship Channel will directly alter the benthos through the removal of sediments. During dredging, water quality may be negatively impacted (i.e., increased turbidity) for short durations, although the area normally is extremely turbid. The widening and deepening of Matagorda Ship Channel will permanently and directly alter sediment quality in the portion of the channels to be modified. However, while sea turtles may be encountered in and near shipping channels, these areas do not provide preferred foraging opportunities. Therefore, any direct or indirect habitat impacts by dredging are expected to be insignificant in regard to ESA-listed sea turtle species.

Estimated Turtle Takes by Dredges

The proposed project would generate approximately 46.5 mcy of dredged material. Hopper dredges will be largely utilized in the offshore areas, producing 3.2 mcy of dredged material. Clamshell dredges will also be utilized in Matagorda Bay, an area expected to produce approximately 8.8 mcy (i.e., 19 percent) of the new work material. However, a hopper dredge may also do the work tentatively assigned to the clamshell dredge, which is expected to produce approximately 8.8 mcy of material, resulting in a total of 12 mcy of new work dredged material. Hydraulic dredges will be used to remove the remainder; hydraulic dredges are not known to adversely affect sea turtles (NMFS 2007). Hopper dredging Matagorda Ship Channel has generated 2.15 mcy of material from 1995-2007, which resulted in 6 turtle takes (3 loggerhead, 2 Kemps' ridley, and 1 green sea turtle). Most (67 percent) of these turtles were associated with dredging in August 2006. Regardless, on average, in the project area one turtle take is associated with every 0.36 mcy of dredged material (2,151,717 cubic yards/6 turtles). This average would translate into an expected take of 33 (12 mcy/0.36 turtle per mcy) turtles (14 loggerhead, 13 green, and 6 Kemp's ridley sea turtles based on reported takes in GDCOE dredging projects) during the course of the proposed dredging, based on the use of hopper dredges completing the work also tentatively assigned to clamshell dredges. Should clamshell dredges be used to complete their assigned work (i.e., 8.8 mcy), hopper dredges would only generate 3.2 mcy of dredged material and result in only 9 turtle takes (4 loggerhead, 4 green, and 1 Kemp's ridley). However, since hopper dredges may be employed in lieu of clamshell dredges, the more conservative estimate of 33 takes must be used. Furthermore, this estimate is based on the implementation of relocation trawling to prevent additional lethal takes by hopper dredges; in the complete absence of relocation trawling, takes by hopper dredges could be higher.

Effects of Relocation Trawling Activities in Association with Hopper Dredging
Relocation trawling has been successful at temporarily displacing Kemp's ridley, loggerhead, leatherback, and green sea turtles from channels in the Atlantic and Gulf of Mexico during periods when hopper dredging was imminent or ongoing. Some turtles captured during relocation trawling operations return to the dredge site and are subsequently recaptured. Sea turtle relocation studies by Standora et al. (1993) at Canaveral Channel relocated 34 turtles to six release sites of varying distances north and south of the channel. Ten turtles returned from southern release sites, and seven from northern sites, suggesting that there was no significant difference between directions. Return times observed suggested that there was a direct correlation between relocation distance and likelihood of return or length of return time to the channel when sea turtles were relocated to the south. No correlation was observed between the northern release sites and the time or likelihood of return. The study found that relocation of turtles to the site 70 km (43 miles) south of the channel would result in a return time of over 30 days.

REMSA, a private company contracted to conduct relocation trawling, captured, tagged, and relocated 69 turtles in a 7-day period at Canaveral Channel in October 2002, with no recaptures; turtles were relocated a minimum of 3-4 miles away (T. Bargo, REMSA, pers. comm. to Eric Hawk, June 2, 2003). Twenty-four hour per day relocation trawling conducted by REMSA at Aransas Pass Entrance Channel (Corpus Christi Ship Channel) from April 15, 2003, to July 7, 2003, relocated 71 turtles from 1.5-5 miles from the dredge site, with 3 recaptures (T. Bargo, REMSA, pers. comm. to Eric Hawk, July 24, 2003). One turtle released on June 14, 2003, approximately 1.5 miles from the dredge site, was recaptured four days later; another turtle captured June 9, 2003, and released about three miles from the dredge site was recaptured nine days later. Subsequent releases occurred five miles away. Of these 68 subsequent capture/releases, 1 turtle released on June 22, 2003, was recaptured 13 days later (REMSA Final Report, Sea Turtle Relocation Trawling, Aransas Pass, Texas, April-July 2003).

Relocation trawling activities initiated by GDCOE in 2007 have resulted in the capture, tagging, and relocation of 65 green, 25 Kemp's ridley, and 12 loggerhead sea turtles. Recent relocation trawling within the immediate project area in August 2006 (i.e., Matagorda Ship Channel) resulted in 21 loggerheads and 6 Kemp's ridley sea turtles captured in 11 days.

Prior to 1997, most relocation trawling in association with hopper dredging was performed by the COE under an ESA section 10 incidental take/research permit. Since then, however, relocation trawling has primarily been conducted by private companies. Since approximately October 1999, Coastwise Consulting, Inc., has conducted over 1,600 days of relocation trawling at Wilmington, North Carolina; Kings Bay and Savannah, Georgia; Pensacola, Florida; and Sabine Pass, Galveston, Freeport, Matagorda Pass, and Corpus Christi, Texas (C. Slay, e-mail to E. Hawk, January 25, 2007). During the course of that work, over 770 loggerhead, Kemp's ridley, green, hawksbill, and leatherback sea turtles were successfully captured, tagged, and released; only one leatherback mortality has been documented, which was attributed to illegal artificial reef material deployed within a designated borrow area. On the Atlantic coast, REMSA has also successfully tagged and relocated over 140 turtles in the last several years, most notably, 69 turtles (55 loggerheads and 14 greens) in a 7-day period at Canaveral Channel in October 2002, with no significant injuries. Other sea turtle relocation contractors (R. Metzger in 2001; C. Oravetz in 2002) have also successfully and non-injuriously trawl-captured and released sea turtles out of the path of oncoming hopper dredges. More recently in the Gulf of Mexico, REMSA captured, tagged, and relocated 71 turtles at Aransas Pass with no apparent ill effects to the turtles. Three injured turtles captured were subsequently transported to University of Texas Marine Science Institute rehabilitation facilities for treatment (two had old, non-trawl related ~~injuries or wounds; the third turtle may have sustained an injury to its flipper, apparently from~~ the door chain of the trawl, during capture). Three of the 71 captures were recaptures and were released around 1.5, three, and five miles, respectively, from the dredge site; none exhibited any evidence their capture, tag, release, and subsequent recapture, was in any way detrimental.

The turtles' capture and handling can result in raised levels of stressor hormones, and can cause some discomfort during tagging procedures. Based on past observations obtained during similar research trawling for turtles, these physiological effects are expected to dissipate within a day (Stabenau and Vietti 1999). Since turtle recaptures are rare, and recaptures that do occur typically happen several days to weeks after initial capture, cumulative adverse effects of recapture are not expected.

The Gulf and South Atlantic Fisheries Development Foundation's August 31, 1998, "Alternatives to TEDs: Final Report," presents data on 641 South Atlantic shallow tows (only one tow was in water over 27.4 m), all conducted under restricted tow times (55 minutes during April through October and 75 minutes from November through March), and 584 Gulf of Mexico nearshore tows conducted under the same tow time restrictions. Offshore effort in the Gulf of Mexico consisted of 581 non-time restricted tows, which averaged 7.8 hours per tow. All totaled, 323 turtle observations were documented: 293 in the nearshore South Atlantic efforts, and 30 in the Gulf efforts (24 nearshore and 6 offshore). Of the 293 South Atlantic turtles (219 loggerhead, 68 Kemp' ridley, 5 green, and 1 leatherback), only 274 were used in the analyses (201 loggerhead, 67 Kemp's ridley, 5 green, and 1 leatherback) because 12 escaped from the nets after being seen and 7 were caught in try nets. Of the 274 South Atlantic turtles captured using restricted tow times, only 5 loggerheads and 1 Kemp's ridley died because of the interaction. For the Gulf efforts, 26 turtles (8 loggerhead, 16 Kemp's ridley, and 2 green) were captured, resulting in three mortalities (1 loggerhead inshore, 1 loggerhead, and 1 green offshore). Excluding all six offshore tows and both offshore mortalities (because of the prolonged, non-restricted tow times), we are left with 1,225 time-restricted tows (584 + 641) resulting in 298 trawl-captured turtles (274 + 24) resulting in seven mortalities, i.e., 2.3 percent of the interactions resulted in death.

Rarely, even properly conducted relocation trawling can result in accidental sea turtle deaths. Henwood (T. Henwood, pers. comm. to E. Hawk, December 6, 2002) noted that trawl-captured loggerhead sea turtles died on several occasions during handling on deck during winter trawling in Canaveral Channel in the early 1980s, after short (approximately 30 minutes) tow times.

However, Henwood also noted that a significant number of the loggerheads captured at Canaveral during winter months appeared to be physically stressed and in "bad shape" compared to loggerheads captured in the summer months from the same site, which appeared much healthier and robust. Stressed turtles or unhealthy turtles or turtles exposed to repeated forced submergences are more likely to be injured or killed during relocation trawling than healthy turtles.

In November 2002, during relocation trawling conducted in York Spit, Virginia, a Kemp's ridley sea turtle was likely struck by one of the heavy trawl doors or it may have been struck and killed by another vessel shortly before trawl net capture. The hopper dredge was not working in the area at the time (T. Bargo, pers. comms. and e-mails to E. Hawk, December 6 and 9, 2002). ~~Additionally, during relocation trawling conducted off Destin, Florida, on December 2, 2006, a~~ leatherback turtle was captured and killed. However, this mortality occurred after the trawler encountered a large section of debris, potentially illegally dumped artificial reef material, which likely impacted the sea turtle (C. Slay, pers. comms. and e-mails to E. Hawk, December 4, 2006).

NMFS typically limits tow times for relocation trawling to 42 minutes or less measured from the time the trawl doors enter the water when setting the net to the time the trawl doors exit the water during haulback ("doors in - doors out"). The National Research Council (NRC) report "Decline of the Sea Turtles: Causes and Prevention" (NRC 1990) suggested that limiting tow durations to 40 minutes in summer and 60 minutes in winter would yield sea turtle survival rates that approximate those required for the approval of new TED designs, i.e., 97 percent. The NRC report also concluded that mortality of turtles caught in shrimp trawls increases markedly for tow times greater than 60 minutes.

Four lethal sea turtle takes during August 2006 maintenance dredging of the Matagorda Ship Channel occurred during concurrent relocation trawling activities that captured 27 sea turtles. In contrast, during relocation trawling in January-February 2004 no sea turtles were captured during 427 tows in Matagorda Ship Channel (U.S. Army Corps of Engineers Sea Turtle Data Warehouse); however, one turtle was taken by hopper dredge during the concurrent relocation trawling activities.

No hawksbill sea turtle mortalities have been recorded during relocation trawling, and relocation-trawling takes of this species are extremely rare. One leatherback sea turtle mortality was associated with relocation trawling off Destin, Florida, in December 2006; however, this incident was attributed to illegally-deployed and unmarked artificial reef material within a borrow site, and was considered a freak event. Therefore, NMFS believes that the possibility of relocation trawling take mortality occurring to either of these species is discountable.

In summary, NMFS believes that properly conducted and supervised relocation trawling (i.e., observing NMFS-recommended trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result in adverse effects (i.e., injury or death) to sea turtles. NMFS estimates that, overall, sea turtle trawling and relocation efforts will result in considerably less than 0.5 percent mortality of captured turtles, primarily due to their being previously stressed or diseased or if struck by trawl doors or accidents on deck. On the other hand, hopper dredge entrainments invariably result in injury, and are almost always fatal. In the regional biological opinions on hopper dredging, NMFS requires relocation trawling and tagging as methods of reducing sea turtle entrainment in hopper dredges and to document the effects of relocation trawling, according to criteria defined in the ITS.

Estimated Turtle Takes by Relocation Trawler

Even though relocation trawling involves directed take of turtles, it constitutes a legitimate RPM because it reduces the level of almost certain lethal and injurious take of sea turtles by hopper dredges, and allows the turtles captured non-injuriously by trawl to be relocated out of the path of the dredges. Without relocation trawling, the number of lethal takes of sea turtles by hopper dredging would likely be significantly greater than the estimated number discussed above and specified in the ITS. The number of non-lethal sea turtles takes expected by relocation trawlers ~~does not directly translate into potential lethal takes by hopper dredges in the absence of~~ relocation trawling, due to the differences in footprint between the two gears. The spread of a relocation trawler is much greater than the intake of a hopper dredge, therefore, the trawler will encounter a significantly greater number of sea turtles. However, it is reasonable to assume that in the absence of relocation trawling the number of lethal takes would increase, but predicting a precise number (i.e., lethal take by hopper dredging in the absence of relocation trawling) would be problematic due to the fact that the COE has consistently used relocation trawling as a standard practice for the majority of its projects in the Gulf of Mexico in recent years. The Consultation Handbook (for Procedures for Conducting Consultation and Conference Activities Under Section 7 of the Endangered Species Act, U.S. Fish and Wildlife Service and National Marine Fisheries Service, March 1998) expressly authorizes such directed take as an RPM at page 4-54. Therefore, NMFS will in this section evaluate the expected level of turtle take through required relocation trawling, so that these levels can be included in the evaluation of whether the proposed action will jeopardize the continued existence of the species.

The number of turtles relocated by trawlers in association with Gulf of Mexico hopper dredging projects varies considerably by project area, amount of effort, and time of year. For example, in 2006 the dredging of the Houston-Galveston Navigation Channels, which produced 3.7 million cubic yards of material (i.e., similar to what is expected in the proposed action), resulted in 7 loggerheads relocated in 60 days of trawling. However, in 2006 over approximately 15 days, 34 green sea turtles were relocated during the dredging of the Brownsville Entrance Channel. Furthermore, sea turtle distribution can be very patchy, resulting in significant differences in number of turtle takes by relocation trawler. For example, in 2003, Aransas Pass relocation trawling associated with hopper dredging resulted in 71 turtles captured and released in 3 months of relocation trawling, while the aforementioned Houston-Galveston project in 2006 only experienced 7 turtles in 2 months.

Due to the amount of required work and the duration of the project (i.e., 2 years), NMFS estimates that relocation trawling associated with the proposed action will take no more than 182 sea turtles during the course of the proposed work (43 loggerhead, 128 Kemp's ridley, 1 hawksbill, 1 leatherback, and 9 green sea turtles based on frequency data in Epperly et al. 2002). This estimate is based on the amount of work required for the proposed project (i.e., duration of two years), recent history of relocation trawler takes in the Gulf of Mexico, the possibility that a significant pulse of turtles could be encountered by relocation trawlers (e.g., 2003 event at Aransas Pass), and increased presence of sea turtles in coastal waters as turtle populations recover and new TED regulations take effect leading to increased trawl capture rates. As stated in the RPMs and Terms and Conditions of this opinion's ITS, relocation trawling is required under specific circumstances. While unlikely, Matagorda Ship Channel relocation trawling may result in lethal sea turtle takes. Due to the amount of work involved and the number of potential captures by relocation trawlers over the two years of the proposed project (i.e.,.182 captures), based on a 0.5 percent mortality rate of captured turtles we predict 1 of the captures (most likely Kemp's ridley, based on frequency data in Epperly et al. 2002) will result in a sea turtle mortality (0.5 percent mortality rate * 182 captures = 0.9 mortalities). The remaining 181 takes are not expected to be injurious or lethal due to the short duration of the tow times (15 to 30 minutes per tow; not more than 42 minutes, as per Term and Condition No. 13) and required safe-handling procedures.

Effects and Desirability of Tagging and Taking Genetic Samples From Relocated Animals
Tagging prior to release will help NMFS learn more about the habits and identity of trawl-captured animals after they are released, and if they are recaptured they will enable improvements in relocation trawling design to further reduce the effect of the take. External and internal flipper tagging (e.g., with Inconel and PIT tags) is not considered a dangerous procedure by the sea turtle research community, is routinely done by thousands of volunteers in the United States and abroad; and can be safely accomplished with minimal training. NMFS knows of no instance where flipper tagging has resulted in mortality or serious injury to a trawl-captured sea turtle. Such an occurrence would be extremely unlikely because the technique of applying a flipper tag is minimally traumatic and relatively non-invasive; in addition, these tags are attached using sterile techniques. Important growth, life history, and migratory behavior data may be obtained from turtles captured and subsequently relocated. Therefore, these turtles should not be released without tagging (and scanning for pre-existing tags).

Analysis of genetic samples may provide information on sea turtle populations such as life history, nesting beach identification, and distribution/stock overlap, which may ultimately benefit sea turtle protection measures.

Collection of Tissue Samples
Tissue sampling is performed to determine the genetic origins of captured sea turtles, and learn more about turtle nesting beach/population origins. This is important information because some populations, e.g., the northern subpopulation of loggerheads nesting in the Southeast Region, may be declining. For all tissue sample collections, a sterile 4- to 6-mm punch sampler is used. Researchers who examined turtles caught two to three weeks after sample collection noted that the sample collection site was almost completely healed (Witzell, pers. comm.). NMFS does not expect that the collection of a tissue sample from each captured turtle will cause any additional stress or discomfort to the turtle beyond that experienced during capture, collection of measurements, and tagging. Tissue sampling procedures are specified in the terms and conditions of this opinion.

Disorientation Effects of Hopper Dredge and Pumpout Barge Deck Lighting
NMFS believes that female sea turtles approaching nesting beaches, and neonates (i.e., hatchlings) emerging from nests and exiting their natal beaches, may be adversely affected by bright offshore lights from hopper dredges or hopper dredge pumpout barges operating in the

nearshore (0-3 NM) environment. Females approaching the beach to nest could be deterred from nesting by bright lights in the nearshore environment. Hatchlings emerging from their nests could be attracted away from the shortest path to the water and instead crawl or swim toward the bright lights of a nearshore hopper dredge or anchored pumpout barge (instead of crawling or swimming seaward toward the open horizon), thus increasing their exposure time to predation. NMFS recently received a report from a National Park Service biologist at Gulf Islands National Seashore (M. Nicholas, pers. comm. to E. Hawk, September 29, 2003) who relocated a clutch of 97 Perdido Key hatchlings on September 28, 2003. The biologist felt that the hatchlings were in danger of being attracted to a nearby operating, brightly lit hopper dredge which was dredging one-half to one mile offshore in Pensacola Entrance Channel. NMFS considers it prudent that hopper dredges and hopper dredge pumpout barges operating within 3 NM of sea turtle nesting beaches during sea turtle nesting and sea turtle hatchling emergence season (May 1-October 31, annually), should shield essential deck lighting and reduce or extinguish non-essential deck lighting to the maximum extent possible consistent with vessel personnel safety and U.S. Coast Guard navigation requirements, to reduce potential disorientation effects, potential reduced or aborted nesting, and potential increased hatchling mortality from increased exposure to predators. This is consistent with U.S. Fish and Wildlife Service biological opinion requirements and Florida Wildlife Commission requirements for beach nourishment projects where nesting sea turtles may be present, and was jointly developed by these agencies, the Florida Department of Environmental Protection, and the U.S. Army Corps of Engineers, Jacksonville District (R. Trindell, pers. comm. to E. Hawk, September 30, 2003).

Effects of Dredged Material Disposal on Sea Turtles

Typically, dredged materials from channel maintenance dredging activities are disposed of down current of the navigation channels being maintained (by agitation dredging and sidecasting), or in designated disposal areas which are adjacent to and run approximately parallel to the navigation channels, or in nearby designated offshore disposal areas (to minimize transit time of the hopper dredge to and from the dredging site). Alternatively, they are used beneficially for barrier island restoration and creation of island, wetland, marsh, and shallow-water habitats, or to renourish eroded mainland beaches.

NMFS believes the proposed disposal activities are unlikely to adversely affect sea turtles. These species are highly mobile and should be able to easily avoid a descending sediment plume discharged at the surface by a hopper dredge opening its hopper doors, or pumping its sediment load over the side. NMFS also believes that foraging habitat for sea turtles is not likely a limiting factor in the Gulf of Mexico, and thus the temporary removal of relatively small areas (compared to remaining foraging habitat) of potential foraging habitat by burial with dredged material sediment will not measurably adversely affect sea turtles. Turtles will typically forage further offshore where non-ephemeral limestone ledges supporting algal/sponge growth are located. These ledges are not routinely covered by shifting sands, as they are prone to in the high wave-energy nearshore environment. Disposal activities involving beach renourishment that would only potentially adversely affect sea turtles in their onshore nesting activities, or their nests, are under the purview of the U.S. Fish and Wildlife Service.

Effects of Bed-leveling Mechanical Dredging Devices
Bed-leveling is often associated with hopper dredging (and other types of dredging) operations. Bed-leveling "dredges" do not use suction. They redistribute sediments, rather than removing them. Plows, I-beams, or other seabed-leveling mechanical dredging devices are often used to lower high spots left in channel bottoms and dredged material deposition areas by hopper dredges or other type dredges. Some evidence indicates that they may be responsible for occasional sea turtle mortalities (NMFS 2003b). Sea turtles may be crushed as the leveling device, which weighs about 30 to 50 tons and is typically fixed with cables to a derrick mounted on a barge pushed or pulled by a tugboat at about one to two knots, passes over and crushes a turtle which failed to move out of the way and is not pushed out of the way by the sediment wedge "wave" generated by and moving ahead of the device. Sea turtles at Brunswick Harbor, Georgia, may have been crushed and killed by recent bed-leveling "clean-up dredging" which commenced after the hopper dredge finished its work in a particular area. Brunswick Harbor is also one of the sites where sea turtles captured by relocation trawlers sometimes show evidence of brumating (over-wintering) in the muddy channel bottom, which could explain why, if they were crushed by bed-level type dredges, they failed to react quickly enough to avoid the bed-leveler. However, the use of bed-levelers is probably preferable to the use of hopper dredges for cleanup operations, since turtles foraging/resting/brumating on irregular bottoms are probably more likely to be entrained by suction dragheads (because sea turtle deflector dragheads are less effective on uneven bottoms), hopper dredges move considerably faster than bed-leveler "dredges," and bed-levelers do not use suction.

Although there are no confirmed reports to date which definitively implicate bed-levelers with sea turtle takes, NMFS believes that a possibility exists that bed-leveling mechanical dredging may kill sea turtles during leveling/cleanup operations associated with hopper dredging projects where bed-levelers are used. Takes by bed-leveler type dredges will be difficult to ascertain and determine responsibility for because bed-levelers do not entrain turtle parts, and no dredged materials come aboard for observers to monitor. Furthermore, bed-leveler impacted turtles may not float ashore for several days, if at all. However, if compelling STSSN observer reports and evidence indicate that a turtle was killed by a bed-leveler associated with the hopper dredging project covered by this opinion, reinitiation of consultation will be required.

6 CUMULATIVE EFFECTS

Cumulative effects are the effects of future state, local, or private activities that are reasonably certain to occur within the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Within the action area, the major future change in human activities that is anticipated is associated with eastward expansion of oil and gas exploration and extraction in the Gulf of Mexico and would involve a federal action. The action area's present use for commercial and recreational fishing is expected to continue at the present levels of intensity in the near future. Residential development in coastal Texas is likely to increase as part of the nationwide trend of human migration to the coasts. This trend likely will not have a major effect on the action area's ability to function as a foraging habitat for turtles. As discussed in the Environmental Baseline Section, however, listed species of turtles migrate throughout the Gulf of Mexico and may be affected during their life cycles by non-federal activities outside the action area.

Throughout the coastal Gulf of Mexico, and particularly in Louisiana, the loss of thousands of acres of wetlands is occurring due to natural subsidence and erosion, as well as reduced sediment input from the Mississippi River. Impacts caused by residential, commercial, and agricultural developments appear to be the primary causes of wetland loss in Texas.

Oil spills from tankers transporting foreign oil, as well as the illegal discharge of oil and tar from vessels discharging bilge water will continue to affect water quality in the Gulf of Mexico. Cumulatively, these sources and natural oil seepage contribute most of the oil discharged into the ~~Gulf of Mexico. Floating tar sampled during the 1970s, when bilge discharge was still legal,~~ concluded that up to 60 percent of the pelagic tars sampled did not originate from the northern Gulf of Mexico coast.

Marine debris will likely persist in the action area in spite of marine pollution prohibitions. In Texas and Florida, approximately half of the stranded turtles examined have ingested marine debris (Plotkin and Amos 1990; Bolten and Bjorndal 1991). Although entanglements affect fewer individuals than ingestion of debris, entanglement in marine debris may contribute more frequently to the death of sea turtles.

Coastal runoff and river discharges carry large volumes of petrochemical and other contaminants from agricultural activities, cities and industries into the Gulf of Mexico. The coastal waters of the Gulf of Mexico have more sites with high contaminant concentrations than other areas of the coastal United States, due to the large number of waste discharge point sources. Sea turtles may be exposed to and accumulate these contaminants during their life cycles, with unknown effects.

State regulated commercial and recreational fishing activities in Gulf of Mexico waters probably take endangered species. These takes are not reported and are unauthorized. It is expected that states will continue to license/permit large vessel and thrill-craft operations, which do not fall under the purview of a federal agency and will issue regulations that will affect fishery activities. NMFS will continue to work with states to develop ESA section 6 agreements and section 10 permits to enhance programs to quantify and mitigate these takes. Increased recreational vessel activity in inshore waters of the Gulf of Mexico will likely increase the number of turtles taken by injury or mortality in vessel collisions. Recreational hook-and-line fisheries have been known to lethally take sea turtles, including Kemp's ridleys. In a study conducted by the NMFS Galveston Laboratory between 1993 through 1995, 170 ridleys were reported associated with recreational hook-and-line gear; including 18 dead stranded turtles, 51 rehabilitated turtles, 5 that died during rehabilitation, and 96 that were released by fishermen (Cannon and Flanagan 1996). The Sea Turtle Stranding and Salvage Network (STSSN) also receives stranding reports that identify carcass anomalies that may be associated with the recreational fishery (entangled in line or net, fish line protruding, fish hook in mouth or digestive tract, fish line in digestive tract. The reports do not distinguish between commercial or recreational sources of gear, such as hook, net, and line, which may be used in both sectors. Cumulatively, fishery entanglement anomalies are noted in fewer than 4 percent of the stranded sea turtle carcasses reported between 1990 and 1996, and some carcasses carry more than one anomaly (e.g., fishing line in digestive tract/fishing line protruding from mouth or cloaca); therefore, summing these reports may result in some double counting.

7 JEOPARDY ANALYSIS

The analyses conducted in the previous sections of this opinion serve to provide a basis to determine whether the proposed action would be likely to jeopardize the continued existence of any ESA-listed sea turtles. In Section 5, we have outlined how the proposed dredging and sediment disposal can affect sea turtles, and the extent of those effects in terms of estimates of the numbers of sea turtles caught and/or injured/killed. Now we turn to an assessment of each species' response to this impact, in terms of overall population effects from the estimated take, ~~and whether those effects of the proposed action, when considered in the context of the status of~~ the species (Section 3), the environmental baseline (Section 4), and the cumulative effects (Section 6), will jeopardize the continued existence of the affected species.

"To jeopardize the continued existence of" means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and the recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Thus, in making this determination for each species, we must look at whether there will be a reduction in the reproduction, numbers, or distribution. Then, if there is a reduction in one or more of these elements, we evaluate whether it will cause an appreciable reduction in the likelihood of both the survival and the recovery of the species.

7.1 Effects of the Action on the Likelihood of Survival in the Wild

This section analyzes the effects of the action on the likelihood of survival of each species in the wild. We evaluate whether anticipated take of each species will result in any reduction in reproduction, numbers, or distribution of that species that may appreciably increase its risk of extinction in the wild.

In the following analysis, we demonstrate that although some short-term reduction in numbers and reproduction is expected, the anticipated take of Kemp's ridley, loggerhead, hawksbill, leatherback, and green sea turtles will not appreciably increase the risk of extinction of these species in the wild.

Changes in distribution, even short-term, are not expected to result from the widening and deepening of the Matagorda Ship Channel. Interactions with vessels and/or relocation trawlers may elicit startle or avoidance responses and the effects of the proposed action may result in temporary changes in behavior of sea turtles (minutes to hours) over small areas, but are not expected to reduce the distribution of any sea turtle species. The removal of 34 sea turtles is anticipated during the proposed project. Because all the potential takes are expected to occur anywhere in the action area and sea turtles generally have large ranges in which they disperse, no reduction in the distribution of Kemp's ridley, loggerhead, hawksbill, leatherback, and/or green sea turtles is expected from the take of these individuals.

The non-lethal take of 181 sea turtles by relocation trawlers (43 loggerhead, 127 Kemp's ridley, 1 hawksbill, 1 leatherback, and 9 green sea turtles based on frequency data in Epperly et al. 2002) is not expected to have any measurable impact on the reproduction or numbers of sea turtles. Any negative effects experienced by sea turtles captured and released by relocation trawlers are expected to be minimal and temporary in nature. Although the range of impacts of non-lethal takes are variable, all are expected to be fully recoverable such that no reductions in reproduction or numbers of Kemp's ridley, loggerhead, hawksbill, leatherback, and/or green sea turtles are anticipated.

The lethal take of 33 turtles (14 loggerhead, 13 green, and 6 Kemp's ridley sea turtles based on reported takes in GDCOE dredging projects) by hopper dredges and 1 turtle (most likely a ~~Kemp's ridley sea turtle based on frequency data in Epperly et al. 2002) by relocation trawlers~~ over the duration of the proposed project (i.e., 2 years) will result in short-term effects on individuals. The removal of 33 sea turtles by hopper dredges and 1 by relocation trawlers would result in an instantaneous, but temporary reduction in total population numbers. Thus, the action will result in a reduction of sea turtle numbers. Sea turtle mortality resulting from hopper dredges could result in the loss of reproductive value of an adult turtle. For example, an adult loggerhead sea turtle can lay 3 or 4 clutches of eggs every 2 to 4 years, with 100 to 130 eggs per clutch. The annual loss of one adult female sea turtle, on average, could preclude the production of thousands of eggs and hatchlings, of which a small percentage are expected to survive to sexual maturity. Thus, the death of a female eliminates an individual's contribution to future generations, and the action will result in a reduction in sea turtle reproduction.

All life stages are important to the survival of the species; however, it is important to note that individuals of one life stage are not equivalent to those of other life stages. For example, loggerhead sea turtles have very long developmental times before reaching maturity (up to 38 years). Individuals in earlier life stages are subject to many potential sources of mortality, both natural and human-induced, prior to reaching sexual maturity. Only a fraction of pelagic juveniles are ever expected to contribute to the population through reproduction, and thus are not as valuable to the population as a breeding age adult. The loss of a certain number of pelagic juveniles, therefore, is less of a threat to the species' survival compared to an equal loss of sexually-mature adults.

The relatively low number of expected sea turtle mortalities (i.e., 14 loggerhead, 13 green, and 7 Kemp's ridley sea turtles over 2 years), while detectable, is not significant when scaled against the population size. Considering their population sizes in the Western North Atlantic, we believe the Kemp's ridley, loggerhead, and green sea turtle populations are sufficiently large enough to persist and recruit new individuals to replace those expected to be taken. For example, the TEWG (1998) estimated the total loggerhead population of benthic individuals in U.S. waters – a subset of the whole Western Atlantic population – at over 200,000. Based on this estimate, the potential mortality of 14 loggerhead over the duration of the proposed action (i.e., 2 years) would be less than 0.00007 percent of the current total eastern U.S. population.

The total population of Kemp's ridleys is not known, but nesting has been increasing significantly in the past several years (9 to 13 percent per year) with a trajectory that should meet or exceed recovery goals. Kemps' ridleys mature and nest at an age of 7-15 years, which is earlier than other chelonids. A younger age at maturity may be a factor in the response of this species to recovery actions. A period of steady increase in benthic immature ridleys has been occurring since 1990 and appears to be due to increased hatchling production and an apparent increase in survival rates of immature sea turtles beginning in 1990. The increased survivorship of immature sea turtles is attributable, in part, to the introduction of turtle excluder devices (TEDs) in the United States and Mexican shrimping fleets and Mexican beach protection efforts. The TEWG (2000) projected that Kemp's ridleys could reach the Recovery Plan's intermediate recovery goal of 10,000 nesters by the year 2015. Based on the above analysis, and similar to the conclusion reached for loggerhead sea turtles, the anticipated lethal take of seven (six by hopper dredge, one by relocation trawlers) Kemp's ridley sea turtle on the population would not be expected to be detectable.

Recent green sea turtle population estimates for the western Atlantic area are not available. However, the pattern of green turtle nesting shows biennial peaks in abundance, with a generally positive trend during the ten years of regular monitoring since establishment of index beaches in Florida in 1989. Therefore, similar to the above analyses, the expected lethal take of 13 green sea turtles over two years on the population would not be expected to be detectable.

Although the anticipated mortalites would result in an instantaneous reduction in absolute population numbers, it is not likely these small reductions would appreciably increase the risk of extinction of sea turtles considering the following. For a population to remain stable, sea turtles must replace themselves through successful reproduction at least once over the course of their reproductive lives, and at least one offspring must survive to reproduce itself. If the hatchling survival rate to maturity is greater than the mortality rate of the population, the loss of breeding individuals would be replaced through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Even given a declining trend of a major nesting subpopulation (e.g., loggerhead sea turtles), the present population sizes of Kemp's ridley, loggerhead, and green sea turtles are sufficiently large for their persistence.

Based on the above analysis, we believe that the lethal and non-lethal takes of Kemp's ridley, loggerhead, hawksbill, leatherback, and green sea turtles associated with the proposed action are not reasonably expected to cause, directly or indirectly, an appreciable reduction in the likelihood of survival of these species of sea turtles in the wild.

7.2 Effects of the Action on the Likelihood of Recovery in the Wild

The above analysis on the effects of the action on the likelihood of each species' survival in the wild considered the effects of the numbers of lethal and/or non-lethal takes anticipated for each species. Although no change in distribution was concluded for any species, we concluded lethal takes would result in an instantaneous reduction in absolute population numbers that may also reduce reproduction, but the short-term reductions are not expected to appreciably reduce the likelihood of survival of any species in the wild. The following analysis considers the effects of the take on the likelihood of recovery in the wild. We consider the recovery objectives in the recovery plans prepared for each species that relate to population numbers or reproduction that may be affected by the predicted reductions in the numbers or reproduction of sea turtles resulting from the proposed action.

The Atlantic recovery plan for the United States population of the loggerhead sea turtles (NMFS and USFWS 1991a) lists the following relevant recovery objective over a period of 25 continuous years:

- The adult female population in Florida is increasing and in North Carolina, South Carolina, and Georgia, it has returned to pre-listing nesting levels (NC = 800 nests/season; SC = 10,000 nests/season; GA = 2,000 nests/season).

The recovery plan for Kemp's ridley sea turtles (USFWS and NMFS 1992) lists the following relevant recovery objective:

- ~~Attain a population of at least 10,000 females nesting in a season.~~

The recovery plan for the population of the hawksbill sea turtles (NMFS and USFWS 1993) lists the following relevant recovery objectives over a period of 25 continuous years:

- The adult female population is increasing, as evidenced by a statistically significant trend in the annual number of nests at five index beaches, including Mona Island and BIRNM; and
- The numbers of adults, subadults, and juveniles are increasing, as evidenced by a statistically significant trend on at least five key foraging areas within Puerto Rico, USVI, and Florida.

The Atlantic recovery plan for the United States population of the leatherback sea turtles (NMFS and USFWS 1992) lists the following relevant recovery objective:

- The adult female population increases over the next 25 years, as evidenced by as statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, USVI, and along the east coast of Florida.

The Atlantic recovery plan for the population of green sea turtles (NMFS and USFWS 1991b) lists the following relevant recovery objectives over a period of 25 continuous years:

- The level of nesting in Florida has increased to an average of 5,000 nests per year for at least 6 years; and
- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds.

The potential lethal take of 33 turtles (14 loggerhead, 13 green, and 6 Kemp's ridley sea turtles based on reported takes in GDCOE dredging projects) by hopper dredges and 1 turtle (most likely a Kemp's ridley sea turtle based on frequency data in Epperly et al. 2002) by relocation trawlers over 2 years will result in a reduction in overall population numbers in any given year. We have already determined this take is not likely to reduce population numbers over time due to current population sizes and expected recruitment. Non-lethal takes of sea turtles by relocation trawlers will not affect the adult female nesting population or number of nests per nesting season.

Thus, the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley, loggerhead, hawksbill, leatherback, and/or green sea turtles' recovery in the wild.

7.3 Summary

The proposed widening of Matagorda Ship Channel will not appreciably reduce the likelihood of the survival and recovery in the wild of any of the five species of sea turtles considered in this biological opinion. We conclude that the anticipated reduction in numbers and reproduction by take of sea turtles by hopper dredges and relocation trawlers associated with the proposed action, combined with the non-lethal takes resulting from relocation trawling, when evaluated in the context of each species' status, the environmental baseline, and the cumulative effects, are not expected to jeopardize the continued existence of Kemp's ridley, loggerhead, hawksbill, leatherback, and/or green sea turtles.

8 CONCLUSION

We have analyzed the best available data, the current status of the species, environmental baseline, effects of the proposed action, and cumulative effects to determine whether the proposed action is likely to jeopardize the continued existence of any sea turtle species. Our sea turtle analyses focused on the impacts and population response of loggerhead, Kemp's ridley, hawksbill, leatherback, and green sea turtles in the Gulf of Mexico (i.e., Atlantic basin). However, the impact of the effects of the proposed action on the Atlantic populations must be directly linked to the global populations of the species, and the final jeopardy analysis is for the global populations as listed in the ESA. Because the proposed action will not reduce the likelihood of survival and recovery of any Atlantic populations of sea turtles, it is our opinion that the proposed action is also not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, hawksbill, leatherback, or green sea turtles.

9 INCIDENTAL TAKE STATEMENT (ITS)

Section 9 of the ESA and protective regulations issued pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without a special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the RPMs and terms and conditions of the ITS.

Section 7(b)(4)(c) of the ESA specifies that in order to provide an incidental take statement for an endangered or threatened species of marine mammal, the taking must be authorized under section 101(a)(5) of the MMPA. Since no incidental take of listed marine mammals is expected or has been authorized under section 101(a)(5) of the MMPA, no statement on incidental take of endangered whales is provided and no take is authorized. Nevertheless, GDCOE must immediately notify (within 24 hours, if communication is possible) the NMFS' Office of Protected Resources should a take of a listed marine mammal occur.

9.1 Anticipated Amount or Extent of Incidental Take

Based on historical distribution data and observations from past COE projects, loggerhead, hawksbill, Kemp's ridley, and green sea turtles may occur in the action area and may be taken by hopper dredges, relocation trawlers, and bed-leveling devices used in the proposed action. Incidental take is anticipated; therefore, terms and conditions necessary to minimize and monitor takes are established. NMFS anticipates incidental take, by injury or mortality, will consist of 33 turtles (14 loggerhead, 13 green, and 6 Kemp's ridley sea turtles based on reported takes in GDCOE dredging projects) by hopper dredges and 1 turtle (most likely Kemp's ridley sea turtle based on frequency data in Epperly et al. 2002) by relocation trawlers, and 181 non-injurious ~~takes (43 loggerhead, 127 Kemp's ridley, 1 hawksbill, 1 leatherback, and 9 green sea turtles~~ based on frequency data in Epperly et al. 2002) by relocation trawling over the course of the proposed project (i.e., 2 years).

9.2 Effect of the Take

NMFS has determined the anticipated level of incidental take specified in Section 9.1 is not likely to jeopardize the continued existence of loggerhead, Kemp's ridley, hawksbill, leatherback, and green sea turtles.

9.3 Reasonable and Prudent Measures

NMFS has determined that the following RPMs are necessary and appropriate to minimize impacts of the incidental take of sea turtles during the proposed action. The RPMs that NMFS believes are necessary to minimize the impacts of the proposed hopper dredging have been discussed with the COE in the past and are standard operating procedures, and include the use of temporal dredging windows, intake and overflow screening, use of sea turtle deflector dragheads, observer and reporting requirements, and sea turtle relocation trawling. The following RPMS and associated terms and conditions are established to implement these measures, and to document incidental takes. Only incidental takes that occur while these measures are in full implementation are authorized. These restrictions remain valid until reinitiation and conclusion of any subsequent section 7 consultation.

Seasonal Dredging Windows, Observer Requirements, Deflector Dragheads, and Relocation Trawling

Experience has shown that injuries sustained by sea turtles entrained in the hopper dredge dragheads are usually fatal. Current regional opinions for hopper dredging require seasonal dredging windows and observer monitoring requirements, deflector dragheads, and conditions and guidelines for relocation trawling, which NMFS believes are necessary to minimize effects of these removals on listed sea turtle species that occur in inshore and nearshore Gulf waters.

1. Temperature- and date-based dredging windows

Sea turtles generally move inshore with warming waters and offshore with cooling waters. In east coast channels, Dickerson et al. (1995) found reduced sea turtle abundance with water temperatures less than 16°C. They found that 1,008 trawls conducted at or below 16°C captured 22 turtles (4.4 percent), while 1,791 trawls conducted above 16°C resulted in 473 (95.6 percent) captures. Dickerson et al. also found that sea turtles tend to avoid water temperatures less than 15°C; however, hopper dredging Kings Bay, Georgia, between March 1-12, 1997, with surface water temperatures of 57-58°F (13.9-14.4°C) resulted in 11 turtle takes in nine days (NMFS 1997b).

Recognizing the relationship between water temperature and sea turtle presence and based on work by the NMFS Galveston Laboratory (Renaud et al. 1994, 1995) funded by the COE, NMFS wrote in its September 22, 1995, Regional Biological Opinion (RBO) to the Galveston and New Orleans Districts that sea turtles might be taken by hopper dredges "in all ship channels in the ~~northern Gulf when temperatures exceed 12°C," and that "Lacking seasonal water temperature~~ data, NMFS believes takes may occur from April through November northeast of Corpus Christi, Texas." Consequently, Term and Condition No. 3 of the 1995 RBO required that observers be aboard hopper dredges year-round from Corpus Christi southwest to the Mexican border, but "If no turtle take is observed in December, then observer coverage can be terminated during January and February or until water temperatures again reach 12°." It also required that "In channels northeast of Corpus Christi (except for Mississippi River – Southwest Pass), observers shall be aboard whenever surface water temperatures are 12°C or greater, and/or between April 1 and November 30."

NMFS published a final rule (67 FR 71895, December 3, 2002) effective January 2, 2003, to reduce the impact of large-mesh gillnet fisheries on the Atlantic Coast on sea turtles. This rule was directed primarily at the monkfish fishery, which uses large-mesh gillnets and operates in the area when sea turtles are present. The rule reduces impacts on endangered and threatened species of sea turtles by closing portions of the Mid-Atlantic Exclusive Economic Zone (EEZ) waters to fishing with gillnets with a mesh size larger than 8-inch (20.3-cm) stretched mesh. The timing of the restrictions was based upon an analysis of sea surface temperatures for the above areas. Sea turtles are known to migrate into and through these waters when the sea surface temperature is 11°C or greater (Epperly and Braun-McNeill 2002). The January 15 date for the re-opening of the areas north of Oregon Inlet, North Carolina, to the large-mesh gillnet fisheries was also based upon the 11°C threshold and is consistent with the seasonal boundary established for the summer flounder fishery-sea turtle protection area (50 CFR 223.206(d)(2) (iii)(A)). In summary, NMFS believes that the 11°C threshold established to protect East Coast sea turtles is reasonable and prudent to protect sea turtles in the Gulf of Mexico from hopper dredging operations.

A 1991 jeopardy Opinion to the COE's South Atlantic District on hopper dredging of southeastern U.S. channels first identified a December 1 and March 31 "hopper dredging window" as necessary to minimize sea turtle interactions. Subsequent studies by the COE (Dickerson et al. 1995) in six southeastern channels suggested that the existing windows were accurate. Sea turtles are generally less abundant in coastal waters of both the Southeast and the Gulf of Mexico during this time period compared to other times of the year since water temperatures are coolest.

Temperature- and date-based dredging windows appear to have been very effective in reducing sea turtle entrainments. Observer requirements and monitoring including assessment and relocation trawling have provided valuable real-time estimates of sea turtle abundance, takes, and distribution which have been helpful to COE project planning efforts. Evidence that the windows and observer requirements are effective and valuable is that, throughout its 8-year lifetime (the 1995 RBO was superseded by the GMRBO in 2003), neither the Galveston or New Orleans District's hopper dredging projects ever exceeded their anticipated incidental takes authorized by the 1995 RBO.

2. Observer Requirements

NMFS-approved observers monitor dredged material inflow and overflow screening baskets on many projects; however, screening is only partially effective and observed, documented takes provide only partial estimates of total sea turtle mortality. NMFS believes that some listed species taken by hopper dredges go undetected because body parts are forced through the sampling screens by the water pressure and are buried in the dredged material, or animals are crushed or killed but not entrained by the suction and so the takes may go unnoticed. The only mortalities that are documented are those where body parts either float, are large enough to be caught in the screens, and can be identified as from sea turtle species. However, this opinion estimates that with 4-inch inflow screening in place, the observers probably detect and record at least 50 percent of total mortality.

3. Deflector Dragheads

V-shaped, sea turtle deflector dragheads prevent an unquantifiable yet significant number of sea turtles from being entrained and killed in hopper dredges each year. Without them, turtle takes during hopper dredging operations would unquestionably be higher. Draghead tests conducted in May-June 1993 by the COE's Waterways Experimental Station (WES), now known as the Engineering Research and Development Center (ERDC), in clear water conditions on the sea floor off Fort Pierce, Florida, with 300 mock turtles placed in rows, showed convincingly that the newly-developed WES deflector draghead "performed exceedingly well at deflecting the mock turtles." Thirty-seven of 39 mock turtles encountered were deflected, 2 turtles were not deflected, and none were damaged. Also, "the deflector draghead provided better production rates than the unmodified California draghead, and the deflector draghead was easier to operate and maneuver than the unmodified California flat-front draghead." The V-shape reduced forces encountered by the draghead, and resulted in smoother operation. V-shaped deflecting dragheads are now a widely accepted conservation tool, the dredging industry is familiar with them and their operation, and they are used by all COE Districts conducting hopper dredge operations where turtles may be present.

4. Relocation Trawling

Relocation trawling has proved to be a useful conservation tool in most dredging projects where it has been implemented. The September 22, 1995, RBO included a conservation recommendation for relocation trawling which stated that "Relocation trawling in advance of an operating dredge in Texas and Louisiana channels should be considered if takes are documented early in a project that requires use of a hopper dredge during a period in which large number of sea turtles may occur." That RBO was amended by NMFS (Amendment No. 1, June 13, 2002) to change the conservation recommendation to a term and condition of the RBO. Overall, it is NMFS' opinion that the COE Districts choosing to implement relocation trawling have benefited from their decisions. For example, in the GDCOE, Freeport Harbor Project (July 13-September 24, 2002), assessment and relocation trawling resulted in one loggerhead capture. In Sabine Pass (Sabine-Neches Waterway), assessment and relocation trawling in July-August 2002 resulted in five loggerhead and three Kemp's ridley captures. One turtle was killed by the dredge; this occurred while the relocation trawler was in port repairing its trawl net (P. Bargo, pers. comm. 2002). In the Jacksonville District, sea turtles have been relocated out of the path of hoppers dredges operating in Tampa Bay and Charlotte Harbor or their entrance channels. During St. ~~Petersburg Harbor and Entrance Channel dredging in the fall of 2000, a pre-dredging risk~~ assessment trawl survey resulted in capture, tagging, and relocation of two adult loggerheads and one subadult green turtle. In February 2002 during the Jacksonville District's Canaveral Channel emergency hopper dredging project for the Navy, two trawlers working around the clock captured and relocated 69 loggerhead and green turtles in seven days, and no turtles were entrained by the hopper dredge. In the Wilmington District's Bogue Banks Project in North Carolina, two trawlers successfully relocated five turtles in 15 days between March 13 and 27, 2003; one turtle was taken by the dredge. In 2003, Aransas Pass relocation trawling associated with hopper dredging resulted in 71 turtles captured and released (with three recaptures) in three months of dredging and relocation trawling. Five turtles were killed by the dredge. No turtles were killed after relocation trawling was increased from 12 to 24 hours per day (T. Bargo, pers. comm. to E. Hawk, October 27, 2003). In 2006, trawling associated with the dredging of the Houston-Galveston Navigation Channels resulted in 7 loggerheads relocated in 60 days of trawling (U.S. Army Corps of Engineers Sea Turtle Data Warehouse, http://el.erdc.usace.army.mil/seaturtles/index.cfm). From January through May 2007, relocation trawling activities in GDCOE channel projects have resulted in the capture and relocation of 65 green, 25 Kemp's ridley, and 12 loggerhead sea turtles as of May 23 (*Ibid*).

This opinion authorizes the per-fiscal-year non-lethal non-injurious take (minor skin abrasions resulting from trawl capture are considered non-injurious), external flipper-tagging, and taking of tissue samples of 181 sea turtles (43 loggerhead, 127 Kemp's ridley, 1 hawksbill, 1 leatherback, and 9 green sea turtles based on frequency data in Epperly et al. 2002) in association with any relocation trawling conducted during the course of the proposed project. This take is limited to relocation trawling conducted during actual hopper dredging. Relocation trawling performed to reduce endangered species/hopper dredge interactions is subject to the requirements detailed in the terms and conditions of this opinion.

NMFS estimates that one turtle may be killed or injured pursuant to relocation trawling associated with the proposed project. NMFS shall be immediately notified of any mortalities/injuries sustained by protected species during relocation/assessment trawling.

Summary

NMFS believes that seasonal dredging windows, deflector dragheads, observer and screening requirements, and relocation trawling have proved convincingly over the last decade to be an excellent combination of reasonable and prudent measures for minimizing the number and impact of sea turtle takes, enabling NMFS to assess the quantity of turtles being taken, and allowing the COE to meet its essential dredging requirements to keep federal navigation channels open.

There are increased costs associated with observers and relocation trawling (recent estimates are $3,500-$5,000/day for 24 hours of relocation trawling and $150-$200/day for a hopper dredge endangered species observer); delays sometimes occur, particularly when two turtles are taken in 24 hours, or when clay-like materials clog the inflow screening boxes; and dredging projects may take longer to complete. However, overall, NMFS believes that loss of production associated with the deflector draghead is insignificant, while saving significant numbers of sea turtles from almost-certain death by dismemberment in suction dragheads; increased production costs, including costs of observers and relocation trawlers, pale in comparison to overall project costs; and NMFS' experience over the past decade with the COE's South Atlantic districts (SAD) and Gulf of Mexico's districts has shown that federal hopper dredging projects get completed in a timely fashion. Also, allowable overdredging by the COE reduces to some degree the need for frequent maintenance dredging, and the conservation measures required by the biological opinions in place result in significantly reduced dredge interactions with sea turtles–interactions which usually prove fatal.

NMFS considers that PIT tagging, external flipper tagging, and tissue sampling of turtles captured pursuant to relocation trawling, including genetic analysis of tissue samples taken from dredge- and trawl-captured turtles, will provide benefits to the species by providing data which will enable NMFS to make determinations on what sea turtle stocks are being impacted, and how that may change over time as the population growth rates change among the different stocks (S. Epperly, pers. comm. to E. Hawk).

9.4 Terms and Conditions

In order to be exempt from liability for take prohibited by section 9 of the ESA, the GDCOE must comply with the following terms and conditions, which implement the RPMs described above. These terms and conditions are non-discretionary.

1. Hopper Dredging (RPM 1): Hopper dredging activities shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters.

2. Non-hopper Type Dredging (RPM 1): Pipeline or hydraulic dredges, because they are not known to take turtles, must be used whenever possible between April 1 and November 30.

3. Observers (RPM 2): The GDCOE shall arrange for NMFS-approved protected species observers to be aboard the hopper dredges to monitor the hopper bin, screening, and dragheads for sea turtles and their remains. Observer coverage sufficient for 100 percent monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges between April 1 and November 30, and whenever surface water temperatures are 11°C or greater.

4. Operational Procedures: During periods in which hopper dredges are operating and NMFS-approved protected species observers are *not* required, (as delineated in No. 3 above), the GDCOE must:

   a. Advise inspectors, operators, and vessel captains about the prohibitions on taking, harming, or harassing sea turtles.

   b. Instruct the captain of the hopper dredge to avoid any turtles and whales encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the GDCOE if sea turtles or whales are seen in the vicinity.

   ~~c. Notify NMFS if sea turtles are observed in the dredging area, to coordinate further~~ precautions to avoid impacts to turtles.

   d. Notify NMFS immediately by phone (727/824-5312), fax (727/824-5309), or e-mail (**takereport.nmfsser@noaa.gov**) if a sea turtle or other threatened or endangered species is taken by the dredge.

5. Screening (RPM 2): When sea turtle observers are required on hopper dredges, 100 percent inflow screening of dredged material is required and 100 percent overflow screening is recommended. If conditions prevent 100 percent inflow screening, inflow screening may be reduced gradually, as further detailed in the following paragraph, but 100 percent overflow screening is then required.

   a. Screen Size: The hopper's inflow screens should have 4-inch by 4-inch screening. If the GDCOE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, the screens may be modified sequentially: mesh size may be increased to 6-inch by 6-inch, then 9-inch by 9-inch, then 12-inch by 12-inch openings. Clogging should be greatly reduced with these flexible options; however, further clogging may compel removal of the screening altogether, in which case effective 100 percent overflow screening is mandatory. The GDCOE shall notify NMFS beforehand if inflow screening is going to be reduced or eliminated, and provide details of how effective overflow screening will be achieved.

   b. Need for Flexible, Graduated Screens: NMFS believes that this flexible, graduated-screen option is necessary, since the need to constantly clear the inflow screens will increase the time it takes to complete the project and therefore increase the exposure of sea turtles to the risk of impingement or entrainment. Additionally, there are increased risks to sea turtles in the water column when the inflow is halted to clear screens, since this results in clogged intake pipes, which may have to be lifted from the bottom to discharge the clay by applying suction.

6. Dredging Pumps: Standard operating procedure shall be that dredging pumps shall be disengaged by the operator when the dragheads are not firmly on the bottom, to prevent impingement or entrainment of sea turtles within the water column. This precaution is especially important during the cleanup phase of dredging operations when the draghead

frequently comes off the bottom and can suck in turtles resting in the shallow depressions between the high spots the draghead is trimming off.

7. Sea Turtle Deflecting Draghead (RPM 3): A state-of-the-art rigid deflector draghead must be used on all hopper dredges at all times.

8. Dredge Take Reporting and Final Report: Observer reports of incidental take by hopper dredges must be faxed to NMFS' Southeast Regional Office (phone: 727/824-5312, fax: 727/824-5309, or electronic mail: **takereport.nmfsser@noaa.gov**) by onboard NMFS-approved protected species observers, the dredging company, or the GDCOE within 24 hours of any sea turtle or other listed species take observed.

   A final report summarizing the results of the hopper dredging and any documented sea turtle or other listed species takes must be submitted to NMFS within 30 working days of completion of the dredging project. Reports shall contain information on project location (specific channel/area dredged), start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes and sightings of protected species, mitigative actions taken (if relocation trawling, the number and species of turtles relocated), screening type (inflow, overflow) utilized, daily water temperatures, name of dredge, names of endangered species observers, percent observer coverage, and any other information the GDCOE deems relevant.

9. Sea Turtle Strandings: The GDCOE Project Manager or designated representative shall notify the Sea Turtle Stranding and Salvage Network (STSSN) state representative (contact information available at: http://www.sefsc.noaa.gov/seaturtleSTSSN.jsp) of the start-up and completion of hopper dredging operations and bed-leveler dredging operations and ask to be notified of any sea turtle strandings in the project area that, in the estimation of STSSN personnel, bear signs of potential draghead impingement or entrainment, or interaction with a bed-leveling type dredge.

   Information on any such strandings shall be reported in writing within 30 days of project end to NMFS' Southeast Regional Office. Because the deaths of these turtles, if hopper dredge or bed-leveler dredge related, have already been accounted for in NMFS' jeopardy analysis, these strandings will not be counted against the GDCOE's take limit.

10. Reporting - Strandings: The GDCOE shall provide NMFS' Southeast Regional Office with a report detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment.

11. Relocation Trawling Report (RPM 4): The GDCOE shall provide NMFS' Southeast Regional Office with an end-of-project report within 30 days of completion of any relocation trawling. This report may be incorporated into the final report summarizing the results of the hopper dredging project.

12. Conditions Requiring Relocation Trawling (RPM 4): Handling of sea turtles captured during relocation trawling in association with the dredging project shall be conducted by

NMFS-approved protected species observers. Relocation trawling shall be undertaken by the GDCOE where any of the following conditions are met:

a. Two or more turtles are taken in a 24-hour period in the project.

b. Four or more turtles are taken in the project.

13. <u>Relocation Trawling (RPM 4)</u>: Any relocation trawling conducted or contracted by the GDCOE to temporarily reduce or assess the abundance of these listed species during a hopper dredging project in order to reduce the possibility of lethal hopper dredge interactions, is subject to the following conditions:

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a. Trawl Time: Trawl tow-time duration shall not exceed 42 minutes (doors in - doors out) and trawl speeds shall not exceed 3.5 knots.

b. Handling During Trawling: Sea turtles captured pursuant to relocation trawling shall be handled in a manner designed to ensure their safety and viability, and shall be released over the side of the vessel, away from the propeller, and only after ensuring that the vessel's propeller is in the neutral, or disengaged, position (i.e., not rotating). Resuscitation guidelines are attached (Appendix I).

c. Captured Sea Turtle Holding Conditions: Sea turtles may be held briefly for the collection of important scientific measurements, prior to their release. Captured sea turtles shall be kept moist, and shaded whenever possible, until they are released, according to the requirements of Term and Condition No. 13-e, below.

d. Scientific Measurements: When safely possible, all turtles shall be measured (standard carapace measurements including body depth), tagged, weighed, and a tissue sample taken prior to release. Any external tags shall be noted and data recorded into the observers log. Only NMFS-approved protected species observers or observer candidates in training under the direct supervision of a NMFS-approved protected species observer shall conduct the tagging/measuring/weighing/tissues sampling operations.

NMFS-approved protected species observers may conduct more invasive scientific procedures (e.g., blood letting, laparoscopies, external tumor removals, anal and gastric lavages, mounting satellite or radio transmitters, etc.) and partake in or assist in "piggy back" research projects but only if the observer holds a valid federal sea turtle research permit (and any required state permits) authorizing the activities, either as the permit holder, or as designated agent of the permit holder, and has first notified NMFS' Southeast Regional Office, Protected Resources Division.

e. Take and Release Time During Trawling - Turtles: Turtles shall be kept no longer than 12 hours prior to release and shall be released not less than 3 nm from the dredge site. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than 5 nm away. If it can be done safely, turtles may be transferred onto another vessel for transport to the release area to enable the relocation trawler to keep sweeping the dredge site without interruption.

f. Injuries: Injured sea turtles shall be immediately transported to the nearest sea turtle rehabilitation facility. Minor skin abrasions resulting from trawl capture are considered non-injurious. The GDCOE shall ensure that logistical arrangements and support to accomplish this are pre-planned and ready. The GDCOE shall bear the financial cost of sea turtle transport, treatment, and rehabilitation.

g. Flipper Tagging: All sea turtles captured by relocation trawling shall be flipper-tagged prior to release with external tags which shall be obtained prior to the project from ~~the University of Florida's Archie Carr Center for Sea Turtle Research.~~ This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard these relocation trawlers to flipper-tag with external tags (e.g., Inconel tags) captured sea turtles. Columbus crabs or other organisms living on external sea turtle surfaces may also be sampled and removed under this authority.

h. PIT-Tag Scanning: This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler to PIT-tag captured sea turtles. PIT tagging of sea turtles is not required to be done if the NMFS-approved protected species observer does not have prior training or experience in said activity; however, if the observer has received prior training in PIT tagging procedures, then the observer shall PIT tag the animal prior to release (in addition to the standard external tagging):

Sea turtle PIT tagging must then be performed in accordance with the protocol detailed at NMFS' Southeast Fisheries Science Center's Web page: http://www.sefsc.noaa.gov/seaturtlefisheriesobservers.jsp. (See Appendix C on SEFSC's "Fisheries Observers" Web page);

PIT tags used must be sterile, individually-wrapped tags to prevent disease transmission. PIT tags should be 125-kHz, glass-encapsulated tags–the smallest ones made. Note: If scanning reveals a PIT tag and it was not difficult to find, then do not insert another PIT tag; simply record the tag number and location, and frequency, if known. If for some reason the tag is difficult to detect (e.g., tag is embedded deep in muscle, or is a 400-kHz tag), then insert one in the other shoulder.

i. Other Sampling Procedures: All other tagging and external or internal sampling procedures (e.g., blood letting, laparoscopies, external tumor removals, anal and gastric lavages, mounting satellite or radio transmitters, etc.) performed on live sea turtles are not permitted under this opinion unless the observer holds a valid sea turtle research permit authorizing the activity, either as the permit holder or a designated agent of the permit holder.

j. PIT-Tag Scanning and Data Submission Requirements: All sea turtles captured by relocation trawling or dredges shall be thoroughly scanned for the presence of PIT tags prior to release using a multi-frequency scanner powerful enough to read multiple frequencies (including 125-, 128-, 134-, and 400-kHz tags) and read tags deeply embedded in muscle tissue (e.g., manufactured by Trovan, Biomark, or Avid). Turtles whose scans show they have been previously PIT tagged shall nevertheless be externally flipper tagged. Sea turtle data collected (PIT tag scan data and external tagging data) shall be submitted to NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149. All sea turtle data collected shall be submitted in electronic format within 60 days of project completion to Lisa.Belskis@noaa.gov and Sheryan.Epperly@noaa.gov. Sea turtle external flipper tag and PIT tag data generated and collected by relocation trawlers shall also be submitted to the Cooperative Marine Turtle Tagging Program (CMTTP), on the appropriate CMTTP form, at the University of Florida's Archie Carr Center for Sea Turtle Research.

k. Handling Fibropapillomatose Turtles: NMFS-approved protected species observers are not required to handle viral fibropapilloma tumors if they believe there is a health hazard to themselves and choose not to. When handling sea turtles infected with fibropapilloma tumors, observers must maintain a separate set of sampling equipment for handling animals displaying fibropapilloma tumors or lesions.

14. Requirement and Authority to Conduct Tissue Sampling for Genetic Analyses (RPM 2): This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler or hopper dredge to tissue-sample live- or dead-captured sea turtles without the need for an ESA section 10 permit.

All live or dead sea turtles captured by relocation trawling and hopper dredging (for both GDCOE-conducted and GDCOE-permitted activities) shall be tissue-sampled prior to release. Sampling shall continue uninterrupted until such time as NMFS determines and notifies the GDCOE in writing.

Sea turtle tissue samples shall be taken in accordance with NMFS' SEFSC procedures for sea turtle genetic analyses (Appendix II of this opinion). The GDCOE shall ensure that tissue samples taken during the dredging project are collected and stored properly and mailed every three months until completion of the dredging project to: NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center, Attn: Lisa Belskis, 75 Virginia Beach Drive, Miami, Florida 33149.

15. Training - Personnel on Hopper Dredges: The GDCOE must ensure that all contracted personnel involved in operating hopper dredges (whether privately-funded or federally-funded projects) receive thorough training on measures of dredge operation that will minimize takes of sea turtles. It shall be the goal of the hopper dredging operation to establish operating procedures that are consistent with those that have been used successfully during hopper dredging in other regions of the coastal United States, and which have proven effective in reducing turtle/dredge interactions. Therefore, COE Engineering Research and Development Center experts or other persons with expertise in

this matter shall be involved both in dredge operation training, and installation, adjustment, and monitoring of the rigid deflector draghead assembly.

16. Dredge Lighting (RPM 1): From May 1 through October 31, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within 3 nm of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or OSHA requirements. All non-essential lighting on the dredge and pumpout barge shall be minimized through reduction, shielding, lowering, and appropriate placement of lights to minimize illumination of the water to reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches.

10 CONSERVATION RECOMMENDATIONS

Pursuant to section 7(a)(1) of the ESA, the following conservation recommendations are made to assist the GDCOE in contributing to the conservation of sea turtles and Gulf sturgeon by further reducing or eliminating adverse impacts that result from hopper dredging.

1. Channel Conditions and Seasonal Abundance Studies: Channel-specific studies should be undertaken to identify seasonal relative abundance of sea turtles within Gulf of Mexico channels. The December 1 through March 31 dredging window and associated observer requirements listed above may be adjusted (after consultation and authorization by NMFS) on a channel-specific basis, if (a) the GDCOE can provide sufficient scientific evidence that sea turtles are not present or that levels of abundance are extremely low during other months of the year, or (b) the GDCOE can identify seawater temperature regimes that ensure extremely low abundance of sea turtles in coastal waters, and can monitor water temperatures in a real-time manner. Surveys may indicate that some channels do not support significant turtle populations, and hopper dredging in these channels may be unrestricted on a year-round basis. To date, sea turtle deflector draghead efficiency has not reached the point where seasonal restrictions can be lifted.

2. Draghead Modifications and Bed Leveling Studies: The GDCOE should supplement other efforts to develop modifications to existing dredges to reduce or eliminate take of sea turtles, and develop methods to minimize sea turtle take during "cleanup" operations when the draghead maintains only intermittent contact with the bottom. Some method to level the "peaks and valleys" created by dredging would reduce the amount of time dragheads are off the bottom. NMFS is ready to assist the GDCOE in conducting studies to evaluate bed- leveling devices and their potential for interaction with sea turtles, and develop modifications if needed.

3. Draghead Evaluation Studies and Protocol: Additional research, development, and improved performance is needed before the V-shaped rigid deflector draghead can replace seasonal restrictions as a method of reducing sea turtle captures during hopper dredging activities. Development of a more effective deflector draghead or other entrainment-deterring device (or combination of devices, including use of acoustic

deterrents) could potentially reduce the need for sea turtle relocation or result in expansion of the winter dredging window. NMFS should be consulted regarding the development of a protocol for draghead evaluation tests. NMFS recommends that GDCOE coordinate with ERDC, SAD, the Association of Dredge Contractors of America, and dredge operators (Manson, Bean-Stuyvesant, Great Lakes, Natco, etc.) regarding additional reasonable measures they may take to further reduce the likelihood of sea turtle takes.

4. Continuous Improvements in Monitoring and Detecting Takes: The GDCOE should seek continuous improvements in detecting takes and should determine, through research and development, a better method for monitoring and estimating sea turtle takes by hopper dredge. Observation of overflow and inflow screening is only partially effective and provides only partial estimates of total sea turtle mortality.

   Overflow Screening: The GDCOE should encourage dredging companies to develop or modify existing overflow screening methods on their company's dredge vessels for maximum effectiveness of screening and monitoring. Horizontal overflow screening is preferable to vertical overflow screening because NMFS considers that horizontal overflow screening is significantly more effective at detecting evidence of protected species entrainment than vertical overflow screening.

   Preferential Consideration for Horizontal Overflow Screening: The GDCOE should give preferential consideration to hopper dredges with horizontal overflow screening when awarding hopper dredging contracts for areas where new materials, large amounts of debris, or clay may be encountered, or have historically been encountered. Excessive inflow screen clogging may in some instances necessitate removal of inflow screening, at which point effective overflow screening becomes more important.

5. Section 10 Research Permits, Relocation Trawling, Piggy-Back Research, and 50 CFR Part 223 Authority to Conduct Research on Salvaged, Dead Specimens: NMFS recommends that GDCOE, either singly or combined with other COE Districts, apply to NMFS for an ESA section 10 research permit to conduct endangered species research on species incidentally captured during relocation trawling. For example, satellite tagging of captured turtles could enable the GDCOE to gain important knowledge on sea turtle seasonal distribution and presence in navigation channels and also, as mandated by section 7(a)(1) of the ESA, to utilize their authorities in furtherance of the purposes of the ESA by carrying out programs for the conservation of listed species. SERO shall assist the GDCOE with the permit application process.

   NMFS also encourages the GDCOE to cooperate with NMFS' scientists, other federal agencies' scientists, and university scientists holding appropriate research permits to make fuller use of turtles taken or captured by hopper dredges and relocation trawlers pursuant to the authority conferred by this opinion. NMFS encourages "piggy-back" research projects by duly-permitted individuals or their authorized designees. Section 10-permitted piggy-back projects could include *non-lethal* research of many types, including blood letting, laparoscopies, anal and gastric lavages, mounting satellite or radio transmitters, etc.

Important research can be conducted without a section 10 permit on salvaged dead specimens. Under current federal regulations (see 50 CFR 223.206 (b): Exception for injured, dead, or stranded [threatened sea turtle] specimens), "Agents. . . of a Federal land or water management agency may. . . salvage a dead specimen which may be useful for scientific study." Similar regulations at 50 CFR 222.310 provide "salvaging" authority for endangered sea turtles.

6. Draghead Improvements - Water Ports: NMFS recommends that the GDCOE require or ~~at least recommend to dredge operators that all dragheads on hopper dredges contracted~~ by the GDCOE for dredging projects be eventually outfitted with water ports located in the *top* of the dragheads to help prevent the dragheads from becoming plugged with sediments. When the dragheads become plugged with sediments, the dragheads are often raised off the bottom (by the dredge operator) with the suction pumps on in order to take in enough water to help clear clogs in the dragarm pipeline, which increases the likelihood that sea turtles in the vicinity of the draghead will be taken by the dredge. Water ports located in the top of the dragheads would relieve the necessity of raising the draghead off the bottom to perform such an action, and reduce the chance of incidental take of sea turtles.

   NMFS supports and recommends the implementation of proposals by ERDC and SAD personnel for various draghead modifications to address scenarios where turtles may be entrained during hopper dredging (Dickerson and Clausner 2003). These include: 1) An adjustable visor, 2) water jets for flaps to prevent plugging and thus reduce the requirement to lift the draghead off the bottom, and 3) a valve arrangement (which mimics the function of a "Hoffer" valve used on cutterhead type dredges to allow additional water to be brought in when the suction line is plugging) that will provide a very large amount of water into the suction pipe thereby significantly reducing flow through the visor when the draghead is lifted off the bottom, reducing the potential to take a turtle.

7. Economic Incentives for No Turtle Takes: The GDCOE should consider devising and implementing some method of significant economic incentives to hopper dredge operators such as financial reimbursement based on their satisfactory completion of dredging operations, or *X* number of cubic yards of material moved, or hours of dredging performed, *without taking turtles*. This may encourage dredging companies to research and develop "turtle friendly" dredging methods; more effective, deflector dragheads; pre-deflectors; top-located water ports on dragarms; etc.

8. Sedimentation Limits to Protect Resources (Hardbottoms/Reefs): NMFS recommends water column sediment load deposition rates of no more than 200 $mg/cm^2/day$, averaged over a 7-day period, to protect coral reefs and hardbottom communities from dredging-associated turbidity impacts to listed species foraging habitat.

9. Sodium Vapor Lights on Offshore Equipment: On offshore equipment (i.e., hopper dredges, pumpout barges) shielded low-pressure sodium vapor lights are highly recommended for lights that cannot be eliminated.

11 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed widening of the Matagorda Ship Channel involving a combination of mechanical, pipeline, and hopper dredges. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) The amount or extent of taking specified in the incidental take statement is exceeded; (2) new ~~information reveals effects of the action may affect listed species or critical habitat in a manner~~ or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action.

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APPENDIX I

SEA TURTLE HANDLING AND RESUSCITATION GUIDELINES

Any sea turtles taken incidentally during the course of fishing or scientific research activities must be handled with due care to prevent injury to live specimens, observed for activity, and returned to the water according to the following procedures:

A) Sea turtles that are actively moving or determined to be dead (as described in paragraph (B)(4) below) must be released over the stern of the boat. In addition, they must be released only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels.

B) Resuscitation must be attempted on sea turtles that are comatose or inactive by:

1) Placing the turtle on its bottom shell (plastron) so that the turtle is right side up and elevating its hindquarters at least 6 inches (15.2 cm) for a period of 4 to 24 hours. The amount of elevation depends on the size of the turtle; greater elevations are needed for larger turtles. Periodically, rock the turtle gently left to right and right to left by holding the outer edge of the shell (carapace) and lifting one side about 3 inches (7.6 cm) then alternate to the other side. Gently touch the eye and pinch the tail (reflex test) periodically to see if there is a response.

2) Sea turtles being resuscitated must be shaded and kept damp or moist but under no circumstance be placed into a container holding water. A water-soaked towel placed over the head, carapace, and flippers is the most effective method in keeping a turtle moist.

3) Sea turtles that revive and become active must be released over the stern of the boat only when fishing or scientific collection gear is not in use, when the engine gears are in neutral position, and in areas where they are unlikely to be recaptured or injured by vessels. Sea turtles that fail to respond to the reflex test or fail to move within 4 hours (up to 24, if possible) must be returned to the water in the same manner as that for actively moving turtles.

4) A turtle is determined to be dead if the muscles are stiff (rigor mortis) and/or the flesh has begun to rot; otherwise, the turtle is determined to be comatose or inactive and resuscitation attempts are necessary.

Any sea turtle so taken must not be consumed, sold, landed, offloaded, transshipped, or kept below deck.

These requirements are excerpted from 50 CFR 223.206(d)(1). Failure to follow these procedures is therefore a punishable offense under the Endangered Species Act.

APPENDIX II

PROTOCOL FOR COLLECTING TISSUE FROM SEA TURTLES FOR GENETIC ANALYSIS

Method for Dead Turtles

<<<IT IS CRITICAL TO USE A NEW SCALPEL BLADE AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES>>>

1) Put on a new pair of latex gloves.
2) Use a new disposable scalpel to cut out an approx. 1 cm (½ in) cube (bigger is NOT better) piece of muscle. Easy access to muscle tissue is in the neck region or on the ventral side where the front flippers "insert" near the plastron. It does not matter what stage of decomposition the carcass is in.
3) Place the muscle sample on a hard uncontaminated surface (plastron will do) and make slices through the sample so the buffer solution will penetrate the tissue.
4) Put the sample into the plastic vial containing saturated NaCl with 20 percent DMSO.*
5) Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.
6) Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.
7) Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.
8) Wrap parafilm around the cap of the vial by stretching it as you wrap.
9) Place vial within whirl-pak and close.
10) Dispose of the scalpel.
11) Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify the location on the turtle where the sample was obtained.
12) Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

Method for Live Turtles

<<< IT IS CRITICAL TO USE A NEW BIOPSY PUNCH AND GLOVES FOR EACH TURTLE TO AVOID CROSS-CONTAMINATION OF SAMPLES >>>

1) Turn the turtle over on its back.
2) Put on a new pair of latex gloves.
3) Swab the entire cap of the sample vial with alcohol.
4) Wipe the ventral and dorsal surfaces of the rear flipper 5-10 cm from the posterior edge with the Betadine/iodine swab.
5) Place the vial under the flipper edge to use the cleaned cap as a hard surface for the punch.
6) Press a new biopsy punch firmly into the flesh as close to the posterior edge as possible and rotate one complete turn. Cut all the way through the flipper to the cap of the vial.
7) Wipe the punched area with Betadine/iodine swab; rarely you may need to apply pressure to stop bleeding.
8) Use a wooden skewer to transfer the sample from the biopsy punch into the plastic vial containing saturated NaCl with 20 percent DMSO.*

9) Use the pencil to write the stranding ID number (observer initials, year, month, day, turtle number by day), species, state and carapace length on the waterproof paper label and place it in the vial with the sample. EXAMPLE: For a 35.8 cm curved carapace length green turtle documented by Jane M. Doe on July 15, 2001 in Georgia, the label should read "JMD20010715-01, C. mydas, Georgia, CCL=35.8 cm". If this had been the third turtle Jane Doe responded to on July 15, 2001, it would be JMD20010715-03.

10) Label the outside of the vial with the same information (stranding ID number, species, state and carapace length) using the permanent marker.

11) Place clear scotch tape over the writing on the vial to protect it from being smeared or erased.

12) Wrap parafilm around the cap of the vial by stretching it as you wrap.

13) Place vial within whirl-pak and close.

14) Dispose of the biopsy punch.

15) Note on the stranding form that a part was salvaged, indicating that a genetic sample was taken and specify ~~the location on the turtle where the sample was obtained.~~

16) Submit the vial with the stranding report to your state coordinator. State coordinators will forward the reports and vials to NMFS for processing and archiving.

***The 20 percent DMSO buffer in the plastic vials is nontoxic and nonflammable. Handling the buffer without gloves may result in exposure to DMSO. This substance soaks into skin very rapidly and is commonly used to alleviate muscle aches. DMSO will produce a garlic/oyster taste in the mouth along with breath odor. The protocol requires that you WEAR gloves each time you collect a sample and handle the buffer vials.**

The vials (both before and after samples are taken) should be stored at room temperature or cooler. If you don't mind the vials in the refrigerator, this will prolong the life of the sample. DO NOT store the vials where they will experience extreme heat (like in your car!) as this could cause the buffer to break down and not preserve the sample properly.

Questions:
Sea Turtle Program
NOAA/NMFS/SEFSC
75 Virginia Beach Drive
Miami, FL 33149
305-361-4207

THANK YOU FOR COLLECTING SAMPLES FOR SEA TURTLE GENETIC RESEARCH!!

Genetic Sample Kit Materials

- latex gloves
- alcohol swabs
- Betadine/iodine swabs
- 4-6 mm biopsy punch – sterile, disposable (Moore Medical Supply 1-800-678-8678, part #0052442)
- wooden skewer
- single-use scalpel blades (Fisher Scientific 1-800-766-7000, cat. # 08-927-5A)
- plastic screw-cap vial containing saturated NaCl with 20 percent DMSO, wrapped in parafilm
- waterproof paper label, ¼" x 4"
- pencil to write on waterproof paper label
- permanent marker to label the plastic vials
- scotch tape to protect writing on the vials

- piece of parafilm to wrap the cap of the vial
- whirl-pak to return/store sample vial

The Matagorda Ship Channel Improvement Project was permitted by USACE in 2009. As part of the permitting process a Biological Opinion (BO) from the National Marine Fisheries Service (NMFS) in St. Petersburg, FL was issued addressing impacts to sea turtles. The originally permitted project was not undertaken due to economic conditions in the oil and gas industry.

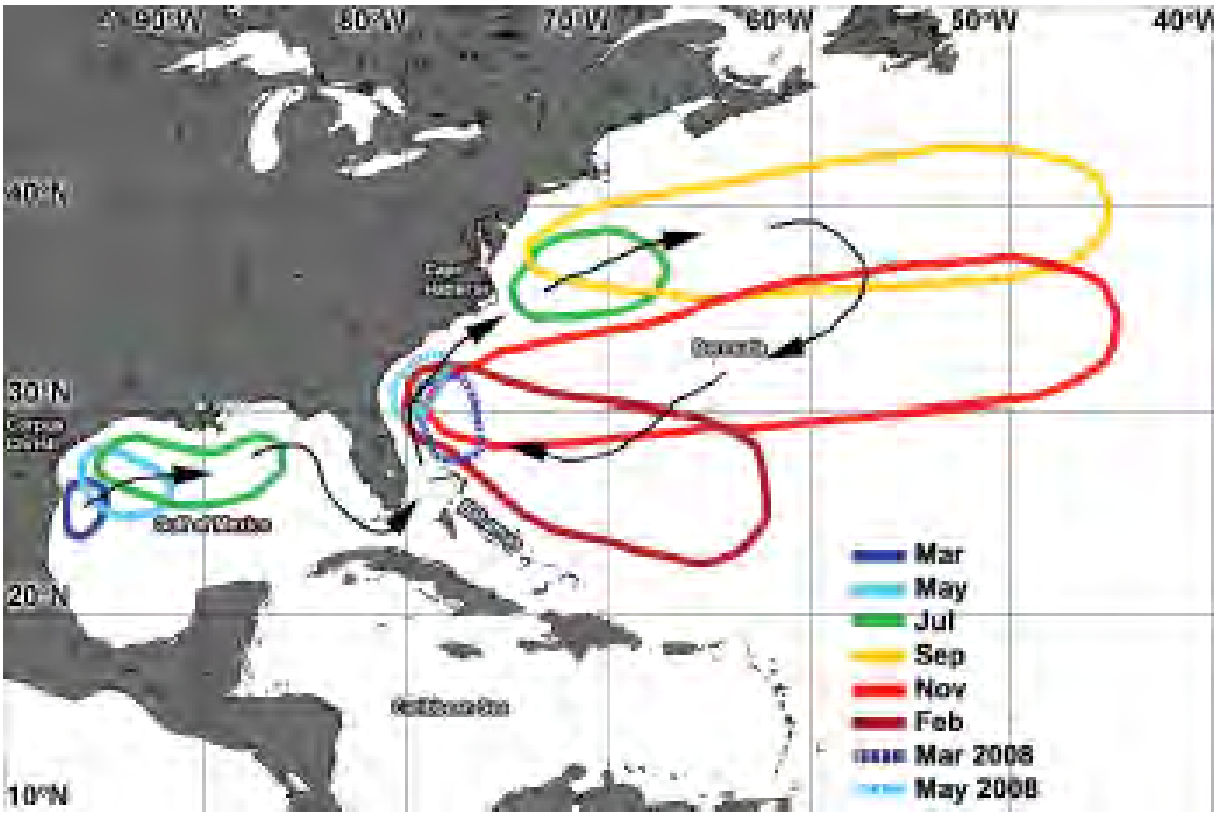
The project was revived by USACE and the Port of Calhoun in 2016 as a Feasability Study. As part of the Feasability Study a NEPA review is being undertaken. The study follows the footprint of the previously permitted project. The BO issued as part of the previous permitting remains valid, per discussions with NMFS, as long as the impacts are unchanged. The original BO concurred with the determination that the project of May Effect, Not Likely to Adversely Affect sea turtles and no jeopardy to the species. An Incidental Take Statement (ITS) was issued for individual turtles, and the ITS remains in effect.

Reinitiation of BOs is required when "(1) The amount or extent of taking specified in the incidental take statement is exceeded; (2) new information reveals effects of the action may affect listed species or critical habitat in a manner or to an extent not previously considered; (3) the identified action is subsequently modified in a manner that causes an effect to listed species or critical habitat that was not considered in the biological opinion; or (4) a new species is listed or critical habitat designated that may be affected by the identified action."

We do not believe reinitiation of the BO is required for the following reasons.

(1) The amount of take specified in the ITS has not been exceeded, as the project has not been commenced.
(2) The information presented in the original BO detailed the effects of the action, and any new information brought forward has not modified the effects in ways not previously considered.
(3) The identified action has not been subsequently modified in a manner that would effect the identified species in a manner not considered in the original BO.
(4) New Critical Habitat (CH) was identified for the loggerhead turtle in 2014. The entrance channel extension is encompassed in the Feeding Critical Habitat for the species. The conditions in the original BO include both temporal dredging windows and the use of turtle monitors during hopper dredging activities. These conditions remain in effect for this project and, as such, would not change the determination of May Effect, Not Likely to Adversely Affect and no jeopardy on the loggerhead turtle. A study of the extent of Sargassum (the determinant for Feeding CH) in the Gulf of Mexico and Atlantic Ocean by Grower and King (2011) mapped the movement of sargassum mats. They found the mats were typically seen south of the project area in March and made their way to the project area in May – July (see figure below). The dredging window condition in the BO states that hopper dredging can only be done between December 1 and March 31. This window puts the dredging operations outside the period when young loggerhead sea turtles would typically be feeding in the project area.

For these reasons we have determined that the current project is in line with the previously issued Biological Opinion, meeting all the conditions set forth in said BO, and the determination of May Effect, Not Likely to Adversely Affect and no jeopardy for sea turtles remains unchanged. Therefore, we do not believe reinitiation of the Section 7 Consultation would be required for this project.



Simplified outline diagram showing the average extent of Sargassum in March, May, July, September, November and February, based on MERIS count distributions by month as shown in figure 2. Only in 2008 does MERIS detect significant Sargassum in the Atlantic between March and June (dashed outlines). (Figure from Grower and King, 2011)

Grower, JFR, and SA King (2011) Distribution of floating Sargassum in the Gulf of Mexico and the Atlantic Ocean mapped using MERIS. International Journal of Remote Sensing. 32(7):1917-1929.

BIOLOGICAL ASSESSMENT FOR IMPACTS TO ENDANGERED AND THREATENED SPECIES RELATIVE TO THE MATAGORDA SHIP CHANNEL, PORT LAVACA, TEXAS PROJECT MATAGORDA AND CALHOUN COUNTIES, TEXAS

Prepared by:
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Contents

1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

This Biological Assessment (BA) is being prepared to fulfill the U.S. Army Corps of Engineers' (USACE) requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. The proposed Federal action (project) requiring the assessment is the widening and deepening of the Matagorda Ship Channel (MSC) in Matagorda and Calhoun counties, Texas. Details of the proposed project are provided in Section 1.2; specific details are available in the Draft Environmental Impact Statement (EIS; USACE, 2018). This BA evaluates the potential impacts the project may have on federally listed endangered and threatened species and is being prepared to assist U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) personnel in fulfilling their obligations under the ESA. Table 1 presents a list of federally listed threatened and endangered species that are addressed in this BA, as provided by USFWS and NMFS.

Table 1. Threatened and Endangered Wildlife Species of possible occurrence in Calhoun and Matagorda Counties, Texas

Common Name	Scientific Name	Status
Mammals		
Gulf Coast jaguarondi	*Herpailurus yagouaruondi cacomitli*	Endangered
West Indian manatee	*Trichechus manatus*	Threatened
Blue whale	*Balaenoptera musculus*	Endangered
Finback whale	*Balaenoptera physalus*	Endangered
Humpback whale	*Megaptera novaegnliae*	Endangered
Sei whale	*Balaenoptera borealis*	Endangered
Sperm whale	*Physeter macrocephalus*	Endangered
Birds		
Northern aplomado falcon	*Falco femoralis septentrionalis*	Endangered
Piping plover	*Charadrius melodus*	Threatened
Red knot	*Calidris canutus rufa*	Threatened
Whooping crane	*Grus Americana*	Endangered
Reptiles		
Green sea turtle	*Chelonia mydas*	Threatened
Hawksbill sea turtle	*Eretomochelys imbricate*	Endangered
Kemp's Ridley sea turtle	*Lepidochelys kempii*	Endangered
Leatherback sea turtle	*Dermochelys coriacea*	Endangered
Loggerhead sea turtle	*Caretta*	Threatened
Corals		
Lobed star	*Orbicella annularis*	Threatened
Mountainous star	*Orbicella faveolata*	Threatened
Boulder star	*Orbicella franksi*	Threatened
Elkhorn coral	*Acropora palmata*	Threatened
Clams		
Golden Orb	Quadrula aurea	Candidate

*This species only needs to be considered for wind related projects within the migratory route.

For the purposes of the BA, we define the "project area" as those areas that will be directly affected by construction and maintenance of the proposed project. This includes the proposed dredging footprint, existing and proposed placement areas (PAs) identified in the Dredged Material Management Plan (DMMP), DMMP restoration and nourishment areas, and mitigation areas (Figure 1).

The "study area" includes a larger area for which environmental effects of the proposed project have been analyzed (Figure 2). The study area encompasses a larger area that contains the smaller project area, and includes a 10-mile radius into the Gulf of Mexico (Gulf) from the end of the entrance channel.

1.2 ALTERNATIVES CONSIDERED

This section discusses alternatives considered during the preparation of the Environmental Impact Statement (EIS). While alternate sites might be considered alternatives for some projects that address a national or statewide need, such is not the case for this project. The alternatives addressed were channel widening alternatives and dredged material placement alternatives at the project location. The No-Action Alternative always remains an alternative to the proposed action. The purpose of the proposed project is to improve the deep-draft transport of commerce on the MSC. The current channel is economically inefficient, with up to 90% of vessels calling at Port of Port Lavaca-Point Comfort (the Port) reported to be light loaded due to draft limitations of the present channel configuration. By expanding the MSC dimensions and associated turning basin and marine slips, cargo vessels could reduce or eliminate light-loading measures, and larger cargo vessels unable to transit the current channel configuration could call on the Port. The channel improvements would reduce transportation costs for existing commodities, which are crucial to the regional economy. Because the existing turning basin at 1,000 feet (ft) by 1,000 ft may be deepened but cannot be expanded to accommodate the larger vessels, the Calhoun Port Authority (CPA) proposes to construct a new turning basin at the intersection of the MSC and Alcoa Channel to accommodate larger vessels that would be able to call on the Port. In addition, a wider channel would potentially allow for two-way traffic of smaller vessels during periods of increased transits.

1.2.1 Channel Improvement Alternatives

Identification of reasonable alternatives for channel improvements began with identifying actions that would meet the stated need for the project and comparing them to one another by assessing the benefits and consequences of each alternative to the human and natural environment. Thus, a set of basic criteria is formulated against which potential project impacts were evaluated. An evaluation framework was developed to measure, quantify, and report impacts from each alternative using the established criteria. These criteria are generally derived from water resource planning guidance of the USACE and are described in terms of technical and environmental perspectives.

Technical criteria developed for alternative formulation and evaluation were based on maximizing the navigational attributes of the waterway for commercial vessel transportation in a manner that would achieve the stated purpose and need of the project and is determined as the least environmentally damaging practicable alternative. The general environmental criteria for navigation projects are to assure that care be taken to preserve and protect significant ecological, aesthetic, and cultural values, and to conserve natural resources. Particular emphasis was placed on the following:

- Protection and preservation of the existing fish and wildlife resources along with the protection and preservation of estuaries and wetland habitats and water quality and improvement of these resources through beneficial use of dredged material;
- Consideration in the project design of the least disruptive construction techniques and methods;
- Mitigation for project-related unavoidable impacts by minimizing, rectifying, reducing or eliminating, compensating, replacing, or substituting resources; and
- Preservation of significant historical and archeological resources through avoidance of effects. This is the preferable action to any other form of mitigation since these are finite, nonrenewable resources.

Two structural channel improvement alternatives were developed and evaluated using the technical and environmental criteria described above (Table 2). The primary difference between Alternative A and Alternative B is the presence/absence of a Passing Lane. Each alternative included multiple depths to be refined during the planning stage.

Table 2. Array of structural alternatives for the Matagorda Ship Channel Project.

Alternative	Depth Main / Entrance	Width Main / Entrance	Turning Basin	Passing Lane
No Action	38' / 40'	200' / 300'	~1,000'	NO
A	41' / 43'	350' / 600'	1,200'	NO
	43' / 45'	350' / 600'	1,200'	NO
	45' / 47'	350' / 600'	1,200'	NO
	47' / 49'	350' / 600'	1,200'	NO
	49' / 51'	350' / 600'	1,200'	NO
	51' / 53'	350' / 600'	1,200'	NO
B	41' / 43'	350' / 600'	1,200'	YES
	43' / 45'	350' / 600'	1,200'	YES
	45' / 47'	350' / 600'	1,200'	YES
	47' / 49'	350' / 600'	1,200'	YES
	49' / 51'	350' / 600'	1,200'	YES
	51' / 53'	350' / 600'	1,200'	YES

The PDT discussed the Final Array of Alternatives with the MSC Pilots. During the discussion, the Pilots indicated that a Passing Lane would not increase port efficiencies. Alternative B was removed from further consideration. Economic analyses indicate that Alternative A – 47' MLLW for the main channel and 49' MLLW for the entrance channel is the preferred alternative.

1.2.2 Dredged Material Placement Alternatives

The proposed action and other alternatives would require placement of construction and maintenance dredged material. The quantity of dredged material removed from the MSC would vary by alternative, and the mix of PAs would primarily distinguish the placement alternatives, along with the types of dredging equipment capable of constructing the improvements.

Thus, a range of dredged material placement alternatives was also considered, including confined upland placement, beneficial use, confined in-water, unconfined in-water, and ocean placement. In the interest of meeting the project purpose and need while minimizing and mitigating for environmental impacts, the Corps met with representatives of several State and Federal resource agencies to develop a DMMP/Beneficial Use Plan. Work Group participants included representatives from the following State and Federal agencies:

- USACE
- Texas Commission on Environmental Quality (TCEQ)
- Texas Parks and Wildlife Department (TPWD)
- NMFS
- USFWS

A DMMP was identified and evaluated for potential impacts in the DEIS (USACE, 2018).

1.2.3 No-Action Alternative

The No-Action Alternative for this project is one which would result in no construction or improvements to the MSC.

1.2.4 Agency's Preferred Alternative

Proposed improvements to the MSC would entail deepening the Main Channel from 38' MLLW to 47' MLLW, with 2' of advance maintenance and 2' of allowable overdepth. The Main Channel would be widened from its existing width of 200' to a proposed width of 350'. The Entrance Channel would deepen from 40' MLLW to 49' MLLW, with 3' of advance maintenance and 2' of allowable overdepth. The Entrance Channel width is proposed to be modified from 300 to 600 ft. In addition, a new turning basin would be constructed to allow for a ship-turning circle of 1,200' 47', with 2' of advance maintenance and 2' of allowable overdepth. Approximately 30.2 million cubic yards (mcy) of new work material would be generated upon initial construction, and 167.2 mcy of maintenance material would be generated over a period of 50 years after construction of the improvement project.

The proposed DMMP entails features that will utilize new work and maintenance dredged material to:

1. Place material in an offshore sand engine southwest of the entrance channel jetty;
2. Place new work and future maintenance material in in-bay unconfined PAs located northwest of the MSC in Matagorda Bay;
3. Place new work material from the MSC Entrance Channel at the existing Matagorda Ocean Dredged Material Disposal Site (ODMDS) (O5) located 3 miles offshore from the Matagorda Peninsula and 1,200 ft south of the MSC Entrance Channel centerline; and

4. Place future maintenance material from the MSC Entrance Channel at the existing Matagorda Ocean Dredged Material Disposal Site (PA 1) located 2 miles offshore from the Matagorda Peninsula and 1,000 ft south of the MSC Entrance Channel centerline.

The PAs proposed in the DMMP are shown on Figure 1.

1.3 PROJECT AREA HABITAT DESCRIPTION

The study area (see Figure 2) is located in the Gulf Prairies and Marshes Ecological Region as described by Gould et al. (1960). This Eco-region spans the Texas coastline, extending 30 to 80 miles inland. Elevations range from sea level to approximately 250 ft (76.2 m). The Gulf Marshes are low, wet areas with salinities ranging from fresh to saline. Submerged aquatic vegetation, including seagrasses, grow in open-water areas and are also considered special aquatic sites. The Gulf Prairies are primarily uplands, dominated by tallgrass and post oak savannah. However, woody encroachment by trees and scrub species, including Chinese tallow (*Sapium sebiferum*), mesquite (*Prosopis glanduosa*), huisache (*Acacia farnesiana*), and oaks (*Quercus* spp.) (Hatch et al., 1990), plus agricultural and urban development have modified much of the coastline.

The project area is located in the Texan Biotic Province as described by Blair (1950). This province represents a transitional area between the forested Austroriparian Province to the east and grassland provinces to the west. The integration of forests and grasslands results in a mixture of vertebrate species typical of the two habitats. Blair (1950) identifies 23 amphibians known to occur in the Texan province, including 18 anurans (frogs and toads) and 5 caudates (salamanders and newts).

Matagorda Bay is the third largest estuary on the Texas coast, encompassing 420 square miles (1,087.8 square kilometers) and having an average depth of 6.5 ft (2.0 m) (Armstrong et al., 1987; U.S. Environmental Protection Agency [EPA], 1999). The system includes Lavaca, East Matagorda, Keller, Carancahua, and Tres Palacios bays (see Figure 2). Open-water areas include the unvegetated, bottom portion (excluding hard substrates such as oyster reefs) of the subtidal estuarine environment. Open-water habitats support communities of benthic organisms and corresponding fisheries populations.

2.0 STATUS OF THE LISTED SPECIES

To assess the potential impacts of the proposed project on endangered and threatened species, a literature review was performed and other scientific data was researched to determine species distributions, habitat needs, and other biological requirements. Significant literature sources consulted for this report include the USFWS series on endangered species of the seacoast of the U.S. (National Fish and Wildlife Laboratories [NFWL], 1980), Federal status reports and recovery plans, job reports of the TPWD, peer-reviewed journals, and other standard references. Habitat assessments were initially based on aerial photography and National Wetlands Inventory mapping. Input was also solicited from State and Federal Resource Agency personnel and from personnel from

Federal National Wildlife refuges (NWRs) and State Wildlife Management areas in the area.

2.1 GULF COAST JAGUARONDI

2.1.1 Reason for Status

USFWS listed the Gulf Coast jaguarondi (*Herpailurus yagouaroundi cacomitli*) as endangered on 14 June 1976 (41 FR 24062). Later it received protection under the ESA of 1973. The primary reason for the decline of the jaguarondi is the loss of habitat. Their primary habitat is in dense brush within fertile regions of the Rio Grande Valley. This habitat has been cleared of brush for agricultural purposes and less than 5% of its habitat remains (Campbell, 1995).

2.1.2 Habitat

The jaguarondi is a secretive cat and it uses dense thorny shrublands of the Rio Grande Valley. They sometimes utilize riparian habitat along rivers or creeks. The optimal habitat is not known due to their secretive nature, though it is believed to be similar to the ocelot (*Leopardus pardalis*). Larger tracts of shrublands (at least five acres) are important to allow adequate range. Little is known about their breeding habitat, and most of what is known is anecdotal (Campbell, 1995).

2.1.3 Range

The jaguarondi is believed to range from southern Texas to Tamaulipas and Veracruz in Mexico (Natureserve, 2018). No sightings of jaguarondi have been made in Texas since 1990 in Brazoria County, though these may have been released individuals (Matthews and Moseley, 1990). The USFWS and other researchers have been using game cameras to monitor for the presence of jaguarondi throughout its range for over 25 years and have found no images (USFWS, 2018).

2.1.4 Distribution in Study Area

The historical distribution of the jaguarondi is throughout southern Texas, though no sightings have been made since 1990 (Matthews and Moseley, 1990). The species is believed to be on the verge of extirpation in Texas. While it is possible that a jaguarondi may be present in Calhoun or Matagorda counties, there is no suitable habitat for the species in the study area and it is unlikely to occur there.

2.2 WEST INDIAN MANATEE

2.2.1 Reason for Status

USFWS listed the West Indian manatee (*Trichechus manatus*) as endangered on 11 March 1967 (32 FR 4001). Later it received protection under the ESA of 1973. The largest known human-related cause of manatee mortality is collisions with hulls and/or propellers of boats and ships. The second-largest human-related cause of mortality is entrapment in floodgates and navigation locks. Other known causes of human-related manatee mortality include poaching and vandalism, entrapment in shrimp nets and other fishing gear, entrapment in water pipes, and ingestion of marine debris (USFWS, 2001). Hunting and fishing pressures were responsible for much of its original decline because of the demand for meat, hides, and bones, which resulted in near extirpation of the species (USFWS, 1995).

A prominent cause of natural mortality in some years is cold stress, and major die-offs associated with the outbreaks of red tide have occurred, where manatees appear to have died because of ingestion of filter feeding tunicates that had accumulated the neurotoxin-producing dynoflagellates responsible for causing the red tide (USFWS, 2001). The low reproductive rate and habitat loss make it difficult for manatee populations to recover.

2.2.2 Habitat

The West Indian manatee inhabits shallow coastal waters, estuaries, bays, rivers, and lakes. Throughout most of its range, it appears to prefer rivers and estuaries to marine habitats, although manatees inhabit marine habitats in the Greater Antilles (Lefebvre et al., 1989). It is not averse to traveling through dredged canals or using quiet marinas. Manatees are apparently not able to tolerate prolonged exposure to water colder than 68 degrees Fahrenheit (°F) (20 degrees Celsius [°C]). In the northern portions of their range, during October through April, they congregate in warmer water bodies, such as spring-fed rivers and outfalls from power plants. They prefer waters that are at least 3.3 to 6.6 ft (1 to 2 m) in depth; along coasts, they are often in water 9.8 to 16.4 ft (3 to 5 m) deep. They usually avoid areas with strong currents (NatureServe, 2018).

Manatees are primarily dependent upon submergent, emergent, and floating vegetation, with the diet varying according to plant availability. They may opportunistically eat other foods such as acorns in early winter in Florida or fish caught in gill nets in Jamaica (O'Shea and Ludlow, 1992).

2.2.3 Range

The manatee ranges from the southeastern U.S. and coastal regions of the Gulf of Mexico, through the West Indies and Caribbean, to northern South America. U.S. populations occur primarily in Florida (NatureServe, 2018), where they are effectively isolated from other populations by the cooler waters of the northern Gulf of Mexico and the deeper waters of the Straits of Florida (Domning and Hayek, 1986).

2.2.4 Distribution in Study Area

The West Indian manatee historically inhabited the Laguna Madre, Gulf of Mexico, and tidally influenced portions of rivers. It is currently, however, extremely rare in Texas waters, and the most recent sightings are likely individuals migrating or wandering from Mexican waters. Historical records from Texas waters include Cow Bayou, Sabine Lake, Copano Bay, the Bolivar Peninsula, and the mouth of the Rio Grande (Schmidly, 2004). Also, on July 25 and 26, 2005, a manatee was sighted near the Dolphin Point subdivision in Port O'Connor, and on August 13, 2005, a manatee was sighted at the southwest end of Espiritu Santo Bay, near Port O'Connor. In May 2005, a manatee appeared in the Laguna Madre near Port Mansfield. The latest reported siting of a manatee along the Texas Gulf Coast occurred in January, 2007 in Corpus Christi Bay (TMMSN, 2007). Although the West Indian manatee is chiefly a marine species, its occurrence in the study area is unlikely, though possible.

2.3 NORTHERN APLOMADO FALCON

2.3.1 Reasons for Status

The northern aplomado falcon (*Falco femoralis septentrionalis*) was proposed for endangered status on 20 May 1985 (50 FR 20810). The listing was published as final on 25 February 1986, and the rule became effective on 27 March 1986 (51 FR 6686). Although reasons for the decline of the aplomado falcon are not known (Hector, 1987), habitat degradation due to brush encroachment is probably the main factor in the disappearance of this bird from the U.S. (Hector, 1983). Overcollecting of the falcons and their eggs may have contributed to the decline on a local basis (Hector, 1983, 1987). The NAS (comments published in 51 FR 6686, 25 February 1986) identified the decline as being through the loss of open grassland habitat through overgrazing and other excessive range practices. Currently, the most serious threat is reproductive failure caused by continued use of organochlorine pesticides such as DDT and DDE in Latin America, which affect both the aplomado falcon and its prey species (Hector, 1983).

2.3.2 Habitat

Typical habitat of this species is open country, especially savannah rangeland and open woodland, containing scattered mesquites (*Prosopis* spp.), yuccas (*Yucca* spp.), oaks (*Quercus* spp.), and acacias (*Acacia* spp.) (AOU, 1998; Hector, 1983; 51 FR 6686, 25 February 1986). Open terrain with scattered trees (for nesting and observation perches), relatively low ground cover (less concealment for prey), an abundance of small to medium-sized birds, and nesting platforms (e.g., stick nests or large bromeliads), particularly in yuccas and mesquites, are the habitat requirements for this bird (Hector, 1981; USFWS, 1995). The preferred habitat of the aplomado falcon in southern Texas was coastal prairie with widely scattered mesquites and yuccas (Hector, 1987).

2.3.3 Range

The aplomado falcon is resident throughout much of Central and South America (AOU, 1998). Three subspecies are recognized: the northern aplomado falcon (*F. f. septentrionalis*) and two others (*F. f. femoralis* and *F. f. pichinchae*) (Hector, 1983). The subspecies *septentrionalis* historically occurred in southeastern Arizona, southern New Mexico, southern Texas, much of Mexico, the Pacific coast of Guatemala, and perhaps Nicaragua where it intergrades with *F. f. femoralis*. Highest nesting densities in the U.S. were formerly in New Mexico and Texas; today this bird is virtually absent from the U.S. (Homerstad, 1990) and nests regularly only in the coastal plains of eastern Mexico (Vera Cruz, Chiapas, Campeche and Tabasco) in the palm and oak savannah and is rarely seen outside this area (Hector, 1981, 1983).

In Texas, the northern aplomado falcon formerly ranged from Cameron County northward to San Patricio County, and west from Ector and Midland counties to El Paso County (Oberholser, 1974). Around the turn of the century, the southeast corner of Cameron County was an important nesting area for the aplomado falcon, with over 100 nests being recorded (Hector, 1983). Other breeding records in Texas have come from Hidalgo, Kenedy, Brooks, Pecos, Ector and Midland counties, with the last nesting pair recorded from Brooks County in 1941 (Oberholser, 1974). Until recently, the last confirmed nesting in the U.S. was near Deming, New Mexico in 1952 (USFWS, 1995), while the last documented nesting in Texas was in 1941 (Hector 1981). Since 1985, reintroduction efforts have been underway at several sites in south Texas in order to reestablish populations in the U.S. Reintroduction sites have included the Laguna Atascosa NWR and the King Ranch. These birds are hatched in California, flown to Texas at age 3 to 4 weeks, reared in hack boxes, and fed periodically following fledging. Near Rockport, Texas twelve territorial pairs of falcons were known to be distributed along Matagorda Island, while two more pairs where known along San Jose Island (Hunt et al. 2013). These areas are not historically known to be associated with aplomado falcons. Matagorda Island is also home to potential avian predators of the falcon, including resident white-tailed hawks (*Geranoaetus albicaudatus*) and crested caracaras (*Caracara cheriway*) (Hunt et al. 2013).

2.3.4 Presence in the Study Area

Suitable habitat may exist further inland within the study area; no suitable habitat exists within the project area and its presence is highly unlikely. Even if this species recovers sufficiently from its present decline and spreads into its former range, lack of suitable nesting habitat in the project area would preclude its occurrence there.

2.4 PIPING PLOVER

2.4.1 Reasons for Status

USFWS listed the piping plover (*Charadrius melodus*) as threatened on 11 December 1985 (50 FR 50726). The piping plover is a federally listed endangered species in the Great Lakes watershed, while the birds breeding on the Atlantic Coast and northern Great Plains are federally listed as threatened. Piping plovers wintering in Texas and Louisiana are part of the northern Great Plains and Great Lakes populations and, therefore, are listed as threatened.

Shorebird hunting during the early 1900s caused the first known major decline of piping plovers (Bent, 1929). Since then, loss or modification of habitat resulting from commercial, residential, and recreational developments, dune stabilization, damming and channelization of rivers (eliminating sandbars, encroachment of vegetation, and altering water flows), and wetland drainage have further contributed to the decline of the species (USFWS, 1995). Additional threats include human disturbances through recreational use of habitat, and predation of eggs by feral pets (USFWS, 1995).

2.4.2 Habitat

General habitat includes shorelines or oceans, rivers, and inland lakes. Within the Great Plains, breeding habitat includes sandy beaches (between dunes and high tide line), spoil islands and sandbars in rivers, and sandy or alkaline shorelines along shallow lakes (AOU, 1998; Haig and Elliot-Smith, 2004). Gravel and sand pits, as well as industrial ponds, are also occasionally used (Haig and Elliot-Smith, 2004). Along the Great Lakes and the Atlantic Coast, piping plovers typically breed on open, sparsely vegetated, sand, gravel, and cobble beaches (Haig and Elliot-Smith, 2004). Beach width appears to be an important factor in nest site selection (Haig and Elliot-Smith, 2004; USFWS, 2003b).

Within their wintering range, which includes the Texas Gulf Coast, piping plovers inhabit beaches and bay margins, particularly tidal mudflats and sandflats, algal flats, sandy beaches, and spoil islands (AOU, 1998; Haig and Elliot-Smith, 2004).

2.4.3 Range

The piping plover breeds on the northern Great Plains (Iowa, northwestern Minnesota, Montana, Nebraska, North and South Dakota, Alberta, Manitoba, and Saskatchewan), in the Great Lakes (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario), and along the Atlantic Coast from Newfoundland to Virginia and (formerly) North Carolina. It winters on the Atlantic and Gulf coasts from North Carolina to Mexico, including coastal Texas, and, less commonly, in the Bahamas and West Indies (AOU, 1998; 50 FR 50726, 11 December 1985). Migration occurs both through the interior of North America east of the Rocky Mountains (especially in the Mississippi Valley) and along the Atlantic Coast (AOU, 1998). Few data exist on the migration routes of this species.

2.4.4 Presence in the Study Area

Critical habitat for the piping plover coastal wintering grounds was designated July 10, 2001 (66 FR 36038), and this designation was challenged on March 20, 2006, by the Texas GLO. The court ordered the USFWS to vacate 19 of the 37 designated units in Texas and reevaluate them for possible redesignation. On May 20, 2008 (73 FR 29294), the Service revised and proposed the redesignation of critical habitat for wintering piping plovers in Texas in 18 units, 4 of which (19, 21, 22, and 23) occur within the proposed project area. Units 24, 25, and 26, which are also in the project area, remain designated critical habitat. Critical habitat includes the land from the seaward boundary of mean lower low water to where densely vegetated habitat, not used by the species, begins and where the constituent elements no longer occur.

Critical Habitat Unit TX-19 occurs on Matagorda Island Beach (976 acres [ac]) in Calhoun County. This stretch of beach occurs along the Gulf side for 36 miles from Cedar Bayou to Pass Cavallo on the northeast. These lands are infrequently inundated by seasonal winds and fall entirely within the boundaries of Matagorda Island NWR (65 FR 41781–41812, 6 July 2000). Unit TX-22 occurs on Decros Point (1,114 ac) at the Matagorda-Calhoun county line. This unit includes about 4.3 miles of beach habitat around the island at the western tip of Matagorda Peninsula between the natural opening to Matagorda Bay and the MSC. This area is a wind tidal flat that is infrequently inundated by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-23 is a 769-ac shoreline along West Matagorda Peninsula in Matagorda County. This unit extends 24 miles along the Gulf from the jetties at the MSC to the old Colorado River channel. This area is also known as a wind tidal flat and is infrequently flooded by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-24 is a 1,868-ac tract on West Matagorda Bay/Western Peninsula Flats in Matagorda County. This unit extends along the bayside of Matagorda Peninsula southwest of Greens Bayou to 1.6 miles north of Greens Bayou. This unit is also considered a wind tidal flat that is infrequently inundated by seasonal winds (65 FR 41781–41812, 6 July 2000). Unit TX-25 is located on West Matagorda Bay/Eastern Peninsula Flats (575 ac) in Matagorda County. This area follows the bayside of

Matagorda Peninsula from Maverick Slough southwest for 3 miles. The unit begins at Maverick Slough to the northeast, and extends 3 miles to the southwest, enclosing a series of flats along Matagorda Bay (65 FR 41781–41812, 6 July 2000). Unit TX-26 is located in Matagorda County on the Colorado River Diversion Delta (13 ac). This unit follows the shore of the extreme east-northeast corner of West Matagorda Bay from Culver Cut to Dog Island Reef. The southeastern tidally emergent portion of Dog Island Reef is included with this unit. The upland areas include areas used for roosting for the piping plover (65 FR 41781–41812, 6 July 2000). NDD (2006b) documented records show this species occurring within the project area. These records are located bayside of Matagorda Peninsula approximately 1.7 air miles southwest of Greens Bayou Cut southwesterly to the breakwater just northeast of Matagorda Peninsula airport and extending west-southwest from Decros Point across the Calhoun-Matagorda county line. A review of ebird shows multiple sightings of piping plovers at Pass Cavallo between 2016 and 2019, as many as 118 on one occasion in 2019 and smaller numbers of sightings (less than 10 at a time) along the beach at Port O'Connor between 2000 and 2018 (ebird.org).

2.5 RED KNOT

2.5.1 Reasons for Status

The red knot (*Calidris canutus rufa*) was federally listed as endangered on 12 January 2015 (79 FR 73706). The primary factor threatening the red knot is destruction and modification of its habitat, particularly the reduction in key food resources resulting from reductions in horseshoe crabs, which are harvested primarily for use as bait and secondarily to support a biomedical industry.

Counts of red knots within the principal wintering areas in Chile and Argentina declined by nearly 75 percent from 1985 to 2007 and declined by an additional 15 percent in the past year (2007 to 2008).

2.5.2 Habitat

Red knots use marine habitats during their migration through South and North America. They prefer sandy coasts near tidal inlets or at the mouths of bays or estuaries. The beach habitats are preferable due to the higher concentration of benthic bivalves which are an important food source (Harrington and Flowers, 1996). During the northbound migration red knots can be found feeding on clams along the coast of Virginia (Cohen et al, 2009, 2010) and on horseshoe crab eggs on Delaware Bay beaches (Tsipoura and Burger, 1999).

Red knots winter in on the sandy beaches of Texas and Florida, though they may also use peaty bank areas in Georgia or mangroves in Florida. They have been noted to move from the sandy beaches to intertidal mud flats to feed on benthic invertebrates (Rodrigues, 2000).

2.5.3 Range

Red knots of the *rufa* subspecies (*Calidris canutus rufa*) are medium-sized shorebirds that breed only in Arctic Canada and migrate approximately 18,500 miles annually between Arctic breeding grounds and primary wintering areas in Tierra Del Fuego, at the southern tip of South America. They also winter in three other distinct coastal areas of the Western Hemisphere: the southeastern United States (mainly Florida and Georgia, with smaller numbers in South Carolina), the Gulf of Mexico coast of Texas, and Maranhão in northern Brazil (USFWS, 2011).

In South American wintering areas, red knots are found principally in intertidal marine habitats, especially near coastal inlets, estuaries, and bays, or along intertidal earthen shelf formations. The Delaware Bay area (in Delaware and New Jersey) is the largest known spring migration stopover area, with far fewer migrants congregating elsewhere along the Atlantic coast. The concentration in the Delaware Bay area occurs from the middle of May to early June, corresponding to the spawning season of horseshoe crabs. The knots feed on horseshoe crab eggs, rebuilding energy reserves needed to complete migrations to the Arctic. Surveys at wintering areas and at Delaware Bay during spring migration indicate a substantial decline in the red knot in recent years. Research shows that since 1998, a high proportion of red knots leaving the Delaware Bay failed to achieve threshold departure masses needed to fly to breeding grounds and survive an initial few days of snow cover, and this corresponded to reduced annual survival rates (73 FR 75176).

2.5.4 Presence in the Study Area

Along the Texas coast, red knots forage on beaches, oyster reefs, and exposed bay bottoms and roost on high sand flats, reefs, and other sites protected from high tides (NatureServe, 2018). They are believed to use the beaches in Calhoun and Matagorda Counties near but not in the project area. Ebird.org notes eight sightings of red knots in the study area between 1997 and February 2019, with the highest number of birds seen per sighting only exceeding ten once (11 in Nov 2017) (ebird.org). In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. It has been reported that Coquina clams (*Donax variabilis*) serve as a frequent and often important food resource for red knots along Gulf beaches. Reports of the size of flocks along the Gulf of Mexico coast vary considerably, from highs of about 700 to 2,800 (USFWS, 2011).

2.6 WHOOPING CRANE

2.6.1 Reasons for Status

The whooping crane (*Grus americana*) was federally listed as endangered on 11 March 1967 (32 FR 4001). Critical habitat has been designated in Aransas, Calhoun, and Refugio counties in Texas, and includes the Aransas NWR. An experimentally introduced flock in Florida is listed as an experimental nonessential population (FR, 22 January 1993). The main factors for the decline of the whooping crane were loss of habitat to agriculture, human disturbance of nesting areas, uncontrolled hunting, and collisions with power lines (NatureServe, 2018). Biological factors, such as delayed sexual maturity and small clutch size, prevent rapid population recovery. Drought during the breeding season presents serious hazards to this species (Campbell, 1995). Whooping cranes are vulnerable to loss of habitat along their long migration route (NatureServe, 2018), along which they are still subject to cataclysmic weather events, accidental shooting, collision with power lines, and predators. They are susceptible to avian tuberculosis, avian cholera and lead poisoning (Campbell, 1995). Exposure to disease is a special problem when large numbers of birds are concentrated in limited areas, as often happens during times of drought. While in Texas, the main population is at risk from chemical spills along the Gulf Intracoastal Waterway (GIWW), which passes through the center of their winter range (Campbell, 1995). The presence of contaminants in the food base is another potential problem on their wintering grounds (Oberholser, 1974), and a late season hurricane or other weather event could be disastrous to this concentrated population.

2.6.2 Habitat

Nesting habitat in Canada is freshwater marshes and wet prairies (NatureServe, 2018), interspersed with numerous potholes and narrow wooded ridges. Whooping cranes use a variety of habitats during migration (Campbell, 1995). They feed on grain in croplands (Lewis, 1995), and large wetland areas are used for feeding and roosting. Riverine habitats, such as submerged sandbars, are often used for roosting. The principal winter habitat in Texas is brackish bays, marshes, and salt flats, although whooping cranes sometimes feed in upland sites characterized by oak mottes, grassland swales, and ponds on gently rolling sandy soils (Campbell, 1995).

Summer foods include large insect nymphs or larvae, frogs, rodents, small birds, minnows, and berries. During the winter in Texas, they eat a wide variety of plant and animal foods. Blue crabs, clams, and berries of Carolina wolfberry (*Lycium carolinianum*) comprise the diet. Foods taken at upland sites include acorns, snails, crayfish, and insects (Campbell, 1995).

2.6.3 Range

Whooping cranes were originally found throughout most of North America. In the nineteenth century, the main breeding area was from the Northwest Territories to the prairie provinces in Canada, and the northern prairie states to Illinois. A nonmigratory flock existed in Louisiana, but is now extirpated. Whooping cranes wintered from Florida to New Jersey along the Atlantic Coast, along the Texas Gulf Coast, and in the high plateaus of central Mexico. They now breed in isolated, marshy areas of Wood Buffalo National Park, Northwest Territories, Canada. They winter primarily in the Aransas NWR and adjacent areas of the central Texas Gulf Coast (USFWS, 1995). During migration they use various stopover areas in western Canada and the American Midwest.

Two experimental flocks have been established by incubating eggs and rearing the young in captivity before releasing them into the wild. Cranes were introduced in Grays Lake NWR in Idaho in 1975; these birds winter at Bosque del Apache NWR in central New Mexico. This population was not successful and is now extirpated. Introduction of another flock to Kissimmee Prairie in Florida began in 1993. The Florida population will be nonmigratory (NatureServe, 2018).

The natural wild population of whooping cranes spends its winters at the Aransas NWR, Matagorda Island, Isla San Jose, portions of the Lamar Peninsula, and Welder Point on the east side of San Antonio Bay (NatureServe, 2018). The main stopover points in Texas for migrating birds are in the central and eastern panhandle (USFWS, 1995).

2.6.4 Presence in the Study Area

According to USFWS (1995), Matagorda and Calhoun counties are within the species' migration corridor; therefore, the species may occur in the study area because of the close proximity to suitable wintering habitat. According to NDD records, the whooping crane has been recorded from Aransas County in St. Charles Bay (Aransas Wildlife Refuge, Matagorda Island, and nearby wetlands). Ebird.org has multiple documented sightings of whooping cranes along the western shoreline of Matagorda Bay between 2005 and 2017, between Magnolia Beach and Port O'Connor Critical habitat for the whooping crane has been documented adjacent to the study area to the southwest.

2.7 GREEN SEA TURTLE

2.7.1 Reasons for Status

The green sea turtle (*Chelonia mydas*) was listed on 28 July 1978 as threatened except for Florida and the Pacific Coast of Mexico (including the Gulf of California) where it was listed as endangered (43 FR 32808). The greatest cause of decline in green turtle populations is commercial harvest for eggs and food. Other turtle parts are used for leather and jewelry, and small turtles are sometimes stuffed for curios. Incidental catch during commercial shrimp trawling is a continued source of mortality that adversely affects recovery. It is estimated that before the implementation of TED requirements, the offshore commercial shrimp fleet captured about 925 green turtles a year, of which approximately 225 would die. Most turtles killed are juveniles and subadults. Various other fishing operations also negatively affect this species (NMFS, 2006). Epidemic outbreaks of fibropapilloma or "tumor" infections recently have occurred on green sea turtles, especially in Hawaii and Florida, posing a severe threat. The cause of these outbreaks is largely unknown, but it could be caused by a viral infection (Barrett, 1996). This species is also subject to various negative impacts shared by sea turtles in general.

2.7.2 Habitat

The green sea turtle primarily utilizes shallow habitats such as lagoons, bays, inlets, shoals, estuaries, and other areas with an abundance of marine algae and seagrasses. Individuals observed in the open ocean are believed to be migrants en route to feeding grounds or nesting beaches (Meylan, 1982). Hatchlings often float in masses of sea plants (e.g., rafts of sargassum) in convergence zones. Coral reefs and rocky outcrops near feeding pastures often are used as resting areas. The adults are primarily herbivorous, while the juveniles consume more invertebrates. Foods consumed include seagrasses, macroalgae, and other marine plants, mollusks, sponges, crustaceans, and jellyfish (Mortimer, 1982).

Terrestrial habitat is typically limited to nesting activities, although in some areas, such as Hawaii and the Galápagos Islands, they will bask on beaches (Balazs, 1980). They prefer high-energy beaches with deep sand, which may be coarse to fine, with little organic content. At least in some regions, they generally nest consistently at the same beach, which is apparently their natal beach (Allard et al., 1994; Meylan et al., 1990), although an individual might switch to a different nesting beach within a single nesting season.

2.7.3 Range

The green sea turtle is a circumglobal species in tropical and subtropical waters. In U.S. Atlantic waters, it occurs around the U.S. Virgin Islands, Puerto Rico, and continental U.S. from Massachusetts to Texas. Major nesting activity occurs on Ascension Island, Aves Island (Venezuela), Costa Rica, and in Surinam. Relatively small numbers nest in Florida, with even smaller numbers in Georgia, North Carolina, and Texas (Hirth, 1997; NMFS and USFWS, 1991).

2.7.4 Distribution in Texas

The green sea turtle in Texas inhabits shallow bays and estuaries where its principal foods, the various marine grasses, grow (Bartlett and Bartlett, 1999). Its population in Texas has suffered a decline similar to that of its world population. In the mid- to late nineteenth century, Texas waters supported a green sea turtle fishery. Most of the turtles were caught in Matagorda Bay, Aransas Bay, and the lower Laguna Madre, although a few also came from Galveston Bay. Many live turtles were shipped to places such as New Orleans or New York and from there to other areas. Others were processed into canned products such as meat or soup prior to shipment. By 1900, however, the fishery had virtually ceased to exist. Turtles continued to be hunted sporadically for a while, the last Texas turtler hanging up his nets in 1935. Incidental catches by anglers and shrimpers were sometimes marked prior to 1963, when it became illegal to do so (Hildebrand, 1982).

Green sea turtles still occur in these same bays today but in much-reduced numbers (Hildebrand, 1982). While green turtles prefer to inhabit bays with seagrass meadows, they may also be found in bays that are devoid of seagrasses. The green sea turtles in these Texas bays are mainly small juveniles. Adults, juveniles, and even hatchlings are occasionally caught on trotlines or by offshore shrimpers or are washed ashore in a moribund condition (Shaver, 2000; STSSN, 2018).

Green sea turtle nests are rare in Texas. One nest was recorded at the Padre Island National Seashore in 1987, five in 1998, none in 1999, and one in 2000 (NPS, 2007; Shaver, 2000). Between 2001 and 2005, up to five nests per year have been recorded from the Texas coast. In 2006, two green sea turtle nests were recorded at Padre Island National Seashore (NPS, 2007). In 2014 no nests were found in Texas (NPS, 2015), whole only four were found in Texas in 2015, all in the Padre Island area (NPS, 2016). Green sea turtles, however, nest more in Florida and in Mexico. Since long migrations of green sea turtles from their nesting beaches to distant feeding grounds are well documented (Green, 1984; Meylan, 1982), the adult green sea turtles occurring in Texas may be either at their feeding grounds or in the process of migrating to or from their nesting beaches. The juveniles frequenting the seagrass meadows of the bay areas may remain there until they move to other feeding grounds or, perhaps, once having attained sexual maturity, return to their natal beaches outside of Texas to nest.

2.7.5 Presence in the Study Area

Four juvenile/subadult green sea turtles were captured during netting operations conducted by TAMUG at Magnolia Beach from May to October 1996 (Williams and Renaud, 1998). These four turtles were outfitted with radio satellite transmitters and tracked between May 1996 and March 1997. Subsequent locations included western Matagorda Bay, Lavaca Bay, and Powderhorn Bayou. The two green sea turtles that were fitted with satellite transmitters remained in the central Texas coast until a cold front on 11 January 1997 caused them to move approximately 112 miles to the south. One of them began moving north again in mid-February and had returned to the Matagorda Bay area by late March (Williams and Renaud, 1998).

In addition to the netting records, a green sea turtle was taken in the entrance channel of the MSC during dredging operations in 2004 (USACE, 2007), and a green sea turtle was recorded in the MSC southeast of Matagorda Peninsula (NDD, 2006a). However, this may have been the same individual. No green sea turtle nests have been recorded from the study area (NPS; 2007). Of the four green sea turtle nests observed during the 2008 nesting season, three occurred on Padre Island National Seashore, and one occurred on South Padre Island (NPS, 2008).

2.8 HAWKSBILL SEA TURTLE

2.8.1 Reasons for Status

The hawksbill sea turtle (*Eretmochelys imbricata*) was federally listed as endangered on 2 June 1970 (35 FR 8495) with critical habitat designated in Puerto Rico on 24 May 1978 (43 FR 22224). The greatest threat to this species is harvest to supply the market for tortoiseshell and stuffed turtle curios (Meylan and Donnelly, 1999). Hawksbill shell (bekko) commands high prices. Japanese imports of raw bekko between 1970 and 1989 totaled 1,573,770 pounds (713,850 kilograms), representing more than 670,000 turtles. The hawksbill is also used in the manufacture of leather, oil, perfume, and cosmetics (NMFS, 2006).

Other threats include destruction of breeding locations by beach development, incidental take in lobster and Caribbean reef fish fisheries, pollution by petroleum products (especially oil tanker discharges), entanglement in persistent marine debris (Meylan, 1992), and predation on eggs and hatchlings. See USFWS (1998) for detailed information on certain threats, including beach erosion, beach armoring, beach nourishment, sand mining, artificial lighting, beach cleaning, increased human presence, recreational beach equipment, predation, and poaching.

In 1998, NMFS designated critical habitat near Mona Island and Isla Monito, Puerto Rico, seaward to 3.5 miles (63 FR 46693–46701).

2.8.2 Habitat

Hawksbills generally inhabit coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, where they occur at depths of less than 70 ft (21.5 m). Like some other sea turtle species, hatchlings are sometimes found floating in masses of marine plants (e.g., sargassum rafts) in the open ocean (NFWL, 1980). Hawksbills reenter coastal waters when they reach a carapace length of approximately 7.9 to 9.8 inches (20 to 25 centimeters). Coral reefs are widely recognized as the resident foraging habitat of juveniles, subadults, and adults. This habitat association is undoubtedly related to their diet of sponges, which need solid substrate for attachment. Hawksbills also occur around rocky outcrops and high-energy shoals, which are also optimum sites for sponge growth. In Texas, juvenile hawksbills are associated with stone jetties (NMFS, 2006).

While this species is omnivorous, it prefers invertebrates, especially encrusting organisms, such as sponges, tunicates, bryozoans, mollusks, corals, barnacles, and sea urchins. Pelagic species consumed include jellyfish and fish, and plant material such as algae, sea grasses and mangroves have been reported as food items for this turtle (Carr, 1952; Mortimer, 1982; Musick, 1979; Pritchard, 1977; Rebel, 1974). The young are reported to be somewhat more herbivorous than adults (Ernst and Barbour, 1972).

Terrestrial habitat is typically limited to nesting activities. The hawksbill, which is typically a solitary nester, nests on undisturbed, deep-sand beaches, from high-energy ocean beaches to tiny pocket beaches several meters wide bounded by crevices of cliff walls. Typically, the sand beaches are low energy, with woody vegetation, such as sea grape (*Coccoloba uvifera*), near the waterline (NRC, 1990).

2.8.3 Range

The hawksbill is circumtropical, occurring in tropical and subtropical seas of the Atlantic, Pacific, and Indian oceans (Witzell, 1983). This species is probably the most tropical of all marine turtles, although it does occur in many temperate regions. The hawksbill sea turtle is widely distributed in the Caribbean Sea and western Atlantic Ocean, with representatives of at least some life history stages regularly occurring in southern Florida and the northern Gulf (especially Texas), south to Brazil (NMFS, 2006). In the continental U.S., the hawksbill largely nests in Florida where it is sporadic at best (NFWL, 1980). However, a major nesting beach exists on Mona Island, Puerto Rico. Elsewhere in the western Atlantic, hawksbills nest in small numbers along the Gulf Coast of Mexico, the West Indies, and along the Caribbean coasts of Central and South America (Musick, 1979).

2.8.4 Distribution in Texas

Texas is the only state outside of Florida where hawksbills are sighted with any regularity. Most of these sightings involve posthatchlings and juveniles, and are primarily associated with stone jetties. These small turtles are believed to originate from nesting beaches in Mexico (NMFS, 2006). On 13 June 1998, the first hawksbill nest recorded on the Texas coast was found at Padre Island National Seashore. This nest remains the only documented hawksbill nest on the Texas coast (NPS, 2007).

2.8.5 Presence in the Study Area

As previously noted, the hawksbill sea turtle occurs along the Texas coast. However, this species has not been recorded from the study area and no hawksbills have been taken during hopper dredging activities in Texas (USACE, 2019). Nevertheless, this species is of potential occurrence in the study area.

2.9 KEMP'S RIDLEY SEA TURTLE

2.9.1 Reasons for Status

Kemp's ridley sea turtle (*Lepidochelys kempii*) was listed as endangered throughout its range on 2 December 1970 (35 FR 18320). Populations of this species have declined since 1947, when an estimated 42,000 females nested in one day (Hildebrand, 1963), to a total nesting population of approximately 1,000 in the mid-1980s. The decline of this species was primarily the result of human activities including collection of eggs, fishing for juveniles and adults, killing adults for meat and other products, and direct take for indigenous use. In addition to these sources of mortality, Kemp's ridleys have been subject to high levels of incidental take by shrimp trawlers (NMFS, 2006; USFWS and NMFS, 1992). The National Research Council's (NRC) Committee on Sea Turtle Conservation estimated in 1990 that 86% of the human-caused deaths of juvenile and adult loggerheads and Kemp's ridleys resulted from shrimp trawling (Campbell, 1995). It is estimated that before the implementation of turtle excluder devices (TED), the commercial shrimp fleet killed between 500 and 5,000 Kemp's ridleys each year (NMFS, 2006). Kemp's ridleys have also been taken by pound nets, gill nets, hook and line, crab traps, and longlines.

Another problem shared by adult and juvenile sea turtles is the ingestion of manmade debris and garbage. Postmortem examinations of sea turtles found stranded on the south Texas coast from 1986 through 1988 revealed 54% (60 of the 111 examined) of the sea turtles had eaten some type of marine debris. Plastic materials were most frequently ingested and included pieces of plastic bags, Styrofoam, plastic pellets, balloons, rope, and fishing line. Nonplastic debris such as glass, tar, and aluminum foil were also ingested by the sea turtles examined. Much of this debris comes from offshore oil rigs, cargo ships, commercial and recreational fishing boats, research vessels, naval ships, and other vessels operating in the Gulf. Laws enacted during the late 1980s to regulate this dumping are difficult to enforce over vast expanses of water. In addition to trash, pollution from heavy spills of oil or waste products poses additional threats (Campbell, 1995).

Further threats to this species include collisions with boats, explosives used to remove oil rigs, and entrapment in coastal power plant intake pipes (Campbell, 1995). Dredging operations affect Kemp's ridley turtles through incidental take and by degrading the habitat. Incidental take of ridleys has been documented with hopper dredges. In addition to direct take, channelization of the inshore and nearshore areas can degrade foraging and migratory habitat through dredged material placement, degraded water quality/clarity, and altered current flow (USFWS and NMFS, 1992).

Sea turtles are especially subject to human impacts during the time the females come ashore for nesting. Modifications to nesting areas can have a devastating effect on sea turtle populations. In many cases, prime sea turtle nesting sites are also prime real estate. If a nesting site has been disturbed or destroyed, female turtles may nest in inferior locations where the hatchlings are less likely to survive, or they may not lay any eggs at all. Artificial lighting from developed beachfront areas often disorients nesting females and hatchling sea turtles, causing them to head inland by mistake, often with fatal results.

Adult females also may avoid brightly lit areas that would otherwise provide suitable nesting sites.

Kemp's ridley appears to be in the earliest stages of recovery. Approximately 6,000 Kemp's ridley nests were recorded on Mexican beaches during the 2000 nesting season; just over 10,000 nests were recorded there during the 2005 nesting season. Similarly, increased nesting activity has been recorded on the Texas beaches in the last decade or so from four nests in 1995 to 51nests in 2005 (NPS, 2007). In 2014 there were 119 Kemp's ridley nests on Texas beaches (NPS, 2015) and 159 nests in 2015 (NPS, 2016), of these nests five were found in Matagorda Bay area in 2014 and three were found in 2015. The increase likely can be attributed to two primary factors: full protection of nesting females and their nests in Mexico, and the requirement to use TEDs in shrimp trawls both in the U.S. and in Mexico (NMFS, 2006).

2.9.2 Habitat

Kemp's ridleys inhabit shallow coastal and estuarine waters, usually over sand or mud bottoms. Adults are primarily shallow-water benthic feeders that specialize on crabs, especially portunid crabs, while juveniles feed on sargassum and associated infauna, and other epipelagic species of the Gulf (USFWS and NMFS, 1992). In some regions, the blue crab (*Callinectes sapidus*) is the most common food item of adults and juveniles. Other food items include shrimp, snails, bivalves, sea urchins, jellyfish, sea stars, fish, and occasional marine plants (Campbell, 1995, Pritchard and Marquez, 1973; Shaver, 1991).

2.9.3 Range

Adults are primarily restricted to the Gulf, although juveniles may range throughout the Atlantic Ocean since they have been observed as far north as Nova Scotia (Musick, 1979) and in coastal waters of Europe (Brongersma, 1972). Important foraging areas include Campeche Bay, Mexico, and Louisiana coastal waters.
Almost the entire population of Kemp's ridleys nests on an 11-mile stretch of coastline near Rancho Nuevo, Tamaulipas, Mexico, approximately 190 miles south of the Rio Grande. A secondary nesting area occurs at Tuxpan, Veracruz, and sporadic nesting has been reported from Mustang Island, Texas, southward to Isla Aquada, Campeche. Several scattered isolated nesting attempts have occurred from North Carolina to Colombia.

Because of the dangerous population decline at the time, a head-starting program was carried out from 1978 to 1988. Eggs were collected from Rancho Nuevo and placed into polystyrene foam boxes containing Padre Island sand so that the eggs never touched the Rancho Nuevo sand. The eggs were flown to the U.S. and placed in a hatchery on Padre Island and incubated. The resulting hatchlings were allowed to crawl over the Padre Island beaches into the surf for imprinting purposes before being recovered from the surf and taken to Galveston for rearing. They were fed a diet of high-protein commercial floating pellets for 7 to 15 months before being released into Texas (mainly) or Florida waters (Caillouet et al., 1995). This program has shown some results. The first nesting from one of these head-started individuals occurred at Padre Island in 1996, and more nesting has occurred since.

2.9.4 Distribution in Texas

Kemp's ridley occurs in Texas in small numbers and in many cases may well be in transit between crustacean-rich feeding areas in the northern Gulf and breeding grounds in Mexico. It has nested sporadically in Texas in the last 50 years. Nests were found near Yarborough Pass in 1948 and 1950, and in 1960 a single nest was located at Port Aransas. The number of nestings, however, has increased in recent years: 1995 (4 nests); 1996 (6 nests); 1997 (9 nests); 1998 (13 nests); 1999 (16 nests); 2000 (12 nests); 2001 (8 nests); 2002 (38 nests); 2003 (19 nests); 2004 (42 nests); 2005 (51 nests); 2006 (102 nests); and 2008 (195 nests) (NPS, 2008). As noted above, some of these nests were from head-started ridleys. Such nestings, together with the proximity of the Rancho Nuevo rookery, probably account for the occurrence of hatchlings and subadults in Texas. According to Hildebrand (1982, 1987), sporadic ridley nesting in Texas has always been the case.

2.9.5 Presence in the Study Area

Seven Kemp's ridleys were captured during netting operations conducted by Texas A&M University at Galveston (TAMUG) near Magnolia Beach in Matagorda Bay from May to October 1996 (Williams and Renaud, 1998). These seven turtles were outfitted with radio or satellite transmitters and tracked between May and November 1996. Most of the subsequent locations were within 4 miles of the western shoreline of Matagorda Bay. Other locations included Lavaca Bay, Carancahua Bay, Tres Palacios Bay, and Powderhorn Lake (Williams and Renaud, 1998). In addition to the netting records, a Kemp's ridley nested on Matagorda Peninsula in 2002, four Kemp's ridleys nested on Matagorda Island in 2006 (NPS, 2007), and two Kemp's ridleys were taken in the entrance channel of the MSC in 2006 (USACE, 2007). During the 2008 nesting season, 195 nests were observed; 13 of these occurred on Matagorda Island. No Kemp's ridley nests were observed on Matagorda Peninsula in 2008 (NPS, 2008).

2.10 LEATHERBACK SEA TURTLE

2.10.1 Reasons for Status

The leatherback sea turtle (*Dermochelys coriacea*) was listed as endangered throughout its range on 2 June 1970 (35 FR 8495), with critical habitat designated in the U.S. Virgin Islands on 26 September 1978 and 23 March 1979 (43 FR 43688–43689 and 44 FR 17710–17712, respectively). Its decline is attributable to overexploitation by man and incidental mortality associated with commercial shrimping and fishing activities. Use of turtle meat for fish bait and the consumption of litter by turtles are also causes of mortality, the latter phenomenon apparently occurring when plastic is mistaken for jellyfish (Rebel, 1974). Nesting populations of leatherback sea turtles are especially difficult to estimate because the females frequently change nesting beaches; however, Spotila et al. (1996) estimated the 1995 worldwide population of nesting female leatherbacks at 26,000 to 42,000. The major threat is egg collecting, although they are jeopardized to some extent by destruction or degradation of nesting habitat (NatureServe, 2018). This species is probably more susceptible than other turtles to drowning in shrimp trawlers equipped with

TEDs because adult leatherbacks are too large to pass through the TED exit opening. Because leatherbacks nest in the tropics during hurricane season, a potential exists for storm generated waves and wind to erode nesting beaches, resulting in nest loss (NMFS and USFWS, 1992).

Critical Habitat: St. Croix, Virgin Islands; Santa Rosa NP., Costa Rica; sites in Mexico. NMFS (*Federal Register*, 12 May 1995) established a leatherback conservation zone extending from Cape Canaveral to the Virginia-North Carolina border and including all inshore and offshore waters; this zone is subject to shrimping closures when high abundance of leatherbacks is documented. Mortality associated with the swordfish gillnet fisheries in Peru and Chile represents the single largest source of mortality for East Pacific leatherbacks (Eckert and Sarti, 1997).

2.10.2 Habitat

The leatherback sea turtle is mainly pelagic, inhabiting the open ocean, and seldom approaches land except for nesting (Eckert, 1992). It is most often found in coastal waters only when nesting or when following concentrations of jellyfish (TPWD, 2006), when it can be found in inshore waters, bays, and estuaries. It dives almost continuously, often to great depths.

Despite their large size, the diet of leatherbacks consists largely of jellyfish and sea squirts. They also consume sea urchins, squid, crustaceans, fish, blue-green algae, and floating seaweed (NFWL, 1980). The leatherback typically nests on beaches with a deepwater approach (Pritchard, 1971).

2.10.3 Range

The leatherback is probably the most wide-ranging of all sea turtle species. It occurs in the Atlantic, Pacific, and Indian oceans; as far north as British Columbia, Newfoundland, Great Britain, and Norway; as far south as Australia, the Cape of Good Hope, and Argentina; and in other water bodies such as the Mediterranean Sea (NFWL, 1980). Leatherbacks nest primarily in tropical regions; major nesting beaches include Malaysia, Mexico, French Guiana, Surinam, Costa Rica, and Trinidad (Ross, 1982). Leatherbacks nest only sporadically in some of the Atlantic and Gulf states of the continental U.S., with one nesting reported as far north as North Carolina (Schwartz, 1976). In the Atlantic and Caribbean, the largest nesting assemblages occur in the U.S. Virgin Islands, Puerto Rico, and Florida (NMFS, 2006).

The leatherback migrates farther and ventures into colder water than any other marine reptile. Adults appear to engage in routine migrations between boreal, temperate, and tropical waters, presumably to optimize both foraging and nesting opportunities. The longest-known movement is that of an adult female that traveled 3,666 miles to Ghana, West Africa, after nesting in Surinam (NMFS and USFWS, 1992). During the summer, leatherbacks tend to occur along the east coast of the U.S. from the Gulf of Maine south to the middle of Florida.

2.10.4 Distribution in Texas

Apart from occasional feeding aggregations such as the large one of 100 animals reported by Leary (1957) off Port Aransas in December 1956, or possible concentrations in the Brownsville Eddy in winter (Hildebrand, 1983), leatherbacks are rare along the Texas coast, tending to keep to deeper offshore waters where their primary food source, jellyfish, occurs. In the Gulf, the leatherback is often associated with two species of jellyfish: the cabbagehead (*Stomolophus* sp.) and the moon jellyfish (*Aurelia* sp.) (NMFS and USFWS, 1992). According to USFWS (1981), leatherbacks never have been common in Texas waters. No nests of this species have been recorded in Texas for at least 70 years (NPS, 2007). The last two, one from the late 1920s and one from the mid-1930s, were both from Padre Island (Hildebrand, 1982).

2.10.5 Presence in the Study Area

A leatherback was caught by a trawler in a shipping channel approximately 1.5 miles north of Aransas Pass (NMFS, 2003). No leatherbacks have been taken by dredging activities in Texas (USACE, 2019). One leatherback nest was observed during the 2008 nesting season on the Padre Island National Seashore (NPS, 2008). This species is unlikely to occur in the study area.

2.11 LOGGERHEAD SEA TURTLE

2.11.1 Reasons for Status

USFWS listed the loggerhead turtle (*Caretta caretta*) as threatened throughout its range on 28 July 1978 (43 *Federal Register* [FR] 32808). The decline of the loggerhead, like that of most sea turtles, is the result of overexploitation by man, inadvertent mortality associated with fishing and trawling activities, and natural predation. The most significant threats to its population are coastal development, commercial fisheries, and pollution (NMFS, 2006).

2.11.2 Habitat

The loggerhead occurs in the open seas as far as 500 miles from shore, but mainly over the continental shelf, and in bays, estuaries, lagoons, creeks, and mouths of rivers. It favors warm-temperate and subtropical regions not far from shorelines. The adults occupy various habitats, from turbid bays to clear waters of reefs. Subadults occur mainly in nearshore and estuarine waters. Hatchlings move directly to sea after hatching, and often float in masses of sargassum (*Sargassum* sp.). They may remain associated with sargassum for perhaps 3 to 5 years (NMFS and USFWS, 1991a).

Commensurate with their use of varied habitats, loggerheads consume a wide variety of both benthic and pelagic food items, which they crush before swallowing. Conches, shellfish, horseshoe crabs, prawns and other crustacea, squid, sponges, jellyfish, basket starts, fish (carrion or slow-moving species), and even hatchling loggerheads have all been recorded as loggerhead prey (Hughes, 1974; Mortimer, 1982; Rebel, 1974). Adults forage primarily on the bottom, but also take jellyfish from the surface. The young feed on prey concentrated at the surface, such as gastropods, fragments of crustaceans, and sargassum.

Nesting occurs usually on open sandy beaches above the high-tide mark and seaward of well-developed dunes. They nest primarily on high-energy beaches on barrier islands adjacent to continental land masses in warm-temperate and subtropical regions. Steeply sloped beaches with gradually sloped offshore approaches are favored. In Florida, nesting on urban beaches was strongly correlated with the presence of tall objects (trees or buildings), which apparently shield the beach from city lights (Salmon et al., 1995).

2.11.3 Range

The loggerhead is widely distributed in tropical and subtropical seas, being found in the Atlantic Ocean from Nova Scotia to Argentina, the Gulf, Indian and Pacific oceans (although it is rare in the eastern and central Pacific), and the Mediterranean Sea (Iverson, 1986, Rebel, 1974; Ross, 1982). In the continental U.S., loggerheads nest along the Atlantic coast from Florida to as far north as New Jersey (Musick, 1979) and sporadically along the Gulf Coast. In recent years, a few have nested on barrier islands along the Texas coast. The loggerhead is the most abundant sea turtle species in U.S. coastal waters (NMFS, 2006).

2.11.4 Distribution in Texas

The loggerhead is the most abundant turtle in Texas marine waters, preferring shallow inner continental shelf waters and occurring only very infrequently in the bays. It often occurs near offshore oil rig platforms, reefs, and jetties. Loggerheads are probably present year-round but are most noticeable in the spring when a favored food item, the Portuguese man-of-war (*Physalia physalis*), is abundant. Loggerheads constitute a major portion of the dead or moribund turtles washed ashore (stranded) on the Texas coast each year (Sea Turtle Stranding and Salvage Network [STSSN], 2018). A large proportion of these deaths are the result of accidental capture by shrimp trawlers, where caught turtles drown and then are thrown overboard. Before 1977, no positive documentation of loggerhead nests in Texas existed (Hildebrand, 1982). Since that time, several nests have been recorded along the Texas coast. In 1999, two loggerhead nests were confirmed in Texas, while in 2000, five loggerhead nests were confirmed. Between 2001 and 2005, up to five loggerhead nests per year have been recorded from the Texas coast. Two loggerhead nests were recorded in 2006: one on Padre Island National Seashore and the other on South Padre Island (National Park Service [NPS], 2007). During the 2008 nesting season, four loggerheads were observed nesting on Texas beaches, two on Padre Island National Seashore, one on Bolivar Peninsula, and one on Mustang Island (NPS, 2008). Like the worldwide population, the population of loggerheads in Texas has declined. Prior to World War I, the species was taken in Texas for local consumption and a few were marketed (Hildebrand, 1982). Today, even with protection, insufficient loggerheads exist to support a fishery.

2.11.5 Presence in the Study Area

Critical habitat for the loggerhead turtle was designated on 10 July 2014 (79 FR 39856). Critical habitat was designated for areas of breeding, migration, and feeding (*Sargassum* habitat). Only the *Sargassum* habitat is present off the Texas coast. This habitat is described as “developmental and foraging habitat for young loggerheads where surface waters form accumulations of floating material, especially *Sargassum*." The areas identified as *Sargassum* habitat include the western Gulf of Mexico to the eastern edge of the Loop Current and the Atlantic ocean from the Gulf of Mexico along the northern/western boundary of the Gulf Stream and east to the outer edge of the U.S. Exclusive Economic Zone (EEZ) (79 FR 39881).

"Specifically, the Gulf of Mexico area has as its northern and western boundaries the 10 m depth contour starting at the mouth of South Pass of the Mississippi River and proceeding west and south to the outer boundary of the U.S. EEZ. The southern boundary of the area is the U.S. EEZ from the 10 m depth contour off of Texas to the Gulf of Mexico-Atlantic border (83° W. long.). The eastern boundary follows the 10 m depth contour from the mouth of South Pass of the Mississippi River at 28.97° N. lat., 89.15° W. long., in a straight line to the northernmost boundary of the Loop Current (28° N. lat., 89° W. long.) and along the eastern edge of the Loop Current roughly following the velocity of 0.101–0.20 m/second as depicted by Love *et al.* (2013) using the Gulf of Mexico summer mean sea surface currents from 1993–2011, to the Gulf of Mexico Atlantic border (24.58° N. lat., 83° W. long.). The delineation between the Gulf of Mexico and the Atlantic Ocean starts at 24.58° N. lat., 83° W. long. (near the Dry Tortugas), and proceeds southward along 83° W. long. to the outer boundary of the EEZ (23.82° N. lat.) (79 FR 39882-39883).

Loggerhead nests are uncommon in Texas. In 2014 only two nests were found along Texas beaches (NPS, 2015) while in 2015 this number increased to eight nests (NPS, 2016). All but two of the nests were found in the Padre Island area. The two found outside of Padre Island were located on San Jose Island in 2015 (NPS, 2016).

This species has been recorded from the study area. A loggerhead turtle was killed in 1996 during dredging operations in the entrance channel of the MSC, and two loggerheads were taken in the entrance channel of the MSC during dredging operations in 2006 (USACE, 2018).

2.12 WHALES

NMFS identifies five whale species of potential occurrence in the Gulf. These are the sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), fin (or finback) whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*). These species are generally restricted to deeper offshore waters; therefore, it is unlikely that any of these five species would regularly occur in the study area (NMFS, 2003).

2.13 CORALS

NMFS identifies four invertebrate coral species of potential occurrence in the Gulf. These are the lobed star (*Orbicella annularis*), mountainous star (*Orbicella faveolata*), boulder star (*Orbicella franksi*), and elkhorn coral (*Acropora palmata*). These species are generally restricted to deeper offshore waters; therefore, it is unlikely that any of these four species would regularly occur in the study area.

2.14 GOLDEN ORB

2.14.1 Reasons for Status

USFWS announced a 90-day finding on the golden orb (*Quadrula aurea*) on 15 December 2009 (74 FR 66261). The species was added to the list of candidate species on 6 October 2011 (76 FR 62166). The primary threat to the species is the degradation and loss of habitat (Neves, 1991). Impoundments, sedimentation of rivers, dewatering of rivers, sand and gravel mining, and chemical contamination are some of the leading causes of habitat loss and degradation (Neck, 1982; Howells et al., 1996; Winemiller et al.,2010).

Candidate species are not protected under the ESA, but would be subject to all the protections of the ESA were it to be listed prior to, or during, the construction of the project.

2.14.2 Habitat

The golden orb is found almost exclusively in the flowing waters of medium sized rivers (Howells, 2002a). They prefer mud, sand, and gravel substrates and does not tolerate looser packed substrates, such as loose sand or silt (Howells, 2002b).

2.14.3 Range

The golden orb is endemic to the Guadalupe, San Antonio, and Nueces-Frio river basins in central Texas. Their distribution has shrunk significantly and has currently only been reported in Lake Corpus Christi, the Guadalupe, the lower San Marcos, and the lower San Antonio Rivers (76 FR 62166).

2.14.4 Presence in the Study Area

The golden orb has not been noted in the study area. Because the project is located in estuarine and open Gulf waters the species is not expected to be found within the project area.

3.0 EFFECTS ANALYSIS AND AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

In this document, the USACE presents their determinations about each species potentially occurring within the affected area of the MSC Improvement Project, using language recommended by USFWS:

- *No effect* – USACE determines that its proposed action will not affect a federally listed species or critical habitat;
- *May affect, but not likely to adversely affect* – USACE determines that the project may affect listed species and/or critical habitat; however, the effects are expected to be discountable, insignificant, or completely beneficial; or
- *Likely to adversely affect* – USACE determines adverse effects to listed species and/or critical habitat may occur as a direct result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or completely beneficial. Under this determination, an additional determination is made whether the action is likely to jeopardize the continued survival and eventual recovery of the species.

Following USACE effect determinations for the project on federally listed species, USFWS and NMFS will review the information and complete the Section 7 consultation process under the ESA. Because a Biological Opinion (BO) has already been received from NMFS, they will be notified of changes to this BA to ensure that the BO is still appropriate.

The following sections provide the USACE's findings and species-specific avoidance, minimization, and conservation measures that support the effect determinations.

3.1 Gulf Coast Jaguarundi

Because the jaguarundi is not expected at present to occur in the project area, no impacts and no effects are anticipated as a result of the proposed project.

3.2 West Indian Manatee

This species is highly unlikely to occur in the project area; therefore, the project may affect, but is not likely to adversely affect manatees. Several measures will be taken to ensure avoidance and pertain to dissemination of appropriate information to the project construction and operations employees. The following recommendations will be included in the plans and specifications for the project: 1) All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.; 2) All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.; 3) Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.; 4) All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.; 5) Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Houston (1-281-286-8282).; 6) Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle

Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

3.3 Northern Aplomado Falcon

This falcon is not expected at present to occur in the project area. Therefore, no impacts and no effects are anticipated as a result of the proposed project.

3.4 Piping Plover

Proposed designated and designated critical habitat occurs in the vicinity of the project area in Texas Units 19 through 27; the study area includes CH TX-24 and a portion of TX-21. Designation of critical habitat for the piping plover has been temporarily vacated for units TX-22 and TX-23 within the project area; however, these areas continue to be valuable habitat for wintering piping plovers. The primary constituent elements (PCEs) for the piping plover wintering habitat are those components that are essential for the primary biological needs of foraging, sheltering, and roosting, and only those areas containing these PCEs within the designated boundaries are considered critical habitat. The PCEs are found in coastal areas that support intertidal beaches and flats (between annual low and high tide) and associated dune systems and flats above annual high tide (65 FR 41781–41812, 6 July 2000).

No placement of dredged material will occur within areas of designated critical habitat or in areas that include PCEs for this species. There are three PCEs in the critical habitat designation. The first is that the intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. The placement of material in the sand engine is not expected to directly or indirectly adversely affect the foraging behavior of the piping plover, because the material is not significantly different from that already present. The second PCE concerns the adjacent unvegetated or sparsely vegetated sand or mud flats above the high tide line, which are important for roosting piping plovers. These areas may have detritus, debris, or microtoporgraphic relief which offer refuge from high winds and cold weather. The placement of material will not directly affect these areas and is not expected to directly or indirectly affect the roosting of piping plovers, because the material is not significantly different from that already present. The third PCE is focused on the backbeach, that area above the mean high tide seaward of the dune line. This components of this beach/dune system include sparsely vegetated areas for roosting and sheltering from storms and spits and washover areas for feeding and roosting. The placement of material will not directly affect these areas and is not expected to directly or indirectly adversely affect the feeding, sheltering, or roosting of piping plovers, because the material is not significantly different from that already present.

The designated critical habitat for the piping plover would not be directly affected by construction or dredging activities. The piping plover has been recorded at several places in the vicinity of the project area, according to NDD (2006b); however, several decades (1958–2003) of Christmas Bird Count (NAS, 2002) and Ebird (ebird.org) data were reviewed, and piping plovers were not observed along shorelines planned for beach nourishment. The critical habitat may be indirectly affected by placement of material in the offshore sand engine. However, this material placement is not expected to adversely modify the habitat, nor is it expected to directly affect piping plover feeding or behavior. Material placement is expected, in the long term, to prolong the viability of the barrier island where the critical habitat is designated. The source of the material to be used for the sand engine is from the portion of the channel offshore beyond the entrance channel. This material is of the same geological source as that already feeding the beach and should be of the same composition and color as the sand already present on the beach. Recent core samples indicate the material is suitable for beach placement. Conservation measures include survey for presence or absence prior to construction and additional core samples of the sediments to ensure that the composition and color of the sand match that of the existing beach which the sand engine will be feeding. The location of the sand engine is sufficiently far enough offshore (more than 4,000m) that placement of the material is not expected to adversely affect the foraging, sheltering, or roosting of piping plover. Noise from placement activities at the sand engine would dissipate to an ambient level at the beach. Noise from dredging and offshore sand engine placement may affect, but are not likely to adversely affect the species as a result of the proposed project.

3.5 Red Knot

The red knot occurs in limited numbers in the project area, though is known to utilize similar habitat to that of the piping plover. A review of several decades (1958–2003) of Christmas Bird Count (NAS, 2002) and Ebird (ebird.org) data did not show any sightings of red knots along shorelines planned for beach nourishment. The location of the sand engine is sufficiently far enough offshore (more than 4,000m) that placement of the material is not expected to adversely affect the foraging, sheltering, or roosting of red knots. Noise from placement activities at the sand engine would dissipate to an ambient level at the beach. Material placed in the offshore sand engine is expected, in the long term, to prolong the viability of the barrier island where potential red knot habitat may exist. This material is of the same geological source as that already feeding the beach and should be of the same composition and color as the sand already present on the beach. Recent core samples indicate the material is suitable for beach placement. Conservation measures include survey for presence or absence prior to construction and additional core samples of the sediments to ensure that the composition and color of the sand match that of the existing beach which the sand engine will be feeding. Noise from dredging and offshore sand engine placement may affect, but are not likely to adversely affect the species as a result of the proposed project.

3.6 Whooping Crane

Critical habitat for the whooping crane has been documented adjacent to the project area to the southwest, but no critical habitat will be affected by this project. The greatest concern of impacts to whooping cranes involves collisions with structures that are greater than 15 ft in height and smaller than 1 inch in diameter. Research provided in the USFWS Recovery Plan for the whooping crane illustrates that “tests of line marking devices, using sandhill cranes as a surrogate research species, have identified techniques effective in reducing collisions by up to 61%” (Brown and Drewien, 1995; Morkill, 1990; Morkill and Anderson, 1991, 1993; Canadian Wildlife Service and USFWS, 2007). As a conservation measure the following recommendations will be included as best management practices (BMPs) in the plans and specifications - Project equipment that may be a collision hazard to the whooping crane (guy wires that support the dredging equipment, telecommunications towers on the dredges, and antenna or similar items located on the dredges) will be marked using red plastic balls or other suitable marking devices sized and spaced, as directed by USFWS, and lighted during inclement weather conditions when low light and/or fog is present. This BMP would be implemented at the beginning of October through April when whooping cranes are known to be present within the project vicinity. In the event of an unanticipated spill, a project-specific Spill Response Plan will be prepared and implemented prior to the onset of construction activities. With the implementation of the above listed BMPs, this project may affect but is unlikely to adversely affect this species.

3.7 Marine (Sea) Turtles

The responsibility for agency consultation on marine reptiles is divided between two federal agencies: the NMFS for sea turtles in the water, and the USFWS for nesting sea turtles.

Sea turtles may be present in the water within the project dredging sites during certain times of the year. Thus, construction and post-construction maintenance activities could result in impacts to sea turtles. Five species of sea turtle occur in Texas waters: Kemp’s ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, loggerhead sea turtle, and green sea turtle. Since October 1996, three loggerheads, two Kemp’s ridleys, and one green sea turtle have been taken during maintenance dredging of the entrance channel of the MSC (USACE, 2007). During the 2008 nesting season, a total of 204 sea turtle nests were observed on Texas beaches: 195 Kemp’s ridley, 1 leatherback, 4 loggerhead, and 4 green turtles (NPS, 2008). NPS reports that 13 of the 195 Kemp’s ridleys nested on Matagorda Island, but no nests were observed on Matagorda Peninsula. No leatherback, loggerhead, or green sea turtle nests were observed on Matagorda Island or Matagorda Peninsula (NPS, 2008).

3.7.1 Channel Construction Dredging (New Work) and Maintenance

The proposed project calls for the use of pipeline, mechanical, and hopper dredges. It has been well documented that hopper dredging activities occasionally result in sea turtle entrainment and death, even with seasonal dredging windows, V-shaped turtle-deflector dragheads, and concurrent relocation trawling (NMFS, 2003, 2005). Between February 1995 and November 2006, hopper dredging activities within the USACE, Galveston District resulted in 60 lethal takes of sea turtles: 26 loggerheads, 21 green turtles, and 13 Kemp’s ridleys (USACE, 2007). Sea turtles easily avoid pipeline dredges due to the slow movement of the dredge. Apart from direct mortality, dredging activities could have an impact on sea turtles through an increase in sedimentation, turbidity, and resuspension of toxic sediments.

The sedimentation resulting from dredging activities may affect food sources for the turtles, and the turbidity could affect primary productivity. This would be short term, however. The increased possibility of chemical or oil spills could pose a threat to turtles both directly and indirectly through their food source. While adult sea turtles may be mobile enough to avoid areas of high oil or chemical concentrations, hatchlings, posthatchlings, and juveniles in the area would be more susceptible. An increase in marine traffic may result in a higher incidence of collision with sea turtles. Other potential impacts as a result of the project include disorientation because of lighting on vessels, and increased accumulation of plastic detritus.

As noted above, hopper dredging may result in mortality of individual Kemp's ridleys. Since October 1996, two Kemp's ridleys have been taken during maintenance dredging of the MSC (USACE, 2007). This species is seasonal in nearshore waters of Texas. During the onset of colder waters in December, Kemp's ridley will move away from inshore waters into deeper waters, returning in March with warmer waters, ready to nest on the Texas coast and to forage in tidal passes and bays (NMFS, 2003). Restriction of hopper dredging activities to between December 1 and March 31, whenever possible, would reduce the likelihood of direct mortality. Hopper dredging impacts on sea turtles will be minimized by following the reasonable and prudent measures included in the BO prepared by the NMFS for construction and the most recent BO for maintenance dredging in the Gulf of Mexico.

Since October 1996, three loggerhead sea turtles and one green sea turtle have been taken during maintenance dredging of the MSC (USACE, 2007). As with the Kemp's ridley sea turtle, these two species could be negatively impacted by dredging activities. The green sea turtle is known to move into warmer waters during the winter (Shaver, 2000). Two green sea turtles captured at Magnolia Beach in the study area and tracked using satellite telemetry moved 112 miles south into south Texas offshore waters during the winter (Williams and Renaud, 1998). Working within similar windows as described for Kemp's ridleys, and having relocation trawlers working ahead of the dredges, would help to reduce these impacts.

The hawksbill sea turtle has not been recorded from the study area, and no hawksbills have been taken during hopper dredging activities in Texas (USACE, 2007). Nevertheless, the proposed hopper dredging activity can be considered as causing potential adverse effects to hawksbill sea turtle.

Of the five species of sea turtles occurring in Texas waters, the leatherback is the species least likely to be affected by the proposed project because of its rare occurrence and pelagic nature. It is unlikely to occur in the action area and has not been caught in hopper dredges.

3.7.2 Placement of Dredged Materials

The sedimentation resulting from placement of dredged material may affect food sources for turtles, and turbidity could affect primary productivity. PAs would result in the direct loss of bay bottom over the course of the project. This bay bottom may be foraging or resting habitat for sea turtles. If sea turtles are present at disposal sites, they may be affected by sedimentation and turbidity. They could also be exposed to trash and debris; however, turtles should be easily able to overcome a descending plume, and available food sources should not be seriously reduced.

A Kemp's ridley nested on Gulf beaches of Matagorda Peninsula in 2002 and four Kemp's ridleys nested on Gulf beaches on Matagorda Island in 2006 (NPS, 2007). No material would be placed on Gulf beaches as part of the proposed project. Because Kemp's ridleys nest during daylight hours, no disorientation for adults from boat lighting would occur. Hatchlings, however, emerge from the nest at night and may be adversely affected by lighting on the boats. Under natural conditions, hatchlings typically take the shortest route to the water's edge. Bright lights on a nearshore hopper dredge may cause the hatchlings to move toward the lights, resulting in a more circuitous route to the water or open ocean, thereby exposing them to more danger. While nesting in the project area is uncommon, dredging outside of the nesting/emergence season, turning off/lowering/ shielding unessential lighting, and use of shielded, low-sodium vapor lights for those that cannot be safely eliminated would reduce this potential disorientation impact.

Placement of material in the offshore sand engine may have indirect effects on nesting sea turtles. The material placed in the sand engine will, over time, migrate to the beach outside the jetty. The source of the material to be used for the sand engine is from the portion of the channel offshore beyond the entrance channel. This material is of the same geological source as that already feeding the beach and should be of the same composition and color as the sand already present on the beach. Recent core samples indicate the material is suitable for beach placement. To minimize the impacts to nesting sea turtles additional core samples of the sediments will be taken prior to dredging to ensure that the composition and color of the sand match that of the existing beach which the sand engine will be feeding.

3.7.3 Additional Effects

Eastward expansion of oil and gas exploration and extraction in the Gulf and within the study area may be the major future change that could combine with other marine activities (commercial fishing, increased marine transport) and their effects (oil spills, accumulated plastic debris, fishing gear, contaminants, vessel collisions with turtles) to adversely impact marine turtles (NMFS, 2007). These activities, in addition to natural predation and habitat loss/activity disruption due to land development and increases in human density near turtle nesting areas, result in a cumulative adverse effect on sea turtles. The proposed channel improvement activities were considered with other impacts to determine whether or not the proposed project could reduce these species' survival and/or potential recovery. USACE has determined that these combined impacts may affect but are not likely to adversely affect these species.

3.7.4 Avoidance, Minimization, and Conservation Measures

Avoidance measures would include an avoidance plan for hopper dredge impacts to sea turtles. This avoidance plan includes reasonable and prudent measures that have largely been incorporated in USACE civil works projects throughout the Gulf for more than a decade. These measures include use of temporal dredging windows, when possible; intake and overflow screening; use of sea turtle deflector dragheads; observer reporting requirements; and sea turtle relocation/abundance trawling:

- *Hopper Dredging*: hopper dredging activities in Gulf waters from the Mexico-Texas border to Key West, Florida, up to 1 mile into rivers shall be completed, whenever possible, between 1 December and 31 March, when sea turtle abundance is lowest throughout Gulf coastal waters. National Oceanic and Atmospheric Administration (NOAA) should be contacted should dredging need to occur outside of this window.

- *Nonhopper-type Dredging*: pipeline or hydraulic dredges, which are not known to take turtles, must be used whenever possible between 1 April and 30 November in Gulf waters up to 1 mile into rivers.
- *Observers*: Arrangements shall be made for NOAA Fisheries–approved observers to be aboard the hopper dredges to monitor the hopper soil, screening, and dragheads for sea turtles and their remains. Observer coverage sufficient for 100% monitoring (i.e., two observers) of hopper dredging operations is required aboard the hopper dredges in Texas waters between 1 April and 30 November, and whenever surface water temperatures are 51.8°F (11°C) or greater.
- *Screening*: When observers are required on hopper dredges, 100% inflow screening of dredged material is required and 100% overflow screening is recommended. If conditions prevent 100% inflow screening, screening may be reduced gradually, but 100% overflow screening is then required.
- *Sea Turtle Deflecting Draghead*: A state-of-the-art rigid deflector draghead must be used on all hopper dredges in all Gulf channels and sand-mining sites at all times of the year.
- *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges must be reported to NOAA Fisheries by onboard endangered species observers within 24 hours of any observed sea turtle take. A preliminary report summarizing the results of the hopper dredging and any documented sea turtle takes must be submitted to NOAA Fisheries within 30 working days of completion of any dredging project. In addition, an annual report (based on fiscal year) must be submitted to NOAA Fisheries summarizing hopper dredging projects and documented incidental takes.
- *Relocation Trawling*: Relocation trawling shall be undertaken if two or more turtles are taken in a 24-hour period in the project or if other conditions outlined in the BO are met. Handling of sea turtles captured during relocation trawling in association with a hopper dredging project in Gulf navigation channels shall be conducted by NOAA Fisheries–approved endangered species observers.
- *Lighting*: Unnecessary lighting on dredges should be turned off, shielded, or lowered to prevent hatchlings from moving towards the light sources. In addition, low-sodium vapor lights should be used whenever possible.

3.7.5 Nesting Sea Turtles

The placement of dredged material in areas of potential sea turtle nesting can impact the success of turtle hatching and survival. The material to be placed on the beaches needs to match the existing material in both composition and color so that the adult turtles will continue to utilize the nesting habitat. In addition lighting must not be used which will confuse turtle hatchlings and keep them from returning to the Gulf waters. There have been no reported green, hawksbill, leatherback, or loggerhead nesting sites within the study area. The closest reported turtle nesting sites are one Kemp's ridley nest on Matagorda Peninsula in 2002 and four nests on Matagorda Island in 2006 (NPS, 2007).

The source of the material to be used for the sand engine is from the portion of the channel offshore beyond the entrance channel. This material is of the same geological source as that already feeding the beach and should be of the same composition and color as the sand already present on the beach. Recent core samples indicate the material is suitable for beach placement. The sand engine is far enough offshore (more than 4,000m) that the placement activities are not expected to adversely affect nesting sea turtles. As a conservation measure to nesting sea turtles additional core samples of the sediments will be taken prior to dredging to ensure that the composition and color of the sand match that of the existing beach which the sand engine will be feeding. In addition turning off/lowering/ shielding unessential lighting, and use of shielded, low-sodium vapor lights on the dredges for those that cannot be safely eliminated would reduce the potential disorientation impact to hatchlings.

3.7.6 Effect Determinations

Project activities may affect, but are not likely to adversely affect, nesting sea turtles (Kemp's ridley, loggerhead, green, and hawksbill) in the project area. The project area is approximately 16 miles from known nesting locations. No effect is anticipated for nesting leatherback sea turtles; however, the placement of dredged material may affect, but is not likely to adversely affect, leatherback sea turtles because of secondary impacts potentially associated with the placement of dredged material in the bay and the sand engine. Effect determinations due to hopper dredging activities are likely to adversely affect Kemp's ridley, loggerhead, green, hawksbill, and leatherback sea turtles. Dredging and placement activities are not expected to have an effect on the critical *Sargassum* habitat of loggerhead turtles. Effect determinations, based on the information presented in this document and in the EIS, are presented in Table 3.

In summary, construction and post-construction maintenance hopper dredging activities may result in incidental take of individual sea turtles, although upland and ocean placement of dredged materials are not expected to impact sea turtles. Feeding opportunities within the proposed channel and nearby nesting beaches could attract sea turtles, where they might be exposed to additional cumulative risks from boat traffic, contaminants, fishing and fishing gear, and accumulated plastic debris. The likelihood of adverse effects, including incidental take, during construction and maintenance are greatly reduced by full implementation of the avoidance, minimization, and conservation measures outlined above. Incidental take, if it occurs, may effect but is not likely to adversely affect these species.

3.8 Golden Orb

Because there is no suitable habitat for the golden orb within the project area, no impacts and no effects are anticipated as a result of the proposed project.

3.9 Whales

None of the five whale species are expected to occur in the project area; therefore, no effects to the five whale species are anticipated from the proposed action.

3.10 Corals

None of the four coral species are expected to occur in the project area; therefore, no effects to the four coral species are anticipated from the proposed action.

Table 3. Effect determinations for threatened and endangered wildlife species of possible occurrence in Calhoun and Matagorda Counties, Texas

Common Name	Dredging Activities	Placement Activities
Mammals		
Gulf Coast jaguarondi	No effect	No effect
West Indian manatee	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Blue whale	No effect	No effect
Finback whale	No effect	No effect
Humpback whale	No effect	No effect
Sei whale	No effect	No effect
Sperm whale	No effect	No effect
Birds		
Northern aplomado falcon	No effect	No effect
Piping plover	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Red knot	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Whooping crane	May affect, not likely to adversely affect	May affect, not likely to adversely affect
Reptiles**		
Green sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Hawksbill sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Kemp’s Ridley sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Leatherback sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Loggerhead sea turtle	Likely to adversely affect	May affect, not likely to adversely affect
Corals		
Lobed star	No effect	No effect
Mountainous star	No effect	No effect
Boulder star	No effect	No effect
Elkhorn coral	No effect	No effect
Clams		
Golden Orb	No effect	No effect

** The likelihood of adverse effects (incidental take) of sea turtles due to dredging activities is greatly reduced by implementation and adherence to the conservation measures. Adverse effects are not expected to jeopardize the continued survival or recovery of the species.

4.0 SUMMARY

The proposed project may affect a few federally listed endangered or threatened species. The golden orb, listed whale species, and listed coral species are unlikely to occur in the project area, and therefore, no effects are expected for these species. The project may affect, but is not likely adversely affect, the following species: Gulf coast jaguarondi, West Indian manatee, northern aplomado falcon, piping plover, red knot, and whooping crane. Placement of dredged material may affect, but not likely adversely affect sea turtle species (green, hawksbill, Kemp's ridley, leatherback and loggerhead). Dredging activities may affect, but not likely adversely affect some sea turtle species (green, hawksbill, Kemp's ridley, and leatherback). Dredging activities are likely to adversely affect loggerhead sea turtles, but it is unlikely to jeopardize the continued survival or eventual recovery of these species. The project is unlikely to jeopardize/destroy or adversely modify critical habitat for any listed species. Species effect determinations are summarized in Table 3.

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United States Department of the Interior
FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

In Reply Refer To:
FWS/R2/02ETT
X00-2019-I-2182

July 31, 2019

Colonel Timothy R. Vail
Attention: Mr. Douglas Simms, Environmental Compliance Branch
U.S. Army Corps of Engineers, Galveston District
P.O. Box 1229
Galveston, Texas 77553

Dear Colonel Vail:

Thank you for your request for concurrence with the July 31, 2019 Final Biological Assessment (BA) for the deepening and widening of the Matagorda Ship Channel in Matagorda and Calhoun Counties, Texas. The U.S. Army Corps of Engineers (Corps) submitted documentation to the U.S. Fish and Wildlife Service (Service) requesting concurrence that the proposed project "may affect, but is not likely to adversely affect" the West Indian manatee *Trichechus manatus,* piping plover *Charadrius melodus*, and rufa red knot *Calidris canutus rufa*, whooping crane *Grus Americana* or green *Chelonia mydas*, loggerhead *Caretta,* hawksbill *Eretmochelys imbricata*, and Kemps ridley *Lepidochelys kempii* sea turtles, pursuant to the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq*.). The BA also made a determination that the project would not adversely modify piping plover critical habitat.

Section 7 of the Act requires that all Federal agencies consult with the Service to ensure that the actions authorized, funded, or carried out by such agencies do not jeopardize the continued existence of any threatened or endangered species or adversely modify or destroy designated critical habitat of such species.

Please note that the 2015 Memorandum of Understanding defining roles of the Service and the National Marine Fisheries Service (NMFS) states that the NMFS shall have jurisdiction for sea turtles, including parts and products, when in the marine environment ("marine environment" means oceans and seas, bays, estuaries, brackish or riparian water areas, and any other marine waters adjacent to the terrestrial environment) and for activities affecting sea turtles and their habitats in the marine environment. It also states that the Service shall have jurisdiction for sea turtles, including parts and products, when in the terrestrial environment and for activities affecting sea turtles and their habitats in the terrestrial environment. Therefore, this concurrence only applies to the effects of the project on nesting sea turtles.

The Service concurs that the proposed project will not adversely modify piping plover critical habitat and is not likely to adversely affect the federally listed West Indian manatee, whooping crane, piping plover, red knot, or nesting sea turtles since the effects are insignificant or discountable. This concurrence is based upon a review of Service files, the Corps July 31, 2019 Biological Assessment, additional information provided by e-mails, and on the implementation of the following voluntary conservation measures to reduce potential effects to the species to insignificant and/or discountable levels:

West Indian Manatee –

- All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.
- All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.
- Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.
- All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shut down if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes' elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
- Any collision with or injury to a manatee shall be reported immediately to the Texas Marine Mammal Stranding Network (TMMSN) Hotline at 1-888-9-MAMMAL. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Houston (281-212-1504).
- Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shutdown of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

Piping Plover –

- Survey for presence or absence one month prior to construction using qualified monitors. Provide survey report identifying surveyor, date, time, and number of each observation to the Service's Texas Coastal Ecological Service's Field Office prior to the start of construction.

- Conduct additional core samples of the sediments to be used as part of the sand engine to ensure the composition and color of the sand match that of the existing beach.

Red Knot –

- Survey for presence or absence one month prior to construction using qualified monitors. Provide a survey report identifying surveyor, date, time, and number of each observation to the Service's Texas Coastal Ecological Service's Field Office prior to the start of construction.
- Conduct additional core samples of the sediments to be used as part of the sand engine to ensure the composition and color of the sand match that of the existing beach.

Whooping crane -

- Avoid construction during the wintering season of October 1 to April 15 to the extent practicable.
- If construction during the wintering season is necessary, all work crews will be trained in whooping crane identification prior to the start of construction.
- If a whooping crane is identified within 1,000 feet of an active construction area, all work shall immediately stop. When the crane has left the 1,000-ft area on its own accord, work may continue.
- If work occurs in potential habitat during the wintering season, all equipment greater than 15 feet high should be laid down at dusk and overnight so as to avoid whooping crane strikes during times of low visibility.
- If equipment cannot be laid down at dusk or overnight, then such equipment will be marked using red plastic balls or other suitable marking devices and lighted during inclement weather conditions when low light and/or fog is present.
- All whooping crane sightings should be immediately reported to the Texas Coastal Ecological Services Field Office at 281-212-1504.
- A project specific spill response plan will be prepared and implemented prior to the onset of construction activities.

Nesting Sea Turtles –

- Conduct additional core samples of the sediments to be used as part of the sand engine to ensure the composition and color of the sand match that of the existing beach.
- Unessential lighting would be turned off/lowered/shielded and essential lighting would consist of shielded, low-sodium vapor lights on the dredges to reduce the potential disorientation impact to new hatchlings on the beach.
- No work will be conducted on the gulf beach.

We appreciate your efforts to conserve these sensitive species. No further endangered species consultation will be required unless: 1) the identified action is subsequently modified in a manner that causes an effect on a listed species or designated critical habitat; 2) new information reveals the identified action may affect federally protected species or designated critical habitat in a manner or to an extent not previously considered; 3) a new species is listed or a critical habitat is designated under the Act that may be affected by the identified action; or, 4) the project is not completed within five years from the date of this consultation. If you have any questions or comments, please feel free to contact David Hoth, Assistant Field Supervisor at 281/212-1504.

Sincerely,

acting for

Charles Ardizzone
Field Supervisor

Enclosure 4 – Public Involvement

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects

Integrated Draft Feasibility Report and Environmental Impact Assessment

December 2018

(NOTE: This page intentionally left blank.)

1.0 INTRODUCTION

On January 24, 2017, a public scoping meeting was held to provide the public with information about the preparation of a Draft Environmental Impact Statement (DEIS) and concurrent U.S. Army Corps of Engineers (USACE) Feasibility Study, the proposed Project, how the public can participate in the process, and gather information regarding public questions, concerns, and issues regarding the proposed Project. Further information regarding the public scoping meetings is detailed below.

1.1 PROJECT BACKGROUND

The Environmental Impact Statement (EIS) and Feasibility Study for the proposed Matagorda Ship Channel (MSC) Project are intended to identify and evaluate a combination of modifications to improve the efficiency and safety of the Matagorda Ship Channel.

The USACE is leading this study in collaboration with the non-Federal sponsor, the Port of Calhoun Authority. The Corps leads the development of the EIS and their own Feasibility Study. The EIS preparation and Feasibility Study will be conducted concurrently to result in a single integrated Feasibility Study and EIS document.

In December 2016, a *Notice of Intent to Prepare a Draft Environmental Impact Statement for the Matagorda Ship Channel, TX* was published in the Federal Register.

The study will evaluate a range of alternatives for deepening and widening the MSC from offshore in the Gulf of Mexico (Gulf) through the Point Comfort turning basin. Modifications to the existing 26- mile long navigation channel are needed to reduce transportation costs and increase operational efficiencies of maritime commerce movement through the channel. The existing MSC is comprised of an entrance channel about 4 miles long from the Gulf through a man-made cut across Matagorda Peninsula. The bayside channel is about 22 miles long across Matagorda and Lavaca Bays to Point Comfort with a turning basin at Point Comfort. Offshore and through the Matagorda Peninsula, the channel has a 300-foot bottom width and is maintained at a depth of 40 feet mean lower low water (MLLW). Generally, in Matagorda and Lavaca Bays, the channel has a 200-foot wide bottom width and is authorized to a project depth of 38 feet MLLW. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet MLLW and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The DIFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan (DMMP) for the material that would generated by construction and operation of the modified channel.

2.0 PUBLIC SCOPING MEETING PROCESS SUMMARY

The overall public scoping meeting process consisted of the following elements:

• Publishing a *Notice of Intent to Prepare a Draft Environmental Impact Statement for the Matagorda Ship Channel, TX* in the Federal Register

• Distributing a public notice announcing the upcoming public scoping meeting and its location to newspapers
• Distributing public notices by mail to federal, state, and other government agencies and officials, and other interested parties
• Holding an interagency workshop with state and federal agencies to discuss problems and opportunities related to the project
• Holding a public scoping meeting to provide the public with information about the preparation of a Draft DEIS and concurrent USACE Feasibility Study, the proposed Project, how the public may participate in the process, and gather information regarding public questions, concerns, and issues regarding the proposed project
• Reviewing and considering all comments received during the comment period, andthose received after the comment period to the extent practicable

3.0 PUBLIC NOTIFICATIONS

Notifications were made available to the public through published notices.

3.1 NOTICE OF INTENT

The *Notice of Intent to Prepare a Draft Environmental Impact Statement for the Matagorda Ship Channel, TX* was prepared by the USACE and published in the Federal Register, Volume 81, No. 247, on Friday, December 23, 2016. The Federal Register notice is included in **Attachment A**.

3.2 ADVERTISING

Legal notices were published in the *Victoria Advocate* announcing the date, time, location, purpose of the public scoping meeting, and the opportunity for hearing impaired or language translation services if requested.

Affidavits of publication and copies of the legal notices are included in **Attachment B**.

4.0 INTERAGENCY MEETING

The interagency workshop took place on April 27, 2017, from 1:00 to 3:00 p.m., at the USACE Galveston District Headquarters, 2000 Fort Point Road, Galveston, Texas. The purpose of the workshop was to gain early agency stakeholder input as recommended by ER 1105-2-100 on the problems and opportunities related to improving deep draft navigation in the planned reaches of the Matagorda Ship Channel.

Letters inviting stakeholder agencies to participate as cooperating agencies were distributed on
December 16, 2016. Copies of the letters are included in **Attachment C**.

5.0 TRIBAL CONSULTATIONS

Six tribal consultation letters were distributed on December 23, 2016, and Texas tribes were invited to participate in the interagency meeting. Copies of the letters are included in **Attachment C**.

6.0 PUBLIC SCOPING MEETING

The public scoping meeting took place on January 24, 2017, at Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas, 77979 from 5:30 p.m. to 7:30 p.m.

The public scoping meeting was held in an open house style. Upon arrival, attendees were asked to sign in and were provided with a written comment form. A total of 83 people signed in. Copies of the sign-in sheets can be found in **Attachment D.**

Attendees were invited to view a narrated informational presentation and informational display stations around the room and discuss the proposed project with project representatives from USACE and the Port of Calhoun Authority. Display stations provided project background information and information about the NEPA and concurrent Feasibility Study process. Project representatives were available to answer questions and have one-on-one dialogue with scoping meeting attendees.

During the open house, the public was invited to engage project team members in discussion about problems and opportunities and ask questions. Attendees were invited to submit their comments in writing at the scoping meeting or at any time during the comment period via mail, or e-mail.

6.1 PUBLIC SCOPING MEETING COMMENTS RECEIVED

Six written comments were received at the scoping meeting. Several verbal comments were received in verbal discussions by members of the project team. Written comments received at the scoping meeting and throughout the commenting period will be incorporated into the DEIS, as appropriate. Copies of written comments received are included in **Attachment E**. USACE accepted and considered all comments throughout the NEPA process; however, those submitted after February 13, 2017, may not be represented in the DEIS. USACE responses to these comments are found in **Attachment F.**

7.0 PUBLIC DRAFT FR-EIS MEETING

The public scoping meeting took place on May 15, 2018, at Bauer Exhibit Building, 186 Henry Barber Way, County Road 101, Port Lavaca, Texas, 77979 from 6:00 p.m. to 8:00 p.m. The Notice of Availability of Draft Feasibility Report-Environmental Impact Statement (FR-EIS) was published in the Federal Register on Friday May 4, 2018 (**Attachment G**).

The public draft FR-EIS meeting was held in an open house style. Upon arrival, attendees were asked to sign in and were provided with a written comment form. A total of 56 people signed in. Copies of the sign-in sheets can be found in **Attachment H.**

A presentation of the Tentatively Selected Plan was presented by members of the Project Delivery Team. Attendees were offered the opportunity to make comments on the record as part of the meeting. The meeting was recorded by a stenographer. An official transcript of the meeting can be found in **Attachment I**. Display stations provided project background information and information about the NEPA and concurrent Feasibility Study process. Project representatives were available to answer questions and have one-on-one dialogue with meeting attendees.

During the open house, the public was invited to engage project team members in discussion about problems and opportunities and ask questions. Attendees were invited to submit their comments in writing at the meeting or at any time during the comment period via mail, or e-mail.

7.1 PUBLIC DRAFT FR-EIS MEETING COMMENTS RECEIVED

One written comment was received at the draft FR-EIS meeting. Several verbal comments were received in verbal discussions by members of the project team. Written comments received at the meeting and throughout the commenting period will be incorporated into the EIS, as appropriate. Copies of written comments received are included in **Attachment J**. USACE accepted and considered all comments throughout the NEPA process; however, those submitted, or postmarked, after June 21, 2018, may not be represented in the EIS. USACE responses to these comments are found in **Attachment K.**

Attachment A – Notice of Intent

that cause creek flows to back up and rise would be widened to increase channel conveyance and thus reduce water surface elevation. Included in this widening is a proposed project element to align the channel with a CalTrans project to increase flow capacity at Highway 101 and adjacent frontage roads. Impacts from these activities will be evaluated in the FS/EIS.

c. Alternative 3 includes constructing floodwalls along the channel. This Alternative would consider the addition of floodwalls in Reach 2 as a stand-alone measure and in combination with the bridge replacement and channel widening in Alternative 2.

d. Alternative 4 would consider the addition of a bypass culvert as a stand-alone measure and in combination with the bridge replacement and channel widening in Alternative 2. This alternative may include floodwalls, though at a reduced scale compared to Alternative 3. This alternative includes a new bypass inlet located a few hundred feet upstream from University Avenue that would divert high flows to a culvert beneath Woodland Avenue or a street in Palo Alto. A box culvert would follow a roadway in the downstream direction for approximately 1.0 to 1.5 miles to an outlet structure where high flows would be returned to the creek.

4. Environmental Considerations. In all cases, environmental considerations will include riparian habitat, aquatic habitat, sediment budget, fish passage, recreation, public access, aesthetics, cultural resources, and environmental justice as well as other potential environmental issues of concern.

5. Scoping Process. The USACE and SFCJPA are seeking input from interested federal, state, and local agencies, Native American representatives, and other interested private organizations and parties through provision of this notice and holding of a scoping meeting. The purpose of this meeting is to solicit input regarding the environmental issues of concern and the alternatives that should be discussed in the integrated FS/EIS. The public scoping meeting will be held on January 18, 2017 at 6:30 p.m. at the Laurel School Upper Campus, 275 Elliott Drive in Menlo Park, CA.

6. Availability of integrated FS/EIS. The public will have an additional opportunity in the NEPA process to comment on the proposed alternatives after the draft integrated FS/EIS is released to the public in 2017. It is being issued pursuant to section 102(2)(c) of the National Environmental Policy Act (NEPA) of 1969 as implemented by the Council on Environmental Quality regulations (40 CFR parts 1500–1508).

John C. Morrow,

Lieutenant Colonel, Corps of Engineers District Engineer.

[FR Doc. 2016–30985 Filed 12–22–16; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Intent To Prepare a Draft Environmental Impact Statement for the Matagorda Ship Channel, TX, Feasibility Study

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of Intent.

SUMMARY: The U.S. Army Corps of Engineers (USACE) intends to prepare a Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR–EIS) to assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel (MSC) in Calhoun and Matagorda counties, Texas. The DIFR–EIS will evaluate potential impacts of a range of alternatives, including the No Action alternative, structural and non-structural alternatives which address proposed navigation improvements in the study area. The DIFR–EIS will also present an assessment of impacts associated with the placement of dredged material, including potential new upland, confined placement areas, beneficial use of dredged material sites, and at Ocean Dredged Material Disposal Sites (ODMDS). The U.S. Environmental Protection Agency, as the lead Federal agency for designation of an ODMDS under Section 102 of the Marine Protection, Research and Sanctuaries Act of 1972, will utilize this assessment and public comments on the DIFR–EIS to evaluate the potential designation of a new ODMDS. The non-Federal sponsor for the study is the Calhoun Port Authority.

DATES: Comments on the scope of the DIFR–EIS will be accepted through February 13, 2017.

ADDRESSES: Scoping comments may be sent to: *MSC-Feasibility@usace.army.mil* or to USACE, Galveston District, (Attn: RPEC Coastal Section), P.O. Box 1229, Galveston, TX 77553–1229.

FOR FURTHER INFORMATION CONTACT: Galveston District Public Affairs Office at 409–766–3004 or *swgpao@usace.army.mil.*

SUPPLEMENTARY INFORMATION:

1. *Authority.* The study is authorized under Section 216 of the 1970 Rivers and Harbor Act, Public Law 91–611, 91st Congress, H.R. 19877, dated 31 December 1970.

2. *Proposed Action.* The study will evaluate a range of alternatives for deepening and widening the MSC from offshore in the Gulf of Mexico (Gulf) through the Point Comfort turning basin. Modifications to the existing 26-mile long navigation channel are needed to reduce transportation costs and increase operational efficiencies of maritime commerce movement through the channel. The existing MSC is comprised of an entrance channel about 4 miles long from the Gulf through a man-made cut across Matagorda Peninsula. The bayside channel is about 22 miles long across Matagorda and Lavaca Bays to Point Comfort with a turning basin at Point Comfort. Offshore and through the Matagorda Peninsula, the channel has a 300-foot bottom width and is maintained at a depth of 40 feet mean lower low water (MLLW). Generally, in Matagorda and Lavaca Bays, the channel has a 200-foot wide bottom width and is authorized to a project depth of 38 feet MLLW. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet MLLW and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The DIFR–EIS will also evaluate the impacts and potential benefits of a dredged material management plan (DMMP) for the material that would generated by construction and operation of the modified channel.

3. *Scoping.* A scoping meeting will be held on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, TX 77979, from 5:30 to 7:30 p.m. USACE requests public scoping comments to: (a) Identify the affected public and agency concerns; (b) identify the scope of significant issues to be addressed in the DIFR–EIS; (c) identify the critical problems, needs, and significant resources that should be considered in the DIFR–EIS; and (d) identify reasonable measures and alternatives that should be considered in the DIFR–EIS. Scoping comments are requested to be postmarked by February 13, 2017.

4. *Coordination.* Further coordination with environmental agencies will be conducted under the National

Environmental Policy Act, the Fish and Wildlife Coordination Act, the Clean Water Act, the Clean Air Act, the National Historic and Preservation Act, the Magnuson-Stevens Fishery Conservation and Management Act, the Marine Protection, Research and Sanctuaries Act and the Coastal Zone Management Act under the Texas Coastal Management Program, among others.

5. *Availability of DIFR–EIS.* The DIFR–EIS is currently scheduled for release for public review and comment in April 2018.

Dated: December 14, 2016.

Lars N. Zetterstrom,

Colonel, U.S. Army, Commanding.

[FR Doc. 2016–30986 Filed 12–22–16; 8:45 am]

BILLING CODE 3720–58–P

DEPARTMENT OF EDUCATION

[Docket ID ED–2016–OM–0108]

Privacy Act of 1974; System of Records

AGENCY: Office of Management, Department of Education.

ACTION: Notice of an altered system of records.

SUMMARY: In accordance with the Privacy Act of 1974, as amended (Privacy Act), the Department of Education (the Department or ED) publishes this notice of an altered system of records entitled ''Student Loan Repayment Benefits Case Files'' (18–05–15). The system contains records and related correspondence on employees who are being considered for student loan repayment benefits under the Department's Personnel Manual Instruction 537–1 entitled ''Repayment of Federal Student Loans,'' as well as individuals who have been approved for and are receiving such benefits. The information maintained in the system of records entitled ''Student Loan Repayment Benefits Case Files'' consists of one or more of the following: Request letters from selecting officials or supervisors with supporting documentation; employees' (or potential employees') names, home and work addresses, Social Security numbers, student loan account numbers, loan balances, repayment schedules, repayment histories, and repayment status; and the loan holders' names, addresses, and telephone numbers. The information that will be maintained in the altered system of records will be collected through various sources, including directly from the individual to whom the information applies, lending institutions holding student loans for the individual to whom the information applies, officials of the Department, and official Department documents.

DATES: Submit your comments on this altered system of records notice on or before January 23, 2017.

The Department filed a report describing the altered system of records covered by this notice with the Chair of the Senate Committee on Homeland Security and Governmental Affairs, the Chair of the House Committee on Oversight and Government Reform, and the Administrator of the Office of Information and Regulatory Affairs, Office of Management and Budget (OMB), on December 15, 2016. This altered system of records will become effective on the later of: (1) The expiration of the 40-day period for OMB review on January 24, 2017 unless OMB waives 10 days of the 40-day review period for compelling reasons shown by the Department; or (2) January 23, 2017, unless the altered system of records notice needs to be changed as a result of public comment or OMB review. The Department will publish any changes resulting from public comment or OMB review.

ADDRESSES: Submit your comments through the Federal eRulemaking Portal or via postal mail, commercial delivery, or hand delivery. We will not accept comments submitted by fax or by email or those submitted after the comment period. To ensure that we do not receive duplicate copies, please submit your comments only once. In addition, please include the Docket ID at the top of your comments.

- *Federal eRulemaking Portal:* Go to *www.regulations.gov* to submit your comments electronically. Information on using *Regulations.gov*, including instructions for accessing agency documents, submitting comments, and viewing the docket, is available on the site under the ''help'' tab.
- *Postal Mail, Commercial Delivery, or Hand Delivery:* If you mail or deliver your comments about this altered system of records, address them to: Cassandra Cufee-Graves, Director, Office of Human Resources, Learning and Development Division, U.S. Department of Education, 400 Maryland Avenue SW., Washington, DC 20202–4573.

Privacy Note: The Department's policy is to make all comments received from members of the public available for public viewing in their entirety on the Federal eRulemaking Portal at *www.regulations.gov*. Therefore, commenters should be careful to include in their comments only information that they wish to make publicly available.

Assistance to Individuals with Disabilities in Reviewing the Rulemaking Record: On request, we will supply an appropriate aid, such as a reader or print magnifier, to an individual with a disability who needs assistance to review the comments or other documents in the public rulemaking record for this notice. If you want to schedule an appointment for this type of aid, please contact the person listed under **FOR FURTHER INFORMATION CONTACT**.

FOR FURTHER INFORMATION CONTACT: Cassandra Cufee-Graves, Director, Office of Human Resources, Learning and Development Division. Telephone: (202) 453–5588.

If you use a telecommunications device for the deaf (TDD) or a text telephone (TTY), you may call the Federal Relay Service (FRS) at 1–800–877–8339.

SUPPLEMENTARY INFORMATION:

Introduction: The Privacy Act (5 U.S.C. 552a) requires the Department to publish in the **Federal Register** this notice of an altered system of records maintained by the Department. The Department's regulations implementing the Privacy Act are contained in the Code of Federal Regulations (CFR) in 34 CFR part 5b. The Privacy Act applies to information about an individual that contains individually identifiable information that is retrieved by a unique identifier associated with each individual, such as a name or Social Security number. The information about each individual is called a ''record,'' and the system, whether manual or computer-based, is called a ''system of records.'' The Privacy Act requires each agency to publish notices of systems of records in the **Federal Register** and to prepare reports for OMB whenever the agency publishes a new system of records or makes a significant change to an established system of records. Each agency is also required to send copies to the Chair of the Senate Committee on Governmental Affairs and the Chair of the House Committee on Government Reform. These reports are intended to permit an evaluation of the probable or potential effect of the proposal on the privacy or other rights of individuals.

The Student Loan Repayment Benefits Case Files (18–05–15) system of records was last published in the **Federal Register** on May 29, 2002 (67 FR 37411). The system is being altered to add a routine use to permit the Department to make a disclosure in the case of a breach of personally identifiable information in the system as well as a routine use to

Attachment B – Public Notice

The State of Texas,
County of Victoria

Before me, the undersigned authority, on this day personally appeared Olivia Garza.

Who being by me duly sworn, states on oath that she is the Senior Accounting Clerk of

Victoria Advocate. A newspaper published in Victoria, Victoria County, Texas and

has general circulation in Calhoun, Dewitt, Goliad, Gonzales,

Jackson, Karnes, Lavaca, Matagorda, Refugio, Wharton and Victoria Counties.

The attached printed notice for US ARMY CORPS OF ENGINEERS

LEGAL #2017029 was published in the Victoria Advocate on the following dates:

JANUARY 22, 2017

Olivia Garza

OLIVIA GARZA
RETAIL ACCOUNTING

Sworn to and subscribed before me this 24TH day of JANUARY 2017.

NOTICE OF PUBLIC SCOPING MEETING
MATAGORDA SHIP CHANNEL, TEXAS
CHANNEL IMPROVEMENT FEASIBILITY STUDY AND ENVIRONMENTAL IMPACT STATEMENT

Interested parties are hereby notified of and invited to attend a public scoping meeting to be conducted by the U.S. Army Corps of Engineers and the Calhoun Port Authority on:

JANUARY 24, 2017 | 5:30 – 7:30 PM
BAUER CIVIC CENTER
2300 HIGHWAY 35 NORTH, PORT LAVACA, TEXAS 77979

The meeting will provide an opportunity for all persons to identify significant issues related to proposed modifications of the Matagorda Ship Channel. A Draft Integrated Feasibility Report and Environmental Impact Statement will be prepared to assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. Written comments must be postmarked by February 13, 2017. The Notice of Intent to prepare an Environmental Impact Statement is available at
http://www.swg.usace.army.mil/BusinessWithUs/PlanningEnvironmentalBranch/DocumentsforPublicReview.aspx

Comments may be mailed or emailed to:
U.S. ARMY ENGINEER DISTRICT, GALVESTON
ATTENTION: MATAGORDA SHIP CHANNEL FEASIBILITY STUDY, CESWF-PEC-CC
P.O. BOX 1229, GALVESTON, TEXAS 77553-1229
or
MSC-Feasibility@usace.army.mil

Veronica Gonzales
Notary Public in and for Victoria County, Texas

NOTARY PUBLIC STATE OF TEXAS
VERONICA GONZALES
My Commission Expires
November 25, 2017

Attachment C – Letters to Stakeholders

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Ray Newby
Texas General Land Office
Coastal Resources Program
P.O. Box 12873
Austin, Texas 78711-2873

Dear Mr. Newby:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

Review of Draft IFR-EIS – 45-day review period begins April 2018
State & Agency Review of Final IFR-EIS – 30-day review begins May 2019

We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

David Bernhart
Assistant Regional Administrator
National Marine Fisheries Service
Southeast Regional Office
Protected Resources Division
263 13th Avenue South
St. Petersburg, Florida 33701-5505

Dear Mr. Bernhart:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following submittals and review periods have been established in accordance with the current project schedule:

Corps submits Draft Biological Assessment – Mar 2017
Review of Draft IFR-EIS – 45-day review period begins April 2018
National Marine Fisheries Service completes Biological Opinion - July 2018
State & Agency Review of Final IFR-EIS – 30-day review begins May 2019

We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

E. W. Verwers

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Rusty Swafford
Branch Supervisor
National Marine Fisheries Service
Habitat Conservation Division
4700 Avenue U
Galveston, TX 77551

Dear Mr. Swafford:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

Review of Draft IFR-EIS – 45-day review period begins April 2018
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We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Scott Alford
District Conservationist
US Department of Agriculture
National Resources Conservation Service
7705 West Bay Road 77523
Baytown, TX

Dear Mr. Alford:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

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We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Peter Schaefer
Texas Commission on Environmental Quality
Water Quality Division
P.O. Box 13087, MC-150
Austin, TX 78711-3087

Dear Mr. Schaefer:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

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Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Ms. Rebecca Hensley
Regional Director, Ecosystem Resources Program
Texas Parks and Wildlife Department
1502 FM 517 East
Dickinson, TX 77539

Dear Ms. Hensley:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

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Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Ms. Karla Guthrie, Ph.D.
Team Lead, Bays and Estuaries Program
Texas Water Development Board
P.O. Box 13231
Austin, TX 78711-3231

Dear Dr. Guthrie:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

E.W. Verw

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Matthew Mahoney
Waterways Program Coordinator
Texas Department of Transportation, Maritime Division
118 E. Riverside Drive
Austin, Texas 78704

Dear Mr. Mahoney:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

We are inviting the participation of your agency as a Cooperating Agency pursuant to Council on Environmental Quality Regulations for Implementing the National Environmental Policy Act (40 CFR §1501.6 and §1508.5). The purpose of this request is to formalize, via designation as a Cooperating Agency, the continuing coordination and active participation by resource agencies in the MSC Feasibility Study. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

Review of Draft IFR-EIS – 45-day review period begins April 2018
State & Agency Review of Final IFR-EIS – 30-day review begins May 2019

We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

E.W. Verwers

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Chuck Ardizzone
Project Leader
US Fish and Wildlife Service
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058

Dear Mr. Ardizzone:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the bayside channels of the MSC at depths ranging from –38 feet to –50 feet mean lower low water (MLLW) and at widths ranging from 200 feet to 400 feet, and alternatives to modify and extend the Entrance Channel to depths ranging from –40 feet to –55 fee MLLW and at widths ranging from 300 feet to 600 feet. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Award scope for Coordination Act Report (CAR) – January 2017
Receive Draft CAR -- September 2017
Receive Final CAR -- July 2018
Review of Draft IFR-EIS – 45-day review period begins April 2018
State & Agency Review of Final IFR-EIS – 30-day review begins May 2019

We appreciate this opportunity to invite your participation as a Cooperating Agency and request that you advise us as to whether the report review periods shown above are acceptable. In addition, we would like to invite you to participate in the MSC Feasibility Study scoping meeting, which will be held from 5:30 to 7:30 pm on January 24, 2017 at the Bauer Civic Center, 2300 Highway 35 North, Port Lavaca, Texas 77979. Please contact Janelle Stokes of my staff at (409) 766-3039 or at janelle.s.stokes@usace.army.mil.

Sincerely,

E. W. Ver

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Ms. Jo Ann Battise
Chairperson
Alabama-Coushatta Tribe of Texas
571 State Park Road 56
Livingston, Texas 77351

Dear Chairperson Battise:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

In partial fulfillment of responsibilities under Executive Order 13175, the National Environmental Policy Act, and Section 106 of the National Historic Preservation Act, the Corps offers you the opportunity to review and comment on the potential of the proposed study to significantly affect protected tribal resources, tribal rights, or Indian lands. Furthermore, we would like to coordinate our review schedule for study completion so that all reviews and approvals will, to the maximum extent practicable, be conducted concurrently. This concurrent coordination is required by Section 2045 of the Water Resources Development Act of 2007 and Section 1001 of the Water Resources Reform Development Act of 2014. The following review periods for the IFR-EIS have been established in accordance with the current project schedule:

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Sincerely,

E. W. Verwers

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Jimmy Arterberry
Tribal Administrator
The Comanche Nation
P.O. Box 908
Lawton, Oklahoma 73502

Dear Administrator Arterberry:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

E. W. Ver

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Lovelin Poncho
Chairman
Coushatta Tribe of Louisiana
1940 C.C. Bel Road
Elton, Louisiana 70532

Dear Chairman Poncho:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Mattew M. Komalty
Chairman
Kiowa Indian Tribe of Oklahoma
100 Kiowa Way
Carnegie, Oklahoma 73015

Dear Chairman Komalty:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Danny Breuninger, Jr.
President
Mescalero Apache Tribe
P.O. Box 227
Mescalero, New Mexico 88340

Dear President Breuninger:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

E. W. Ver

Eric W. Verwers
Director, Regional Planning and
Environmental Center

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

December 16, 2016

Regional Planning and Environmental Center

Mr. Russell Martin
President
Tonkawa Tribe of Oklahoma
1 Rush Buffalo Road
Tonkawa, Oklahoma 74654

Dear President Martin:

The U.S. Army Corps of Engineers, Galveston District (Corps) intends to prepare an Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study. The Corps and the non-federal sponsor, the Calhoun Port Authority, would like to invite your agency to participate as a Cooperating Agency in the development of the IFR-EIS. The IFR-EIS will assess the social, economic and environmental effects of widening and deepening the Matagorda Ship Channel in Calhoun and Matagorda counties, Texas. In addition to No Action, specific alternatives to be evaluated are expected to include nonstructural measures, structural alternatives to modify the depth of the bayside channels of the MSC and alternatives to modify the depths and extend the length of the Entrance Channel into the Gulf of Mexico. The IFR-EIS will also evaluate the impacts and potential benefits of a dredged material management plan that may include new upland, confined placement areas, beneficial use of dredged material sites, and Ocean Dredged Material Disposal Sites.

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Sincerely,

Eric W. Verwers
Director, Regional Planning and
Environmental Center

Attachment D – Sign-in Sheets for Scoping Meeting

m. mm

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

	Name	Organization	Mailing Address	Email Address	Elected Official?
✓	Cecil + Joan Anderson		268 Ocean Dr. South, P.L. Tex	cecil630@tisd.net	
✓	DAVID ADRIAN	MATAGORDA BAY PILOTS	P.O. BOX 836 PORT LAVACA	david@matagordabaypilots.com	
✓	Martha Toler			lanmar.woodhi@gmail.com	lanmar.woodhi@gmail.com
✓	TONY HOLLADAY	CALHOUN PORT AUTHORITY	POINT COMFORT	JTHOLLAD@TISD.NET	X
✓	STEVE SVETLIK	NORTHSTAR MIDSTREAM	1975 FM 1593 5 POINT COMFORT, TX 77978	(BUSINESS CARD)	
✓	WILLIAM V SCHUSTERET		PO Box 744 SEADRIFT TX 77983	Schuswu@yahoo.com	
✓	Shannon Salyer	District Atty's Office	P.O. Box 1001 PL TX 77979	shannon.salyer@calhouncotx.org	
✓	Robert Howe Howe		22 Boundary 22 Boun	rhportlavaca@aol.com	
✓	Anne Burt		28 Red Snapper Dr. P.L. 77979	e.anne.burt@gmail.com	
✓	JERRY DYKOS		1324 NORTH OCEAN DR. 77979		
✓	GWEN SALYER		1695 Ocean Dr N P.L. 77979	mbpalmlady@yahoo	
✓	LANCE R. TOLER	POWDERHORN	96. ST JOSEPH St 77979	LANMAR.WOODHI@GMAIL.COM	
✓	RANDY FRNKA		99 AVRIL PT. LAVACA TX 77979		
✓	William Quast	Benchmark Eco	PO Box 158 Katy Tx 77492		
✓	Miranda Malek	Calhoun Port Auth			
✓	DAVID HALL	Calhoun County	202 S. ANN Port Lavaca		✓

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

Name	Organization	Mailing Address	Email Address	Elected Official?
~~[illegible] Townley~~	~~Point Comfort / Moore~~			
✓ Rod NEAL	MIRAGE INDUSTRIAL GROUP	347 POWDER HORN	Rod@MIRAGEINDUSTRIALGROUP.COM	
✓ JOE Westfall		1719 BONHAM Victoria TX 77901		
✓ TOM RODINO	RODINO, INC	183 HeronOaks Rockport TX 78382	TOM@RODINOINC.COM	
✓ JIM WOOD	SAND POINT RANCH LP	1555 ASHFORD Hollow Houston 77077	JWOOD1555@ATT.NET	NO
✓ WAYNE Mims	MAGNOLIA BEACH	44 MORRIS AVE PORT LAVACA TX.		
✓ Joe Noel	Magnolia Beach	79 Sally St Port lavaca 77979		
✓ Liz Dykes	Magnolia Beach	1374 N Ocean Dr Port lavaca 77979	baittackle01@gmail.com	
✓ John Bailey	Magnolia Beach	1374 N Ocean Dr		
✓ Garry D. Jistel	Magnolia Beach	1937 CR 250 Cameron, Tx 76520	garrydj55@yahoo.com	NO
✓ SUSAN FRNKA	M B	99 AVRIL DR. PL, TX 77979		
✓ C E JONES		94 Silk Stocking PL TX 77979		
✓ MARTHA M. GUETHLE	HOME OWNER - OLIVIA	31338 SUNLIGHT DR. BULVERDE, TX. 78163		NO
✓ Dell Weatherford	Calhoun Port Authority		dell@TISD.net	Calhoun Port Authority
✓ Josh Waghorne	Alamo Beach	~~280~~ PO Box 165 Port Lavaca Tx 77979		
✓ Robert Marek	Horizon Environmental		Robert.Marek@Horizon-Environ.com	
✓ Curtiss Casa		P.O. Box 273 POC 77982	CAPTLOWTIDE@AIRMAIL.NET	

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

Name	Organization	Mailing Address	Email Address	Elected Official?
Mickey Ardoin		139 LaLucia	mickeyardoin@ymail.com	
David Guillot		442 Coleto Bluff Rd Victoria 77905	DAVIDALLANGUILLOT@gmail.com	
Stasey Beach	Harvest Pipeline		SBEACH@HILCORP.COM	
Doug Schiller		39 SANDCASTLE DR, P.L.	TXSN8V@aol.com	
Murray Schiller		39 SANDCASTLE DR. P.L.	M2STX@aol.com	
John McKnight	Harvest Pipeline		jmcknight@hilcorp.com	
Joseph Konarsky		2801 Ck 424 Taylor Tx 76574	ksky26@gmail.com	
Bryant Davis		17801 McClain Cemetery Road Rogers TX 76569		
Bruce Cowan	Resident Island Pen	PoB 268 POC TX 77982	BubbasDeck@aol.com	
Kimberly Cowan	Resident Island Pen	POB 268 POC TX 77982	KSC407@yahoo.com	
Lydia Falk	Resident Alamo Beach	Po Box 1723 Port Lavaca 77979	downsizing1946@gmail.com	
Kayla Meyer	Port Lavaca Wave Newspaper	107 E. Austin Port Lavaca Tx 77979	kmeyer@plwave.com	
Karen Cash		2205 E Amaqua Cove Victoria 77901		
John Rigaud	CCHC	PO Box 1795 Port Lavaca 77979	jan@russellcain.com	
Peggy Dobbins	Magnolia Beach Community	8942 State Hwy " "	pld2036@aol.com	
Keith Schmidt	Self & Alcoa Remediation Group	871 Bay Meadow DR Port Lavaca TX; Alcoa P.O. Box 101 Point Comfort, TX 77978	Keith.Schmidt@alcoa.com	

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

	Name	Organization	Mailing Address	Email Address	Elected Official?
✓	Otto Sanford		P.O. BOX 524 Lolita Tx 77971	OCSanford@Gmail.com	
✓	Bonnie Banks		1567 N. Ocean Dr. P.L. 77979	bonnieb@tisd.net	
✓	Houston Banks		1567 N Ocean D. PL 77979	houstonb@cts-site	
✓	Elaine Darby	Anchor QEA	~~3~~ 901 S. Mopac, Bldg V, Suite 150 Austin Tx 78746 ~~Houston~~	edarby@AnchorQEA.com	
✓	Justin Boyd	Anderson Machinery	1553 Farm Rd Port Lavaca, 77979	Justinb@amcovt.com	
✓	Sandy Witte	Roberts Roberts Odefey Witte & Wall	PO Box 9 P.L	Sandy@portlavacalaw.com	
?	Fred Whipling	136 Hartman ~~Road~~ - Pt. Sea Drift		CHARDY55@YAHOO.COM	
✓	CHARLES HARDY	HARVEST PIPELINE			
✓	Sara Sneath	Victoria Advocate	311 E. Constitution Victoria, TX 77901	ssneath@vicad.com	
✓	Ryan Easton	TPWD		ryan.easton@tpwd.texas.gov	
✓	John & Rhonda Hubbard	Alamo Beach LP	PO Box 431 Robstown TX 78380	john@atlastubular.com	
✓	RANDY BOYD	CALHOUN PORT		RANDY@RLBCONTRACTING.COM	CALHOUN PORT AUTHORITY CHAIRMAN
✓	Tom Andrews	MBVFD	PO BOX 318 Port Lavaca	?HAOULE21@HOTMAIL.COM	PRESIDENT
✓	Leroy & Karen Smith		PO Box 533 Port O'Connor TX 77982	kms310@yahoo.com	
✓	TANIA FRENCH	Port LAVACA WAVE	P.O. Box 88 Port LAVACA, TX 77979	tfrench@plwave.com	
✓	Mary Margaret Read & Rodney Read		4240 Goehring Rd Ledbetter TX	rread@cvctx.com	
✓	ADAM SMITH		267 STONE OAK DR. INEZ, TX 77968	asmith140@yahoo.com	

Sign-In Sheet

Matagorda Ship Channel, Texas Feasibility Study

Public Scoping Meeting - Port Lavaca, Texas

January 24, 2017

	Name	Organization	Mailing Address	Email Address	Elected Official?
✓	Jason Zeplin	TGLO	6300 Ocean Dr #5848 Corpus Christi TX 78412	jason.zeplin@glo.texas.gov	
✓	Dale Falk		73 Sandcastle Dr Port Lavaca 77979	realvikings@gmail.com	
✓	MATTHEW MAHONEY	TX DOT		matthew.mahoney@txdot.gov	
✓	J.C. Melcher melcher	Send Port	Box 124 Port Lav Tx 77979		
✓	ED CAMPBELL	Self	233 E Main, PL, TX 77979	CAMPBELL@WALTEREDEN.com	
✓	Sherri Dixon	self	2672 W. Bayshore Dr. Palacios 77465		
✓	Earl S Portillo	CPA	808 Peabody, Edna, TX 77957		
✓	Harvey Hodges	Self	5748 FM 1090 Port LAVACA, Tx		
✓	Winston Denton	TPWD	1502 FM 517 E, Dickinson, TX 77539	winston.denton@tpwd.texas.gov	
✓	Bobbie Vickery	Calhoun Co Sheriffs Office CCSO	211 S. Ann Port Lavaca Tx 77979	bobbie.vickery@calhounco tx.org	Sheriff

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

	Name	Organization	Mailing Address	Email Address	Elected Official?
1	Colleen Roco	Texas Parks & Wildlife Dept.	1502 FM 517 E Dickinson Tx 77531	colleen.roco@tpwd.texas.go	NO

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

Name	Organization	Mailing Address	Email Address	Elected Official?
Carol Wootton	Congressman Blake Farenthold		carol.wootton@mail.house.gov	representing
Jack & Bonnie Glover		P.O. Box 274 Seadrift 77983	gloverb@calcoisd.org	
Jim Andrews	Point Comfort Towing	PO Box 509 Point Comfort	james.andrews@harbordocking.com	No
Rhonda Cummins	Texas Sea Grant	186 Henry Barber Way, Port Lavaca 77979	rcummins@tamu.edu	Appointed County Ext. Agent

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

	Name Syma	Organization	Mailing Address	Email Address	Elected Official?
✓	Clyde Syma ~~Calhoun County~~	Calhoun County Pct 3 Commissioner		ClydeSyma@CalhounCoTX.org	✓

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
Public Scoping Meeting - Port Lavaca, Texas
January 24, 2017

Name	Organization	Mailing Address	Email Address	Elected Official?
Neil Heathorne	Benchmark Ecological Services		nheathorne@benchmarkeco.com	
LESLIE HARTMAN	TX PARKS & WILDLIFE	2200 HARRISON PALACIOS 77465	leslie.hartman@tpwd.texas.gov	
TELL BOHORNEY	MATAGORDA BAY PILOTS	715 SADDLEHORN PORT LAVACA TX	milamtel@yahoo.com	
Crystal Miner	Matagorda Bay Pilots	715 Saddlehorn Port lavaca TX		

Attachment E – Scoping Meeting Written Comments

[redacted] [redacted]

Comment Form

Please return your completed form before you leave. You may also mail your comments to:
USACE – Galveston District
Attn: RPEC Coastal Section **Comments are due by February 13, 2017.**
P.O. Box 1229
Galveston, TX 77533-1229
MSC-Feasibility@usace.army.mil

1.Name / Representing: Jim Andrews - Point Comfort Towing (Harbor Tugs)

2.Address [Optional]: PO Box 509 Point Comfort Texas 77987

3.Email [Optional]: james.andrews@harbordocking.com

4.Please provide your comments concerning the Matagorda Ship Channel, Texas Feasibility Study in the blanks below.

STRONGLY IN FAVOR. THE ECONOMIC STRENGTH & POWER OF HOUSTON & TEXAS WERE BUILT UPON THE EXPANSION AND MAINTENANCE OF THE HOUSTON SHIP CHANNEL. NOW OVER 100 YEARS LATER, THE REGIONAL ECONOMY IS SET TO EXPAND FURTHER, BUT MUCH OF HOUSTON & CORPUS CHRISTI IS DEVELOPMENTALLY SATURATED. EXPANSION MAY CONTINUE UNABATED, BRINGING ALONG WITH IT AN INCREASED TAX BASE, BY SUPPORTING THE EXPANSION & DEEPENING OF THE MATAGORDA SHIP CHANNEL.

Comment Form

Please return your completed form before you leave. You may also mail your comments to:
USACE – Galveston District
Attn: RPEC Coastal Section
P.O. Box 1229
Galveston, TX 77533-1229
MSC-Feasibility@usace.army.mil

Comments are due by February 13, 2017.

1.Name / Representing: RANDY & SUSAN FRNKA

2.Address [Optional]: 99 AVRIL DR., Port Lavaca, TX 77979

3.Email [Optional]: sjgoff150l@aol.com

4.Please provide your comments concerning the Matagorda Ship Channel, Texas Feasibility Study in the blanks below.

1) DO NOT WANT CLAY FROM SHIP CHANNEL put on Magnolia BEACH SHELL w/ SAND OVER IT. It is a shell beach, not sand.
2) EROSION FROM SHIP TRAFFIC IS TAKING AWAY FROM MAGNOLIA BEACH, A SOLUTION TO KEEPING WHAT IS LEFT &/OR ADDING MORE BACK TO IT IS NECESSARY.
3) WE LIVE HERE & ENJOY THE BEACH DAILY TO WALK ON & FISH AT TIMES.
4) WE NEED A HARD STRUCTURE TO KEEP SHIPS FROM ERODING MAGNOLIA BEACH, LIKE GRANITE OR CONCRETE JETTIES.
5) IT IS THE LAST "FREE" BEACH IN TX, people come →

Comment Form

FROM SURROUNDING COUNTIES TO ENJOY WITH THEIR FAMILIES.

6) MANY RV'S COME TO ENJOY MAGNOLIA BEACH, FROM AS FAR AWAY AS QUEBEC & ONTARIO, CANADA, & FROM MANY STATES OF USA.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

January 25, 2017

Eric W. Verwers
Director, Regional Planning and Environmental Center
Department of the Army
Galveston District, Corps of Engineers
P.O. Box. 1229
Galveston, TX 77553

SUBJECT: Integrated Feasibility Report and Environmental Impact Statement (IFR-EIS) for the Matagorda Ship Channel (MSC) Feasibility Study

Dear Mr. Verwers:

In accordance with your letter dated December 16, 2016, the U.S. Environmental Protection Agency, the Region 6 NEPA office, has no comments to offer on the proposed project based on the information submitted.

Thank you for this opportunity to comment. If you have any questions, please contact Eli Martinez of my staff at (214) 655-2119 or at martinez.eli@epa.gov for assistance.

Sincerely,

Robert Houston
Chief, Special Projects Section

31 January 2017

USACE - Galveston District
Attn: RPEC Coastal Section
P.O. Box 1229
Galveston, TX 77533

To Whom it May Concern,

My husband and I attended the January 24th Public Scoping Meeting regarding the Matagorda Ship Channel. We recognize the obligation to hold such a meeting and appreciate the efforts put forth by your entire team.

With that being said, we wish to register our concern that Alamo Beach was not included among the list of stakeholders. Unless we do not understand what qualifies a community as a stakeholder, we at Alamo Beach would like to be included in the Stakeholder list.

We, and many others at Alamo Beach, are in favor of the expansion of the ship channel. We want to see Port Lavaca thrive economically. The increased shipping traffic and port use would be a major component in keeping Port Lavaca a growing community.

We, as well as others on Alamo Beach, have several concerns resulting from the proposed expansion of the Matagorda Ship Channel.

- First and foremost are the proposed "islands" resulting from the material removed from the bay to facilitate the increased width and depth. We would like to invoke "NIMBY" (Not In My Back Yard). The details of these "islands" are not yet known to us. For instance, how close to the shoreline would they be constructed? How high above the bay's surface would they protrude? Finally, how large would they be?

- We strongly believe that it would be better not to spoil the beauty of the inhabited coastal communities. Rather, we suggest that the dredged material be deposited on the far side (and uninhabited) portion of the Matagorda Ship Channel. Speaking for many here on Alamo Beach, we voiced these very same concerns during the 2009 meeting in which this expansion and the dredged materials were discussed.

- Our other concern results from the choice not to create "islands" in the bay, but rather, depositing the dredged material on land. We would protest vigorously if we were not given assurances that the material removed from the bay and placed on land would not pose a risk to the environment, as well as to us personally.

- Although we were told at the meeting that the mercury contamination deposited by Alcoa was controlled by the efforts resulting from the "Super Fund" and the flow of water in the bay directs it toward upper Lavaca Bay, we insist on seeing documentation describing the securing of the mercury contamination.

- Enclosed is a copy of the Victoria Advocate which quotes us and reiterates our concerns.

Please include us on your mailing/eMail master list. We will appreciate being updated on this project.

Murray Schiller
Doug Schiller

Murray and Douglas Schiller

39 Sandcastle Drive
Port Lavaca, TX 77979

m2stx@aol.com

VICTORIA ADVOCATE

From here. For here. Since 1846.

Wednesday, January 25, 2017 171ST YEAR NO. 260, 20 PAGES, ©2017, VICTORIA ADVOCATE PUBLISHING CO.

Project dredges up concerns

Work on Matagorda channel could help fight erosion, but others worry about polluted soil

BY SARA SNEATH
SSNEATH@VICAD.COM

PORT LAVACA – The Calhoun County Port Authority is splitting the cost of a study with the federal government on the feasibility of deepening and widening the Matagorda Ship Channel.

The channel was originally built in 1910 and dredged to its current depth of 38 feet in 1966. But larger ships that traverse the channel have to "light load," or decrease the amount of cargo onboard to ensure they don't drag the seafloor.

The 26-mile ship channel from Lavaca Bay to the Gulf of Mexico is the Crossroads' link to the global market, according to the Calhoun County Port Authority. But the channel is too shallow for modern vessels to enter or exit at full capacity. Deepening and widening the ship path is necessary for the port to stay competitive and keep its market share of maritime commerce.

A previous study on the project was funded by Calhoun Liquefied Natural Gas. But the undertaking came to a halt around 2008 when natural gas prices plummeted.

SEE CHANNEL, A6

TO COMMENT

Comments about the Matagorda Ship Channel Project must be submitted by Feb. 13. The comments can be emailed to MSCFeasibility@usace.army.mil or mailed to U.S. Army Engineer District, Galveston, Attention: Matagorda Ship Channel Feasibility Study, CESWF-PEC-CC, P.O. Box 1229, Galveston, TX 77553-1229.

CHANNEL: Public comments accepted through Feb. 13

CONTINUED FROM A1

The new study being funded in part by the federal government will eventually be sent to Congress in hopes that the federal government will find the project financially feasible, said Calhoun Port Authority director Charles Hausmann.

"For this port to grow, this is what we're going to have to do," he said.

A public meeting Tuesday night in Port Lavaca allowed those interested to voice their concerns and comments about the project.

Leroy and Karen Smith own a cabin on Matagorda Peninsula and came to the meeting because they were concerned about where the material dredged up from the sea floor would be placed.

Extending the channel 1 mile and digging it 8 to 10 feet deeper and 200 to 300 feet wider would create 46.5 million cubic yards of dredged material. That's enough to fill the Empire State Building 33 times.

The Smiths want the dredge material placed on the bayside of the island, where erosion has eaten away a swath of land. One house has already washed away, they said.

Murray and Douglas Schiller live on Alamo Beach. The couple is also concerned about where the material dug up from the channel will be placed.

"We're not opposed to the channel," she said. "We're just concerned about our property depreciating."

The Schillers are worried the material will be placed on the front of their property, blocking their view of the water. They're also concerned about what is in the sediment.

From 1966 to 1970, Alcoa Point Comfort Operations discharged mercury-laden wastewater into Lavaca Bay. An island in Lavaca Bay, where much of the mercury has been contained, is a Superfund site, a federal status reserved for the country's most polluted areas.

The Schillers said they want to know that any dredged material placed on land doesn't have mercury, which could leach into the water table.

But Houston Banks, who lives on Magnolia Beach, wants the sediment used along the shore, where land has been lost to erosion. Locals estimate that in some areas as much as 200 yards of Magnolia Beach has been taken by the water.

The Galveston District of the U.S. Army Corps of Engineers will continue taking comments about the project until Feb. 13, said Sheridan Willey, the project manager.

The comments will be addressed as part of the study process.

(1)

Hi,
I am Bobby Harabis
we have a place on the
Beach and it has
about eroded away,
We have lost so much
Beach here.
I have to ask
Why cant some sort of
Deep Water Port be
used here, Offload the
ships on the other side
of the Island, use pipe
line, and sterage on the
barrier, from Island, move
pipe line TO The
customer.

② Bringing larger loads in here will only hasten The erosion. Please Help Save our Beach.

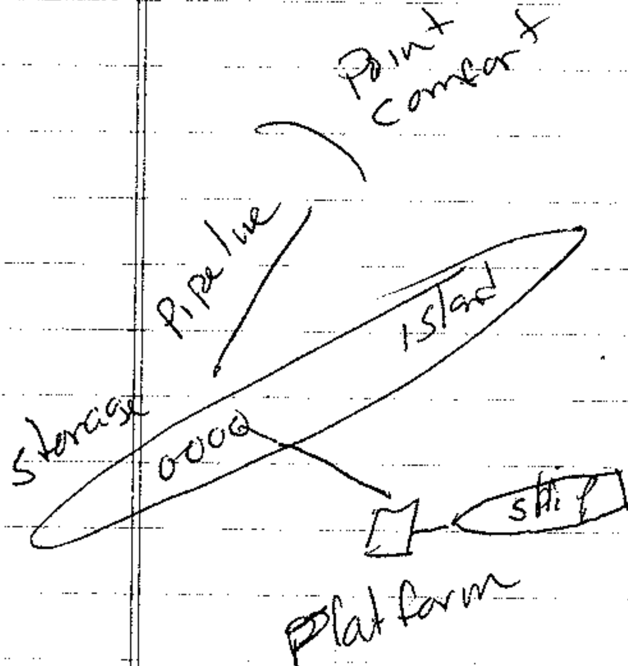
With what the Ship Traffic has done + what we lost in T.S. Bill, we are almost out of beach in some places,

Ive been here my entire life, and Photos from just 10 years ago would blow your mind, from 30 years ago, almost unbelievable

Please Consider all options before making The channel wider, and deeper

please send a mail response or email
bobbyharabis@yahoo.com

Call 361-212-2564



I ~~Ko~~

I Know some Guy's
we'll come build it.
I think it would work.

Have a
Great
Day!

Seriously,
I think it can be done.
If you need help I
Know a Guy that built an
entire Universe in 6 Days

Attachment F – Responses to Scoping Meeting Comments

Scoping meeting comments

Following the scoping meeting thirteen comments were received regarding the Matagorda Ship Channel, TX project. There were three supportive comments included in those letters and emails. These comments will not be addressed below, though we appreciate the support and the commenters taking time to reach out to us. The remaining comments will be addressed below. Some comment letters included multiple topics and many of the letters contained similar comments. Two commenters asked for meeting notes, they were emailed and informed the meeting information would be included in the draft report and would be publicly available upon release. The comments are addressed by topic and not by individual commenter below. The comment topic is in bolded type, while the response is below the comment in italicized text.

The most comment topic was in regards to shoreline erosion on the western side of the Matagorda Bay, in particular the Alamo Beach area.
The concern regarding the erosion of the shoreline along the western side of Matagorda Bay is an important topic. We believe the widening and deepening project, as currently designed, will not exacerbate the erosion. The placement of the dredged material on the western side of the channel should help to tamp down the ship wakes and result in lower force wave action. To address this concern a ship wake analysis was performed by USACE. The model estimated an increase of ship wake wave heights of only 0.1 feet. This minimal increase in ship wake should not exacerbate shoreline erosion (See Main Report Section 3.1.1 and Appendix F – Section 2.6.2).

A couple of commenters asked about the suitability of the dredged material for placement within the bay or in upland placement areas. This comment concerned the presence of toxins in the sediments and in relation to the Alcoa Superfund site.
To address this concern USACE will coordinate with EPA prior to the widening and deepening of the ship channel to develop a sediment sampling and analysis plan. This testing is required for placement of materials offshore and in the waters of the bay. This testing includes bioassays of material for offshore placement, testing of the sediments and elutriate testing. The specific pollutants to be tested will be determined in discussion with the US EPA. For further discussion of this plan see Main Report - Section 5.3.12 and Appendix B – Section 4.9.4.

One comment was concerned that the project would include the closure of Pass Cavallo and the resulting hydrologic and environmental damage that would cause.
The closure of Pass Cavallo is not a part of the current project. Hydrologic analysis for the study do not indicate any danger of the Pass closing (See Main Report – Section 5.1.2 and Appendix F – Secion 2.6.4).

One commenter requested that we work with local and state agencies to find beneficial use opportunities for the dredged material.
The US Army Corps of Engineers is always willing to find beneficial use for dredged material. This is the preferable use of dredged material whenever possible. We are by regulation required to find the least cost and environmentally acceptable plan for placement, however. Any costs above and beyond that would be strictly that of the sponsor and can lead to a project being economically unjustifiable. We are working with the Audubon Society to beneficially place both new work and maintenance

material on Chester Island. This material will help to stabilize the island and create habitat for endangered species and other species of concern (See Main Report – Sections 4.10.17 and 4.11.10, Appendix B – Section 5.4.10, and Appendix E – Section 7).

One commenter does not want the non-sandy dredge material placed on the beaches as part of a beneficial use plan.

The Dredged Material Placement Plan (DMMP) was developed with multiple goals in mind. One of those was to be environmentally acceptable. Placement of non-sandy dredge material on the beach would not be environmentally acceptable and, therefore, there is no plan to place material on the beaches. See Main Report – Section 4.11.10 and Appendix E for more discussion on the DMMP.

One commenter requested that a full economic analysis, along with an analysis of the environmental impacts and hydrologic modeling be conducted and fully articulated in the report.

These analyses are a regular part of the feasibility report and the environmental impact statement. The economic analyses can be found in the Main Report – Sections 3.2, 4.8, 4.11 and Appendix A. The Hydrologic modeling and analyses can be found in the Main Report – Sections 3.1 and 5.1 and Appendix F. The environmental impacts analyses can be found in the Main Report – Sections 3.3 and 5.3 and Appendix B.

A request was made by a commenter to place any sandy dredge material outside the entrance channel jetties to help with erosion that has occurred.

The Dredged Material Placement Plan (DMMP) was developed with multiple goals in mind. One of those was to be environmentally acceptable. A hydraulic shoaling analysis was performed which indicated the need for such placement south of the jetty. (See Main Report – Section 4.11.12, Appendix E, and Appendix F)

One commenter questioned whether the placement of material in the open bay placement areas would create "islands" within the bay that my effect the beauty of the bay.

The Dredged Material Placement Plan (DMMP) was developed with multiple goals in mind. One of those was to be environmentally acceptable. Any placement being considered in the bay as unconfined placement areas would be placed at a height that would not be emergent. In addition, the maximum height of the placement areas would still allow for the movement of recreational boaters. See Main Report – Section 4.11.10 and Appendix E for more discussion on the DMMP.

One commenter was concerned that the Corps would place dredged material on their land without any concern for the landowner's desires.

The Dredged Material Placement Plan (DMMP) was developed with multiple goals in mind. One of those was economics. Placement on land which would need to be purchased, or acquired, would add additional expense to the project. There is no plan to place dredged material on any landowner's property without consulting them and negotiation of a proper financial accommodation. See Main Report – Section 4.11.10 and Appendix E for more discussion on the DMMP.

Attachment G – Notice of Availability

Contracting Activity: DEPT OF THE AIR FORCE, FA4809 4TH CONS SQDN CC
Service Type: Janitorial/Custodial Service
Mandatory for: Indiana Air National Guard, 181st Fighter Wing: Hulman Regional Airport, 800 South Petercheff, Terre Haute, IN
Mandatory Source of Supply: Child-Adult Resource Services, Inc., Rockville, IN
Contracting Activity: DEPT OF THE AIR FORCE, FA7014 AFDW PK
Service Type: Custodial Service
Mandatory for: David W. Dyer Federal Building—Courthouse, 300 NE First Ave., Miami, FL
Mandatory Source of Supply: Goodwill Industries of South Florida, Inc., Miami, FL
Contracting Activity: PUBLIC BUILDINGS SERVICE, ACQUISITION DIVISION/ SERVICES BRANCH
Service Type: Janitorial/Custodial Service
Mandatory for: 183rd Fighter Wing Air National Guard Capitol Airport, 3101 J. David Jones Parkway, Springfield, IL
Mandatory Source of Supply: United Cerebral Palsy of the Land of Lincoln, Springfield, IL
Contracting Activity: DEPT OF THE ARMY, W7M6 USPFO ACTIVITY IL ARNG
Service Type: Laundry Service, Mandatory for: Air National Guard-Sioux City, 2920 Headquarters Avenue, Sioux City, IA
Mandatory Source of Supply: Genesis Development, Jefferson, IA
Contracting Activity: DEPT OF THE AIR FORCE, FA7014 AFDW PK
Service Type: Food Service
Mandatory for: Volk Field Air National Guard, 100 Independence Drive, Camp Douglas, WI
Mandatory Source of Supply: Challenge Unlimited, Inc., Alton, IL
Contracting Activity: DEPT OF THE AIR FORCE, FA7014 AFDW PK
Service Type: Grounds Maintenance Service
Mandatory for: 130th Airlift Squadron, 1679 Coonskin Dr., Unit #36, Charleston, WV
Mandatory Source of Supply: Goodwill Industries of Kanawha Valley, Charleston, WV
Contracting Activity: DEPT OF THE ARMY, W7N7 USPFO ACTIVITY WV ARNG
Service Type: Grounds Maintenance Service
Mandatory for: Admiral Bakerfield Army Reserve Center, San Diego, CA
Mandatory Source of Supply: Job Options, Inc., San Diego, CA
Contracting Activity: DEPT OF THE NAVY, U S FLEET FORCES COMMAND

Amy Jensen,

Director, Business Operations.

[FR Doc. 2018–09529 Filed 5–3–18; 8:45 am]

BILLING CODE 6353–01–P

COMMITTEE FOR PURCHASE FROM PEOPLE WHO ARE BLIND OR SEVERELY DISABLED

Procurement List; Proposed Additions

AGENCY: Committee for Purchase From People Who Are Blind or Severely Disabled.

ACTION: Correction.

SUMMARY: This Notice is to correct the Contracting Activity for NSN 2540–00–587–2532, Tarpaulin, Green, 12'' × 17'' and NSN 2540–01–330–8062, Tarpaulin, Tan, 12″ × 17″. The correct Contracting Activity is Defense Logistics Agency Land and Maritime and not Defense Commissary Agency.

DATES: *Comments must be received on or before:* May 20, 2018.

ADDRESSES: Committee for Purchase From People Who Are Blind or Severely Disabled, 1401 S Clark Street, Suite 715, Arlington, Virginia, 22202–4149.

FOR FURTHER INFORMATION CONTACT: For further information or to submit comments contact: Amy B. Jensen, Telephone: (703) 603–7740, Fax: (703) 603–0655, or email *CMTEFedReg@AbilityOne.gov.*

Amy Jensen,

Director, Business Operations.

[FR Doc. 2018–09530 Filed 5–3–18; 8:45 am]

BILLING CODE 6353–01–P

DEPARTMENT OF DEFENSE

Department of the Army; Corps of Engineers

Joint Notice of Availability for the Draft Matagorda Ship Channel Project Integrated Feasibility Report and Environmental Impact Statement

AGENCY: Department of the Army, U.S. Army Corps of Engineers, DoD.

ACTION: Notice of availability.

SUMMARY: Pursuant to the National Environmental Policy Act (NEPA), the U.S. Army Corps of Engineers, Galveston District (USACE) announces the release of the Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR–EIS) for the Tentatively Selected Plan of the Matagorda Ship Channel Improvement Project, Calhoun and Matagorda Counties, TX. The DIFR–EIS documents the existing condition of environmental resources in and around areas considered for development, and potential impacts on those resources as a result of implementing the alternatives.

DATES: The Galveston District will hold a public meeting for the DIFR–EIS on May 15, 2018 from 6:00–8:00 p.m. USACE will accept written public comments on the DIFR–EIS from May 7, 2018 to June 21, 2018. Comments on the DIFR–EIS must be postmarked by June 21, 2018.

ADDRESSES: The Public Meeting will be held at the Bauer Exhibit Building, 186 Henry Barber Way, County Road 101, Port Lavaca, TX 77979.

FOR FURTHER INFORMATION CONTACT: Questions and comments regarding the proposed draft EIS should be addressed to USACE, Galveston District, Attn: Dr. Harmon Brown, Environmental Compliance Branch, Regional Planning and Environmental Center, P.O. Box 1229, Galveston, TX 77553–1229; (409) 766–3837; *harmon.brown@usace.army.mil.*

SUPPLEMENTARY INFORMATION:

Authority: The lead agency for this proposed action is USACE. This study has been prepared under the authority of Section 216 of the 1970 Flood Control Act (Pub. L. 91–611), as amended. The non-Federal sponsor is the Calhoun Port Authority.

Background: This DIFR–EIS was prepared as required by the National Environmental Policy Act (NEPA) to present an evaluation of potential impacts associated with the Matagorda Ship Channel (MSC) Project Tentatively Selected Plan (TSP). The USACE and the non-Federal sponsor for the study, the Calhoun Port Authority, have conducted this study and prepared the DIFR–EIS. The purpose of this project is to reduce transportation costs and increase operational efficiencies of maritime commerce movement through the Port. The majority of deep-draft ships using the MSC have design drafts in excess of the operating depth of the channel. By expanding channel dimensions, cargo vessels could reduce or eliminate light loading measures, and larger cargo vessels could begin calling on the Port and adjacent facilities.

The need for changes to the MSC is derived from an analysis of current and projected vessel transits, cargo tonnage, and capacity at existing and proposed terminal facilities. This need is becoming more critical given increasing levels of maritime traffic, increasing vessel size, and the desire of Port users to capture transportation efficiencies. By expanding channel dimensions, cargo vessels could reduce or eliminate light loading measures, and larger cargo vessels, unable to transit the existing channel configuration, could begin calling on the Port and adjacent facilities.

The 26-mile MSC is located 125 miles southwest of Galveston, Texas and 80 miles northeast of Corpus Christi, Texas. The northern reach of the MSC is located in Calhoun County and the southern reach and Entrance Channel are in Matagorda County. The MSC is comprised of an Entrance Channel about four miles long from the Gulf through a man-made cut across Matagorda Peninsula, with dual jetties at the entrance from the Gulf. The Gulf Intracoastal Waterway (GIWW) intersects the channel approximately 2.5 miles north of the cut through Matagorda Peninsula. The bay-side channel is about 22 miles long across Matagorda and Lavaca Bays to Point Comfort with a turning basin at Point Comfort.

Offshore (Entrance Channel), the channel has a 300 foot (ft) bottom width, 10 (Horizontal): 1(Vertical) (H:V) side-slopes, and is maintained at a depth of 40 ft Mean Low Low Water (MLLW) plus three feet of advance maintenance depth and two feet of allowable over-depth. Through Matagorda Peninsula, the MSC is authorized to a depth of 38 ft MLLW, with a 300 ft bottom width. Generally, in Matagorda and Lavaca Bays, the channel has a 200 ft wide bottom width with 3H:1V side-slopes and is authorized to a project depth of 38 ft, plus two feet of advance maintenance depth and an additional two feet of allowable over-depth outside the advance maintenance dredging prism. The primary turning basin is maintained to a depth of 38 ft MLLW, and is 1,000 ft by 1,000 ft. Adjacent to the primary turning basin, there is also a 1,279 ft extension that is from the turning basin limit and runs along both the north and south sides of the Calhoun Port Authority pier. Mean natural water depth in Matagorda Bay is approximately 13 ft, while depth in the adjacent bays ranges from seven to eight feet.

Recommended Plan: The TSP entails deepening the channel to 47 ft MLLW, widening the entrance channel to 600 ft and the main channel to 350 ft. The size of the turning basin would be increased to 1,200 ft.

A final decision will be made following the reviews and higher-level coordination within the USACE to select a plan for feasibility-level design and recommendation for implementation. The decision will be documented in the Final Integrated Feasibility Report (FIFR)–EIS. A supplemental DIFR–EIS would not likely be produced unless there are substantial design changes that significantly alter environmental impacts. Coordination with the natural resource agencies will continue throughout the study process.

Project Impacts and Environmental Compliance: The recommended plan would result in the loss of approximately 19 acres of wetlands and 133 acres of oyster reef. Impacts would be fully compensated with the restoration of estuarine emergent marsh and oyster reef in the amount determined during final feasibility planning. Conservation measures identified by the National Marine Fisheries Service (NMFS) and U.S. Fish and Wildlife Service (USFWS) will be considered during this process. The proposed project is not expected to adversely affect federally listed threatened or endangered species.

The impact analysis determined there would be only minor impacts to soils and waterbottoms, water quality, turbidity, protected wildlife species (*i.e.,* marine mammals, and migratory birds), benthic organisms, commercial and recreational fisheries, essential fish habitat, coastal barrier resources, air quality, and noise. No impacts to floodplains and flood control, salinity levels, protected/managed lands, or historic and cultural resources are anticipated. No impacts to minority or low-income populations are expected, and the proposed project would provide a long-term economic benefit to the shipping industry by improving efficiency and safety of commercial traffic in the Matagorda Ship Channel.

Solicitation of Comments: The USACE is soliciting comments from the public, Federal, State, and local agencies and officials, Indian tribes, and other interested parties in order to consider and evaluate the impacts of this proposed activity. Comments will be used in preparation of the FIFR–EIS.

Document Availability: Compact disc copies of the DIFR–EIS are available for viewing at the following libraries:

Matagorda Branch Library, 800 Fisher St., Matagorda, TX 74457.

Calhoun County Public Library, 200 West Mahan St., Port Lavaca, TX 77979.

The document can also be viewed and downloaded from the Galveston District website: *http://www.swg.usace.army.mil/Business-With-Us/Planning-Environmental-Branch/Documents-for-Public-Review/.*

Brenda S. Bowen,

Army Federal Register Liaison Officer.

[FR Doc. 2018–09480 Filed 5–3–18; 8:45 am]

BILLING CODE 3710–KF–P

DEPARTMENT OF EDUCATION

[Docket No.: ED–2018–ICCD–0054]

Agency Information Collection Activities; Comment Request; Fast Response Survey System (FRSS) 109: Teachers' Use of Technology for School and Homework Assignments

AGENCY: National Center for Education Statistics (NCES), Department of Education (ED).

ACTION: Notice.

SUMMARY: In accordance with the Paperwork Reduction Act of 1995, ED is proposing a revision of an existing information collection.

DATES: Interested persons are invited to submit comments on or before July 3, 2018.

ADDRESSES: To access and review all the documents related to the information collection listed in this notice, please use *http://www.regulations.gov* by searching the Docket ID number ED–2018–ICCD–0054. Comments submitted in response to this notice should be submitted electronically through the Federal eRulemaking Portal at *http://www.regulations.gov* by selecting the Docket ID number or via postal mail, commercial delivery, or hand delivery. *Please note that comments submitted by fax or email and those submitted after the comment period will not be accepted.* Written requests for information or comments submitted by postal mail or delivery should be addressed to the Director of the Information Collection Clearance Division, U.S. Department of Education, 400 Maryland Avenue SW, LBJ, Room 216–34, Washington, DC 20202–4537.

FOR FURTHER INFORMATION CONTACT: For specific questions related to collection activities, please contact Kashka Kubzdela, 202–245–7377 or email *NCES.Information.Collections@ed.gov.*

SUPPLEMENTARY INFORMATION: The Department of Education (ED), in accordance with the Paperwork Reduction Act of 1995 (PRA) (44 U.S.C. 3506(c)(2)(A)), provides the general public and Federal agencies with an opportunity to comment on proposed, revised, and continuing collections of information. This helps the Department assess the impact of its information collection requirements and minimize the public's reporting burden. It also helps the public understand the Department's information collection requirements and provide the requested data in the desired format. ED is soliciting comments on the proposed information collection request (ICR) that is described below. The Department of

Attachment H – Draft FR-EIS Public Meeting Sign-in Sheets

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
NEPA Public Meeting - Port Lavaca, Texas
May 15, 2018

Name	Organization	Mailing Address	Email Address	Elected Official?
Tom Andrews	MBVFD	109 Susy Port Lavaca	HAOVCE21@HOTMAIL.COM	
Jan Regan	Port Lavaca City Council	PO Box 1795 77979	jan@russellcain.com	yes
Ed Campbell	Water Eden Co.	233 E Main St, PL TX	campbell@wateredeal.com	
Dell Weathersby	CPA	126 Chevy Chase	dell@tisd.net	yes
Linda LaQuay	T. W. LaQuay Marine	P.O. Box 24, Pt. Lavaca, Tx	dredgelady@hotmail.com	No
David Roberts	ROBERTS, ROBERTS, ODEFEY, WITTE & WALL LLP	P.O. Box 9, Pt. Lavaca, TX	david@portlavacalaw.com	NO
Paul (Skip) [illegible]	Port of Victoria	1934 FM 1432 Victoria TX	[illegible]@portofvictoria.com	NO
David Adrian	Matagorda Bay Pilots	P.O. Box 836 Port Lavaca 77979	david@matagordabaypilots.com	NO
Connie & Ed Hunt	Republican Party	23 Seabreeze St PL	chunt56@yahoo.com	No
Keith Schmidt	Alcoa	Alcoa State Hwy 35 Point Comfort, TX 77978	Keith.Schmidt@alcoa.com	No
Rusty Belflower	Harvest PL	1111 Travis St. Houston Tx 77002	rbelflower@hilcorp.com	No
Michael Cloud		PO Box 7027, Victoria [illegible]	michael@cloudforcongress.com	No
Jaycob Garcia		1006 N. East St, Victoria, Tx	jrg371314@gmail.com	NO
Victor Martinez	MCND #1	1602 Main St, Palacios, TX 77465	vmartinez@portofpalacios.com	NO
Grace Melcher Neal		PO Box 445 San Marcos Texas 78666		NO

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
NEPA Public Meeting - Port Lavaca, Texas
May 15, 2018

Name	Organization	Mailing Address	Email Address	Elected Official?
H.C. "Tony" Wehmeyer Jr.	CPA	PC		Yes
Aron Lee	Port Authority	# 1 Viabella Place Pl ...		Yes
Carlton Albrecht	Property owner	688 Albrecht Rd West Vict. TX		
Blake Farenthold			blake@blake.com	
DEBBIE FARENTHOLD				NO
J.C. Melcher	Port Authority	Box #24 Port Lavaca, Texas		Y
LEROY & KAREN SMITH		PO BOX 533 PORT OCONNOR TX 77982	KMS310@yahoo.com	
[illegible]	FORMOSA PLASTICS	201 FORMOSA DR POINT COMFORT 77978		No
Bret Mecha	TX 27 District	bret.mecha@mail.house.gov		
Otto Sanford	Property owner	P.O. Box 526, Lolita TX	OC Sanford@GMAIL	NO
DD Turner	Wave			
Janice Holladay				No

Sign-In Sheet
Matagorda Ship Channel, Texas Feasibility Study
NEPA Public Meeting - Port Lavaca, Texas
May 15, 2018

Name	Organization	Mailing Address	Email Address	Elected Official?
Forrest Hawes	Calhoun Port Authority	P.O. Box 397 Point Comfort, Tx 77978	feh@calhounport.com	N
Martha Toler	Alcoa	2456 Gin Rd Inez Tx 77968	martha.toler@alcoa.com	N
LANCE TOLER	OWN	96-St JOESEPH AVE TX. 77979	IANMAE.WOODHI@EMAIL.COM	N
TONY HOLLADAY	CALHOUN PORT AUTHORITY	1262 SWEETWATER RD PORT LAVACA, TX 77979	Jtholladetisd.net	Y
Tom & Norma Gallagher		246 Magnolia St. P.Lav.		N
Glen Kurtz	ORION	P.O. Box 108 Port Lavaca, Tx 77979	gkurtz@orionmarinegroup.com	N
Jessica Priest	Victoria Advocate	311 E Constitution St. Victoria, TX 77901	jpriest@vicad.com	N
T.B. HARGROVE, JR	CITIZEN	1021 N. VIRGINIA, PORT LAVACA	thargrove@CABLEONE	N
STEVE SVETLIK	NST POINT COMFORT	1975 FM 1593 S POINT COMFORT	SSvetlik@northstarmidstream.com	N
Steve Koch	SELF	P.O. BOX 1583 FM 1090	LASTKO@EARTHLINK.NET	N
RAYMOND BUTLER	SELF	P.O. 998, P.L.	WRBUTLER@COMCAST.NET	No
Dale Fowler	Victoria EDC	P.O Box 7 Victoria 77902	dalefowler@victoriaedc.com	N
MIKE CLIFTON	own	PO BOX 185 PORT O'CONNOR TX. 77982	CAPTJMC@Hotmail.com	
Stephanie M Cribbs	TxDOT-Maritime	7600 Washington Ave, Houston 77007	stephanie.cribbs@txdot.gov	N
Aaron Martin	NGL	PO Box 63 Point Comfort, TX 77978	aaron.martin@nglep.com	

Attachment I – Transcript of Draft FR-EIS Public Meeting

ORIGINAL

Transcript of the Testimony of

USACE Public Meeting

Date:

May 15, 2018

Case:

TEXAS DRAFT INTEGRATED FEASIBILITY

KTA

KIM TINDALL & ASSOCIATES

Nationwide Court Reporting & Litigation Support

866.672.7880 info@KTandA.com

Transcript of the Testimony of

USACE Public Meeting

Date:

May 15, 2018

Case:

TEXAS DRAFT INTEGRATED FEASIBILITY

KIM TINDALL & ASSOCIATES

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DEPARTMENT OF THE ARMY

GALVESTON DISTRICT, CORPS OF ENGINEERS

MATAGORDA SHIP CHANNEL, TEXAS

DRAFT INTEGRATED FEASIBILITY REPORT and

ENVIRONMENTAL IMPACT STATEMENT

PUBLIC MEETING

PORT LAVACA, TEXAS

CALHOUN/MATAGORDA COUNTIES

BAUER EXHIBIT BUILDING

186 HENRY BARBER WAY, COUNTY RD. 101

PORT LAVACA, TEXAS 77979

MAY 15, 2018

6:00 P.M. - 8:00 P.M.

MS. WILLEY: Good evening, ladies and gentlemen. I am pleased to be here tonight. My name is Sheri Willey, I'm the Galveston District Deputy Chief of Project Management. On behalf of Colonel Lars Zetterstrom, Commander, Galveston District, I welcome you to tonight's public meeting concerning the Matagorda Ship Channel project.

For the record, let me state that this public meeting is being convened at 6:23 p.m. on May 15th, 2018, at the Bauer Exhibit Building in Port Lavaca, Texas. Specifically, we are presenting information and accepting public comments on the Draft Integrated Feasibility Report and Environmental Impact Statement for the study that was released for public review on May 7th, 2018. A court report -- a court recorder is here to transcribe these proceedings and all public comments.

Sorry. There's a script.

The Corps of Engineers and the Calhoun Port Authority have been conducting a study to reduce transportation costs while providing a -- for safe reliable navigation on the Matagorda Ship Channel system. A cost effective plan has been identified that we believe would significantly reduce current and expected inefficiencies in the Matagorda Ship Channel system. This plan, which we refer to as the tentatively selected plan (or TSP), will be described later in this meeting.

I hope that all of you have had an opportunity to read the Notice of Availability either on the Galveston District website or in the announcements that were mailed to individuals and organizations that may have an interest in these proceedings. It contains a summary of the tentatively selected plan and its environmental impacts.

Before we go any further, I'd like to introduce a representative of the Calhoun Port Authority, our study's nonfederal sponsor, Charles Hausmann.

MR. HAUSMANN: First off, I'd like to thank everybody for coming out tonight. This is a really important project not only for Calhoun County but the entire Gulf Coast region and mid coast here. I'd like to introduce, at this time, I've got some board members here. I've got J.C. Melcher, Aaron Luna, Mr. Tony Wehmeyer, Mr. Tony Holladay and Mr. Dell Weathersby.

As most of you are probably aware, the industries here in Calhoun County rely on this Matagorda Ship Channel to keep them competitive in a global marketplace that we live in today. We currently have 325 vessels transit that -- that ship channel each day. One of the things that people don't realize, that channel is directly related to approximately 5,000 jobs attributed to the products that come in and out of the port and up and down that channel. Not only that, to the Texas economy it contributes $12.3 billion into the Texas economy on an annual basis. So it's really important and imperative that we find the means and are able to come up with a design that meets everybody's preferences and can continue to grow the Mat- -- the Matagorda Ship Channel and get it widened and deepened and grow the Calhoun Port Authority. Because what we want to do, we want to keep the jobs we have here. They're good-paying jobs and we want to be able to bring more industry in and create new ones. Thank y'all.

MS. WILLEY: Thank you, Charles. Okay. Charles already recognized the public officials from the Port Authority. I also would like to recognize Jan Regan from the City of Port Lavaca.

MS. HAUSMANN: Ms. Regan had to leave.

MS. WILLEY: Oh, I'm sorry.

Okay. Additionally, I would like to thank those that are with me from the Corps of Engineers: Ms. Franchelle Craft, who is the Project Manager of the study; Dr. Harmon Brown, the Regional Planning Center, Environmental Lead; Ms. Lisa Mairs, Real Estate, Galveston District, she was the one who signed you in this evening; Ms. Jennifer Purcell, Regional Planning Center, Economics Lead; and Ms. Brenda Hayden, the Engineering Lead from Galveston District.

Now, I'm going to describe the ground rules and format of tonight's meeting. I hope everyone completed a comment form when they entered the meeting or will do so before you leave. The comment form is used to provide us with your contact information so we can keep you updated on the status of the study. It can also be used to submit a written comment. If you would like to make your comment orally tonight, please make sure you have indicated your intent on the sign-in sheet at the door. Those wishing to make a comment will be given an opportunity to do so after the presentation.

If you prefer not to speak tonight, you may submit your comments in writing by either dropping them in the box provided -- there is quite a few on the tables -- or send us them by e-mail or regular mail.

Following the opening remarks, Ms. Franchelle Craft, the Project Manager, and our project team, will present an overview of this feasibility study.

After her presentation, I will open the floor for public comments. Federal and state officials that have requested to make a statement will be recognized first. Next, representatives of federal and state resource agencies wishing to make a statement will be called upon. Then I will recognize each individual who has indicated that they wish to comment.

Please keep your remarks to about three minutes as we would like for everyone to have the opportunity to speak and we only have this room until 8:00 -- 8:00 p.m. Also, we would like to emphasize that this is not going to be a question and answer session. The meeting is to provide everyone the opportunity to publicly comment on the plan.

Please give all speakers the courtesy of not making comments during their presentation, silence your cell phones, and hold off applause or other reactions so that we can have an orderly meeting and be respectful of everyone's time. All individuals have an equal right to be heard.

Now, I will have Franchelle Craft make our presentation.

MS. CRAFT: Good evening, everyone. As Sheri stated, myself and -- along with two other team members, we'll just tag team this presentation, and it will be a real quick overview of where the team is with the study and where we are in the planning process.

So this study falls -- so this study falls under 216 of the -- Section 216 of the Flood Control Act of 1970. It authorizes studies to review the operation of completed federal projects and recommend project modifications. As Sheri stated before, our nonfederal sponsor is the Calhoun Port Authority who have -- we have been working closely with along the whole process.

Our study area is located in the Calhoun and Matagorda Counties. It encompasses about, like, 26 miles of existing federal channel that extends into the Matagorda Bay, and the Matagorda Ship Channel has generated business revenues of nearly $12 million.

So at the beginning of our study the team identified some problems and some opportunities that we could address during the planning study. So some of our problems is: The existing channel dimensions create transportation inefficiencies. We have delays due to one traffic -- one-way traffic risks -- restrictions; vessels that are greater than 109 beam width they can't transit in the channel; and then larger vessels are restricted to daylight only transit.

Our second problem we identified was: The turning basin limits the sizes of the vessels that are coming in, currently; and then we have excessive currents in the entrance channel and the bay that limits allowable ship draft.

Some of the opportunities the team identified is: We want to identify significant transportation cost savings; and then we really want to capitalize on large amounts of sediments for the beneficial use.

So our study objectives: The team wanted to improve the navigation efficiency and the safety of the deep-draft navigation center -- I'm -- system; manage environmental quality effects in the project area; and then we want to establish environmentally suitable placement areas and utilize the beneficial use of dredged materials for placement of the dredged material.

I won't go through the whole chart, but these are our existing conditions that are currently out there in the channel now. We have our outer bar and jetty channel has an authorized depth of 40 and is usually kept maintenance dredging at these depths. So I'll give you a few seconds to kind of look at those.

So I'll pass it over to our economist.

MS. PURCELL: Hi, I'm Jennifer Purcell. Can everyone hear me? I'm the economist on the

Matagorda Ship Channel project, and the purpose of the economic analysis is to quantify benefits of the project in terms of dollars. National Economic Development Benefits is what we call it. So if you see the acronym "NED" anywhere it refers to the benefits to the nation in terms of dollars.

So we focused on two of these three historical major commodities. Historically on the channel, it -- it's moved chemicals, petroleum products and crude materials. There have been changes to the commodity profile that began at 2016. For that reason, we focused on the two commodity categories that we determined would benefit from the widening and deepening of the channel: And that's chemicals and petroleum products. So that's what you will see in this graph.

If you do look at the historical record of the Matagorda Ship Channel you will see about double, approximately double this tonnage moved annually from what's shown on this graph. But these are the two commodity categories that we're focusing on, and again, you can see in the legend of the graph that's petroleum products, chemicals, and then the other category just accounts for a small percentage of the tonnage.

So, really quickly, dry bulk, which has moved historically on the Matagorda Ship Channel, there is uncertainty in the tonnage levels that will be moved via the channel in the future so that wasn't focused on in this study. The drivers of the economic justification, as I've already mentioned, are chemicals and petroleum products.

Recently, in the 2016 through 2018 time frame, there's three new users that have moved into the area of the Matagorda Ship Channel and are building or expanding facilities. Those are North Star Midstream (or NST as it's abbreviated here); NGL; and Arrowhead Offshore. They moved into the channel to capitalize on the proximities to oil fields and are beginning to export crude oil.

Again, this just shows that regardless of the project we're projecting growth in both the crude oil or petroleum products commodity categories and that's from these first two companies moving into the channel: Arrowhead Offshore and North Star Midstream. They are listed here in the future without project conditions because at the time that we started this study they were expanding their facilities. The third, NGL, was done with their facility, as I understood, basically, when we were in the beginning stages of this study. And there's another expansion of a historical user in the channel. Formosa Plastics. They are an exporter of chemical products and they're in the middle of an expansion of their facilities. So this just goes to say that we're projecting growth in the amount of utilization of the channel.

So the transportation cost savings that comes from either loading vessels deeper or using larger vessels to move more product. Larger vessels are loading them deeper means that less trips are required. So the designed vessel for this study is a midsize Aframax tanker, that's a larger vessel than has transited the channel in the past. So the dimensions are listed there: 800 feet long; 138 feet wide; and a design draft of 48 feet. That means when it's loaded the vessel will reach 48 feet deep in the water. It's a popular vessel for oil companies for logistical purposes as it says in the slide.

And I will hand it back to Franchelle.

MS. WILLEY: So as a part of the six steps of planning, the team identified some management measures and we broke them up into two groups: We broke them up into a non-structural group and then a structural group.

And so as far as the measures of the non-structure, we wanted to do modifications to traffic management, pilot regulations, met -- modifications to tug assistance, and then, lastly, split deliveries and light loading.

Some of our structured measures included deepening the channel from the current approved depth; widening the channel from the current prove -- current approved bottom width of 200 feet; possibly having some passing lanes; modifying the existing turning basin or just getting a new turning basin. So after gathering more information and talking to the pilots, having industry meetings, the team was able to start screening those measures.

So, off the riff, we were able to screen all of the non-structured measures -- and that was due to the existing pilot rules and procedures -- and we were able to start screening the structured measures and we were able to screen two of those: No passing lane and then not modifying the existing turning basin. So we were left with deepening the channel, and then widening the channel, and then coming up with a new turning basin.

So our final array of alternatives range from a depth of 41 feet to 51 feet; all of the widths will be 350 feet; the turning basin will be 1,200 feet; and then, like I said, we concluded that there would be no passing lanes.

So the plan that the team selected is a depth of 47 feet with a width of 35 [sic] feet and the turning basin being a hundred -- I mean, 1,200 feet. The entry channel will be 49 feet and the width of it will be 600 feet due to safety reasons.

MR. BROWN: Good evening, I'm Harmon Brown, the Environmental Lead on this project.

First, I want to talk to you about the current DMMP (or the Dredge Material Management Plan). Currently, the material's going on the side there. We're having some issues with shoaling back into the channel, so it increases the cost of maintenance, and so we changed that up a little bit and decided to put it on the other side of the channel. This is for the new work material, so it's the heavier clay, stiffer material. If we can put it on -- on the other side of the channel it won't shoal back in -- you know, reduces shoaling back into the channel, but it also provides some protection from the shoreline here.

We also plan to do some work with the Audubon Society on Sundown Island (or also called Chester's Island) and we have an offshore placement site. We have a -- an upland placement, confined placement area here called P-1; and then up here, what we call, ER-3-D is a -- a site that we would like to use, if necessary, for some of our new work material.

So the maintenance material, if you could -- it goes on the opposite side, closer to the shore of the new work material. So the new work material will protect it -- or not necessarily protect it, but help reduce the amount of shoaling back into the channel.

Some of our environmental considerations. Our biggest one -- this is an oyster map that was done by URS back in, I want to say, 2009. This was when it was mapped. So we can see a lot of -- each of these red polygons is a mapped oyster bed, so we're going to have some -- some issues with oysters that we'll have to deal with.

We gone through a lot of environmental compliance. This meeting here is part of the National Environmental Policy Act requirements. Doing a public meeting so that everybody has a chance to comment on the project. We had one -- our scoping meeting -- back in January 2017. This here is to present our Integrated Report and Environmental Impact Statement and get your comments on it. We've also worked with U.S. Fish & Wildlife Service, Magnuson Fisheries on -- on endangered species, and then there's a number of others that we're working with. Lots and lots of compliance that we have to meet.

So the environmental outlook, what we expect or estimate our impacts on this project are: We don't expect any direct impacts to any listed threatened or endangered species or their critical habitat. We have outlined impacts to about 1.5 acres of fresh marsh or in the upland placement area, so we'll have to do some mitigation for that. We're currently looking at a previously impacted area, but speaking with some others here, there are -- we've got some other ideas of other areas we might be able to mitigate.

The channel dredging itself we're estimating 130 acres of oyster reef along the channel. Working with the other resource agencies, they would like us to resurvey right before the project to get a -- a more refined acreage and then mitigation for that would occur within the Matagorda Bay system. We're currently working with Texas Parks & Wildlife and U.S. Fish & Wildlife to try to narrow down some -- some areas where the mitigation would be best sited.

So, as I said, this is part of the NEPA (National Environmental Policy Act) meeting we -- for public comments. The public comment period began on 7 May. It's a 45-day comment period which ends on 21 June. We're accepting oral comments this evening and also written comments. You can provide them tonight on the written sheets. You can also e-mail me at this e-mail. It's also in some of the mailings that were sent out to individuals. Or you can mail them to our address in -- in Galveston. We'd like you to postmark those by 21 June '18; that's the end of the comment period.

And, now, we will turn it back over to Sheri.

MS. WILLEY: Thank you, Harmon.

Now, I am going to recognize if any of the elected officials that were introduced earlier would like to make a statement regarding the Matagorda Ship Channel Feasibility Study. None signed up previously, but I wanted to give another chance in case they would like to make a statement. If you do, raise your hand.

(No response.)

MS. WILLEY: Okay. Additionally, I would like to see if there are any resource agency representatives who would like to make any statements.

(No response.)

MS. WILLEY: Okay. We're going to move along to the statements from the public.

I'm now going to call on the members of the general public to make a statement, the ones that have signed up first. Those statements would be regarding the Matagorda Ship Channel Feasibility Study. We want you to limit your comments to the feasibility study only.

We're going to use the computer -- getting high tech here -- to keep the time. We're -- It's going to count down the time left to speak; and when your time is expired, I ask that you stop speaking after the three minutes have elapsed. When I call upon you, please come forward and speak into the microphone, identify yourself by your full name, and organization you represent, if any. And then as we go through, we're going to go through the list of folks, and then at the -- after the people who have signed up go speak, I will allow others who may decide to speak to come on up and speak.

So the first person on our list is Tom Andrews.

MR. ANDREWS: Yeah. I don't have anything to say right now. I'm okay.

MS. WILLEY: Okay. Thank you. Second on the list is Norma and Tom Gallagher.

MS. GALLAGHER: Yeah. I'm right here.

We live at Magnolia Beach and are very concerned. We live at Magnolia Beach and we're very concerned about losing our beach. We started coming to the beach and camping down there in '03, and we had -- I don't know -- maybe a half a mile of beach going out into the water; and lots of friends camped there and met with us there every year.

Now, you can just maybe fit five or six campers on the point down there. There's just no more beach. It seems like every time they dredge the channel we lose more beach. And I'm wondering when you -- I couldn't figure it out on the map, but I'm wondering if you're going to bring the spoils up for our beach. And Tony said that if they find sand that they'll bring it up. We're just all wondering because we're losing our beach. That's it.

MS. WILLEY: Thank you.

MR. BROWN: Thank you, ma'am.

MS. WILLEY: Next to make a comment is Raymond Butler.

MR. BUTLER: Thank you. I'm Raymond Butler, a lifelong resident in Calhoun County, grew up in Point Comfort, and I grew up on the bay fishing and hunting.

My father brought the first deep-draft vessel through the channel in 1966. I rode several ships with him so I'm familiar with some of the dynamics that are going on out there, although they're a little outdated. I have spent most of my career in the inland barge industry working across the Gulf Coast with almost every deep-draft port on the Gulf Coast, including Charles and his fine commissioners there, and I want to tell you, first, I support this project deeply.

I think it will bring untold benefits to Calhoun County and the whole South Texas area; not only from the expansions and then the increases in tonnage that you outlined, but I think, once it's here, they will come. There's going to be others that see the advantage, and, maybe, we'll have another accelerate or something like it interested in -- in the port when that happens. But I want to share some personal observations with all of you. This comes from looking at all of the Gulf Coast deep-draft ports.

When we deepened and widened the Houston Ship Channel -- And Joe Hrametz is a good friend of mine, he'll verify some of what I'll tell you. But the Houston Ship Channel was deepened and widened probably ten -- ten years ago, and when that happened it started carrying a lot more water in and out of the bay system. San Luis Pass began shoaling up quickly, very quickly.

Now, we're dealing with extreme currents in the intercostal waterway at the Brazos flood gates. There are times when tows can't push it because the water is moving up and down inside the intercoastal waterway and not through San Luis Pass. We have the same dynamic happening right here in Pass Cavallo. Pass Cavallo was filling up bigtime and it'll continue to shoal up. Every natural Gulf Coast pass that's adjacent to a ship channel is filled up. Port Mansfield. All of it. And the intercostal carries more of that water.

And also the erosion at the jetties, the currents have increased bigtime. I remember when we first brought the first ships in you could see the current flowing over the -- the inside buoy and it would lay over a little bit. But Captain David showed me a picture of that buoy being totally almost submerged by the in- -- inbound and outbound currents. They have increased, probably, I don't know, four or five fold from what they were initially, and that's adding to the erosion of the -- of the jetties.

Real quickly, a couple of other points, I want to be real fast about this. When you start talking about placement areas and where to put this material to get the maximum beneficial use out of it, I happened to own some property out at Alamo Beach and the port bought it from me as an avenue to get into a placement area evidently. But when I was living out there, the surge from the ships coming in and out I -- I would not have believed it if I wouldn't have seen it. It is unimaginable un- -- until you go out there and you see that -- that surge happening.

In 1971, the beach at Alamo was way out in the bay. There are even streets platted and a city park platted at Alamo Beach way out there, and that was in 1971. It's all gone. In the time that I was out there, property just flat disappeared like the lady was saying earlier. So it's going away like crazy. Maybe placement on the other side of the channel will help some of that. I hope it does.

But I would also tell you that I have property right now down on South Virginia Street, and I'm a good ways from the channel, but I -- it's -- I'm bulk-headed. My neighbor isn't. My neighbor has lost about 50 or 60 feet in the last five years. So there is still serious erosion going on.

Finally -- you about to cut me off?

MS. WILLEY: No.

MR. BUTLER: We have a couple of areas in this -- is there any way we can go through another slide? There are -- there are two really bad areas in the bay right now we can't use. You can't keep fish there and I think it's -- a lady from Alcoa said maybe it's a Superfund right now, but I would encourage us to use those non-productive sites as placement areas where we already can't use the bay bottom. Think about using that for a placement area. There is one back there in the corner over at Point Comfort. There is another area on the south side of the port, on the south side of the spoil area, that when they dredged that years ago it just silted that whole bay. It's -- it's -- there's a huge area there that's not really good for much. I would consider a -- I would like to see us consider looking at those areas.

That's all I have. Thank you.

MS. WILLEY: Thank you. Dale Fowler?

MR. FOWLER: Thank you. I'm Dale Fowler. I'm with the Victoria Economic Development Corporation and I would just like to say every day we work to bring new industry to this region or encourage our existing industry to grow.

As a matter of fact, I believe that the very reason we love this area so much is because of great things like our -- our medical system, our schools, our great law enforcement and EMS, and -- and the infrastructure that we have in this region, and I happen to believe that we have all of these things because we have industry in this region. And so when I heard about the opportunity for one of our great assets, the deep-draft port, here at Point Comfort to be deepened, I know that that will help facilitate industry in -- in a good way.

And, of course, we're counting on the professionals to do this in a -- in a safe, environmentally safe and -- and friendly way, and, therefore, it makes our job a little easier to bring in new industry and help our existing industry to stay here. It's those jobs that we have here that are supporting just about everything else that we love about this region.

So my at hats off to the leadership at the Calhoun Port Authority, as well as the Corps of Engineers for working on this project and we certainly support it.

MS. WILLEY: Connie and Ed Hunt.

MS. HUNT: No. I don't -- I must have signed the wrong sheet.

MS. WILLEY: Okay. No problem.

We've gone through the list of those who indicated they wanted to make a statement. Is there anyone else who wishes to speak regarding the study?

(No response.)

MS. WILLEY: Okay. Since there isn't

anyone else --

In conclusion, written comments on the Draft Integrated Feasibility Study and Environmental Impact Statement must be received on or before June 21st, 2018. As Harmon mentioned, if you're mailing in your comment, it needs to be postmarked by that date. That is the conclusion of the 45-day comment period that began on May 7th, 2018.

I would like to thank the Calhoun Port Authority for their efforts and assistance in preparing and holding this meeting, and I thank you for your attendance and the interest you all have shown tonight. This meeting is adjourned.

* * * * *

COURT REPORTER CERTIFICATION

COUNTY OF BEXAR)
STATE OF TEXAS)

I, Dicie Lee Eytcheson, a Certified Shorthand Reporter in and for the State of Texas, do hereby certify that this transcript is as true and accurate a record as possible, transcribed by me through computer-aided transcription.

And further certify that I am not a relative or employee of any of the parties hereto, nor interested directly or indirectly in the outcome of this session.

WITNESS MY HAND, this the 24th day of May, A.D. 2018.

Dicie Lee Eytcheson

Dicie Lee Eytcheson, Texas CSR 5392
Expiration Date: 12/31/18
Firm Registration No. 631
Kim Tindall & Associates, LLC
16414 San Pedro Avenue, Suite 900
San Antonio, Texas 78232
Phone: (210) 697-3400
Fax: (210) 697-3408

Attachment J – Draft FR-EIS Public Comments

US Army Corps of Engineers®

CALHOUN Port Authority
POINT COMFORT, TEXAS • USA

Comment Form

Please return your completed form before you leave. You may also mail your comments to:

USACE – Galveston District
Attn: RPEC Coastal Section
P.O. Box 1229
Galveston, TX 77533-1229

Comments are due by June 21, 2018.

1.Name / Representing: TONY HOLLADAY/CALHOUN PORT AUTHORITY

2.Address [Optional]: 1262 SWEETWATER Rd. PORT LAVACA TX 77979

3.Email [Optional]: JThollad@tisd.net

4.Please provide your comments concerning the Matagorda Ship Channel, Texas Feasibility Study in the blanks below.

YOUR PRESENTATION WAS FIRST CLASS AND SO WERE THE PEOPLE THAT SET IT UP + PRESENTED IT, ESPECIALLY DR. BROWN. HE'S AN OUTSTANDING PERSON - THE SLIDE PROJECTION PRESENTATION WAS 1ST CLASS AND PRESENTED THE PROJECT IN THE PROPER LIGHT.

MATAGORDA SHIP CHANNEL, TEXAS
NEPA Public Meeting 15 May 2018

From:	Kenneth Teague
To:	Brown, Harmon III CIV USARMY CESWF (US)
Cc:	McCormick, Karen; Martinez, Maria; keeler.barbara@epa.gov; Alison Fontenot; 401certs@tceq.texas.gov; Swafford, Rusty; Hoth, David; Rebecca Hensley; houston.robert@epa.gov; kenwkramer@aol.com; blackbur@rice.edu; crocker.philip@epa.gov; evans.diane@epa.gov
Subject:	[Non-DoD Source] Comments: MATAGORDA SHIP CHANNEL DRAFT INTEGRATED FEASIBILITY REPORT - ENVIRONMENTAL IMPACT STATEMENT (MSC DIFR-EIS)
Date:	Wednesday, May 30, 2018 11:20:36 PM

Dear Mr. Brown: I have reviewed the subject draft EIS, and I have the following comments:

* The Draft EIS does not accurately document the anticipated effects of the proposed project. Either staff who drafted the EIS are purposely distorting the information, or they don't know what they are talking about.
* More specifically, the USACE has not properly evaluated the potential for dredged material disposal to result in exceedance of State water quality criteria for mercury. The EIS dismisses the concern, stating that all existing data indicate there is no cause for concern. This is not the case. Occasionally, elutriate data from sediment proposed for maintenance dredging in the existing channel indicates that chronic water quality criteria for mercury are exceeded. USACE has chosen in the past to assume that chronic water quality criteria do not apply to dredged material disposal, but they have not actually consulted with any other agencies on this assumption. USACE must test sediment proposed to be dredged and disposed under this proposed program- elutriate must be tested for mercury. Other agencies and the public must be consulted regarding the question whether chronic criteria apply. In particular, TCEQ and EPA (water quality standards) must be consulted.
* In addition, mercury is often detected in sediments from the channel, but bioaccumulations testing is not conducted on sediments proposed for disposal that is regulated under Section 404 of the Clean Water Act. Bioaccumulation testing must be conducted on these sediments, and the results must be provided for public review, prior to finalizing an EIS.
* The USACE has not evaluated the potential effects of the proposed project on hurricane storm surges. Intuitively, it is reasonable to conclude that enlarging any channel on the Gulf coast will increase the risk of storm surge to nature, humans, and human infrastructure. The USACE must simulate the effects of the proposed project on hurricane storm surge and provide the results for review and comment by the public.
* The USACE only very generally evaluated the potential for the proposed project to exacerbate low dissolved oxygen in bottom waters. They did not specifically evaluate the potential for the proposed project to exacerbate low DO in protected areas, such as the port. USACE should simulate the effects of the proposed project on DO in protected areas such as ports.
* The USACE make conclusions regarding the effects of salinity changes on wetlands, apparently based on professional judgement rather than formal analysis. This is unacceptable. The state of Louisiana has developed relatively simple, yet scientifically acceptable models for estimating the effects of salinity on wetlands. The USACE should revise their analysis of wetland impacts of salinity changes, based on modifications of models used in Louisiana.
* The USACE used outdated methods for estimating project impacts on wetlands (HEP). The USACE should revise their estimates of project impacts on wetlands using the HGM approach, as their regulatory group does. Results should be provided for public review and comment.
* The EIS acknowledges that the proposed project may indirectly negatively affect oyster reefs by increasing salinity and turbidity, but does not estimate the magnitude of such impacts, nor propose mitigation. The USACE should model the effects of increased salinity and turbidity on oysters, and should propose appropriate mitigation. The USACE did this previously for Galveston Bay, so it can be done.
* The USACE has proposed minimal mitigation. No mitigation is proposed for temporal losses of ecological function. The USACE should estimate temporal ecological function losses, and propose appropriate mitigation.
* Proposed dredging is sufficiently close to seagrass beds on Matagorda Island, near the channel, to justify concern for potential negative effects of dredging and dredged material disposal on them. Potential negative effects include burial by sediment and decreased light attenuation due to increased suspended solids. The USACE did not estimate these potential impacts. The USACE should estimate potential negative effects of dredging/dredged material disposal on seagrasses. The USACE previously convened a scientific workgroup on seagrasses and dredging, and they recommended that no dredging or dredged material disposal occur within 1 km of a seagrass

bed. They also recommended that dredging in the vicinity of seagrass beds be limited to the seagrass dormant period.

* It is not clear that EPA has evaluated the potential environmental impacts of disposing of clay sediments from within Matagorda Bay, at a new proposed ODMDS in the Gulf of Mexico. It is not clear that EPA has approved those sediments for discharge at that location. First, it has been previously demonstrated that fine grained sediments from Matagorda Bay contain detectable concentrations of mercury, suggesting that bioaccumulation testing must be done. In addition, elutriate data from these sediments sometimes results in exceedance of state chronic water quality criteria for mercury. Finally, the dredged material from Matagorda Bay proposed to be disposed of at a new disposal area in the Gulf, is very different than the sediments at the proposed disposal area. It is my understanding that this requires a complex analysis to resolve whether or not it is acceptable to dispose of dissimilar sediment under the Ocean Dumping program.

* Summarizing, the proposed project is highly likely to have significant negative environmental effects on the Matagorda Bay estuarine ecosystem. The USACE has not properly evaluated the potential environmental effects, and therefore, has not appropriately disclosed those impacts, as required by NEPA. USACE should revise their estimates as discussed above, and should provide a revised draft EIS for public review and comment, again, prior to finalization of an EIS.

Sincerely,

Kenneth G. Teague, PWS, Certified Senior Ecologist

2918 Ranch Rd 620 N, #236

Austin, TX 78734

Sent from Mail <Blockedhttps://go.microsoft.com/fwlink/?LinkId=550986> for Windows 10

From:	Kenneth Teague
To:	Brown, Harmon III CIV USARMY CESWF (US)
Cc:	McCormick, Karen; Martinez, Maria; keeler.barbara@epa.gov; Alison Fontenot; 401certs@tceq.texas.gov; Swafford, Rusty; Hoth, David; Rebecca Hensley; houston.robert@epa.gov; kenwkramer@aol.com; blackbur@rice.edu; crocker.philip@epa.gov; evans.diane@epa.gov
Subject:	[Non-DoD Source] Additonal Comment: MATAGORDA SHIP CHANNEL DRAFT INTEGRATED FEASIBILITY REPORT - ENVIRONMENTAL IMPACT STATEMENT (MSC DIFR-EIS)
Date:	Thursday, May 31, 2018 11:41:35 AM

I forgot to mention another concern in my previous email:

* USACE did not evaluate the potential impact of larger ships using the larger channel, creating larger wakes, and thus larger waves impacting the shoreline, causing shoreline erosion. USACE should simulate such effects, and estimate the increase in shoreline erosion, and propose appropriate mitigation. Results should be provided in a revised DEIS for public review and comment.

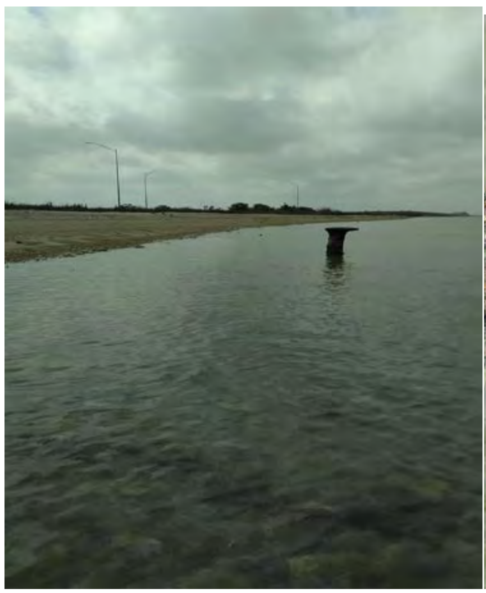
Kenneth Teague

Sent from Mail <Blockedhttps://go.microsoft.com/fwlink/?LinkId=550986> for Windows 10

Dr. Harmon Brown
U.S. Army Corp of Engineers, Galveston District
Re: Comments, Matagorda Ship Channel Project

To Whom It May Concern: May 22, 2018

To inform you about information that the Corp of Engineers may not have. According to information I received directly from National Ocean Service personnel, in 1990, the City of Point Comfort had a survey marker placed on dry land by the Nation Ocean Service north of Point Comfort side of Lavaca Bay Causeway for use in monitoring tides and water temperatures. (approximately N 28 degrees 39.446 minutes, W 96 degrees 34.5655 minutes). The attached photos from 2017 and 2018 reveal rates of erosion that now place the marker at least twenty feet offshore (see attached photos).



In 1994, Formosa Plastic Corporation placed a wastewater outfall into Lavaca Bay estuary (N28degrees 40’ 54” and W96degrees34’54”). These coordinates are on Formosa’s 2016 wastewater permit given by TCEQ. The permit allows Formosa to discharge from 6,000,000 to 9,000,000 gallons of water per day. Presently the discharge the rate is 6,000,000 a day. This is within 5 to 7 miles of MATAGORDA SHIP CHANNEL I have photos showing current velocity flowing in a southerly direction and visuals from Google Maps(zoom in on coordinates) that show the effect of the outfall flow on wave action of the bay. I believe this outfall flow has a significant impact on the high rate of erosion evidenced in Lavaca bay.

My point in this letter is to highlight the increasing rate of erosion to the protective land mass on the East Lavaca Bay Causeway Approach and suggest that the Formosa Outfall Flow of some six million gallons per day is a major contributing factor.

Respectfully Submitted,

Myron A. Spree

MATAGORDA BAY PILOTS
P.O. BOX 836
PORT LAVACA, TEXAS
77979

06 June 2018

To: Dr. Harmon Brown
USACE Galveston District
2000 Fort Point Road
Galveston, TX 77550

RE: Matagorda Ship Channel Widening and Deepening

Dr. Brown,

The Matagorda Bay Pilots have been stewards of the Matagorda Ship Channel (MSC) since its construction in the 1960's. Over the last 50 years, pilots have watched vessel size increase, almost tripling in deadweight while customer demand for these larger vessel increase as well, yet no physical changes to the ship channel have occurred during this period. The pilots have reached their safety limits with regards to vessels sizes.

As you are aware, the MSC is one of the shallowest and narrowest "deep draft" channels in the country. These dimensions, coupled with one of the most dangerous entrances in the country make these larger vessels transiting the ship channel extremely difficult and at times dangerous. There are times the MSC is closed to larger vessels due to high environmental forces, such as wind, seas and currents, which is not the case in larger channels. The MSC was originally designed for a 30,000 deadweight vessel, yet the pilots have transited vessels as large as 87,000 deadweight in the past five years. The margin for error is so slim; there are only certain periods of the day and weather windows where they can safely transit.

A deeper and wider ship channel will allow for easements in the restrictions of *Panamax* vessels while also allowing the highly demanded *Aframax* vessel to transit the channel, which cannot enter the MSC without these much needed modifications. A wider and deeper channel will increase the safety margin for all vessels transiting the MSC and allow for safer transits at night and in inclement weather. Pilots are not tasked with economics, but with safety. A wider and deeper channel will exponentially increase the safety for all vessels utilizing the waterway, whether a local fisherman, an inland barge or an ocean going vessel.

In summary, the Matagorda Bay Pilots **<u>SUPPORT</u>** and increase in the dimensions to the ship channel in both depth and width. These dimensions will enhance the safety for vessels transiting the ship channel and the economics for the users of the waterway.

Respectfully Submitted,

Captain David Adrian
Presiding Officer
Matagorda Bay Pilots

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 16, 2018

Mr. Dr. Harmon Brown
Biologist
Environmental Compliance Branch
Regional Planning & Environment Center
USACE – Galveston District
P.O. Box 1229
Galveston, Texas 77553-1229

Via: E-mail

Re: TCEQ NEPA Request #2018-133, Joint Notice of Availability Draft Integrated Feasibility Study and Environmental Impact Statement for the Proposed U.S. Army Corps of Engineers, Matagorda Ship Channel Project; Calhoun and Matagorda Counties

Dear Mr. Brown:

The Texas Commission on Environmental Quality (TCEQ) has reviewed the above-referenced project and offers the following comments:

A review of the project for general conformity impact in accordance with 40 CFR Part 93 indicates that the proposed action is located in Calhoun and Matagorda Counties, which is currently unclassified or in attainment of the National Ambient Air Quality Standards for all six criteria air pollutants. Therefore, general conformity rules do not apply.

The Office of Water does not anticipate significant long term environmental impacts from this project as long as construction and waste disposal activities associated with it are completed in accordance with applicable local, state, and federal environmental permits, statutes, and regulations. We recommend that the applicant take necessary steps to ensure that best management practices are used to control runoff from construction sites to prevent detrimental impact to surface and ground water.

Any debris or waste disposal should be at an appropriately authorized disposal facility. If the facility intends to store hazardous waste for more than 90 days, they need to coordinate with our Waste Permits Division to seek authorization prior to storage.

Thank you for the opportunity to review this project. If you have any questions, please contact the agency NEPA Coordinator, at (512) 239-3500 or NEPA@tceq.texas.gov.

Sincerely,

Ryan Vise
Division Director
Intergovernmental Relations

My question is "What are you going to do to prevent further erosion of the beach at Magnolia Beach caused by ship traffic"? The already heavy ship traffic is constantly eroding the beach area. Deepening and widening the shipping channel will likely create even more traffic, larger vessels and vessels traveling at even greater speeds. All of these thing will accelerate the beach erosion problem that to date appears to have been ignored you and the industry.

John Mayne
johnmayne2013@gmail.com <mailto:johnmayne2013@gmail.com>
36 Bay Front Lane
Port Lavaca, TX 77979
(361) 484-5272

W.R.BUTLER COMMENTS ON MATAGORDA SHIP CHANNEL DEEPENING AND WIDENING PROJECT
MAY 16, 2018
BY

RAYMOND BUTLER, P.E.
P.O. BOX 498
PORT LAVACA, TX 77979
wrbutler@comcast.net
713-882-9750

To:
Dr. Harmon Brown
U.S. Army Corps of Engineers
Galveston, TX

CC:
Mr. Charles Hausman
Executive Director and Manager
Calhoun County Navigation District

Capt. David Adrian
President Matagorda Bay Pilots
Port Lavaca, TX

Mr. Joe Hrametz
Chief of Navigation
U.S. Army Corps of Engineers
Galveston, TX

Dear Dr. Brown,

This letter will serve as my written statement in support of the verbal comments I presented at last night's public hearing held at the Bauer Exhibit Building in Port Lavaca. Thank you for providing an opportunity to offer my thoughts.

My name is Raymond Butler. I am a life-long resident of Calhoun County, growing up in Point Comfort. I spent all of my youth on Lavaca Bay feeding my passion for boats and the water. That passion remains with me today.

In 1966, my father, a former steamship captain for Alcoa Aluminum, became the first authorized/state-licensed Matagorda Bay Pilot. He was instrumental in the design of the original Matagorda Ship Channel (MSC) and brought the first deep draft ship across the Matagorda Bar in November of 1966. I was fortunate enough to be able to accompany my father on many voyages of inbound and outbound ships during my high school years.

My career after high school included obtaining an engineering degree from Texas A&M and subsequent 30 years experience in all phases of marine transportation, including owning my own marine towing company, serving in executive management for two of the country's largest tank barge operators, and a 10-year period of managing the Gulf Intracoastal Waterway from St. Marks, Florida, to Brownsville, Texas. I am a registered professional engineer in the state of Texas (#49122) and own Butler Consulting, a licensed marine engineering consulting firm (#6228).

My time managing the Gulf Intracoastal Waterway included extensive interaction with the deep and shallow-draft marine transportation industry, Corps of Engineers, Coast Guard, United States Congress, and virtually all of the Gulf Coast ports. I was a key member in several Corps of Engineers' studies and projects (including the two post-Katrina floodgate structures on the GIWW at New Orleans), where I came to know and appreciate the value of the Waterways Experiment Station in Vicksburg.

Before I continue with my intended-constructive comments, I want to reaffirm that I wholeheartedly SUPPORT the deepening and widening of the MSC! In addition to serving the known increases in tonnage, I believe the presence of the improved channel will result in untold benefits for both the local economies and the Gulf Coastal Region. America's waterways and deep-draft channels, are, unfortunately, the "Best Kept Secret" of America's economic success worldwide! Many of us in the industry have been trying to tell this story to our legislators in Washington and the public for years, and we cannot lose sight of the need to keep telling this story! We have been benefitting from the amazing foresight and vision of our forefathers, and it's way past time for our country to renew that vision.

During my lifetime on the Lavaca Bay complex, I have seen the completion of Lake Texana, the opening of the MSC, impacts of Hurricane Carla (and subsequent storms), and the amazing continuing changes in shaping of the bay relative to hydraulic impacts on land masses. Please allow me to briefly summarize my thoughts concerning the proposed MSC project and share my experiences that my have benefit to the project's ultimate design:

1. Across the Gulf Coast, I have observed when ship channels are constructed (especially so when they are deepened and widened), the bays and adjacent coastal regions are impacted greatly. Several things seem to happen without fail.

   First, the nearby natural passes, that may have already begun to close as a result of the re-direction of major in/out-flow to the bay complex, increase their rate of closure. I cite San Luis Pass, Cedar Bayou, San Bernard River, Colorado River, Pass Cavallo, Port Mansfield, et al.

   Second, currents in the ship channels begin to increase significantly by orders of 3 to 4 times their original values, making for increasing navigation challenges, need for channel relocations and re-alignments (GIWW/MSC intersection), extra safety measures (current velocity meters, alternate entry channels for shallow-draft, etc.).

   Third, erosion and sedimentation patterns, especially within the original jetty structures, begin to impact stability of protection for the land and the channel (see MSC erosion acceleration both within the jetties and on the northern shores of surrounding land masses). This impact extends far into the bay system from the entrance channels, in my experience (see erosion impacts on attached photos, and note the GIWW/MSC intersection and recent re-alignment of the GIWW channel due to accelerated sedimentation of the original GIWW alignment). Another unintended consequence of the hydraulic impacts resulting from the increase in ship channel capacity is the increasing current that results in the GIWW. As more water flows in and out of the bay systems, the GIWW begins to carry more water, and currents dramatically increase. I cite the major current increases now noticeable by barge line operators at both the Colorado and Brazos structures. Changes are needed at both of these structures to accommodate traffic increases and prevention of inefficiencies.

2. There are at least two sites adjacent to the MSC in Lavaca Bay that are known unproductive, "non-useable" locations. One is the known superfund site at the Alcoa Placement Area on the west side of the Alcoa basin. There is another "non-useable" site on the south side of the Point Comfort Port Peninsula (old dredge placement area) that has been rendered of little value due to the uncontrolled spread of unconfined material from the dredging of the turning basin. This area is quite large, shallow, and covered with silt. In my view, we should consider using these two non-productive locations for placement of dredge material that has no other viable beneficial placement option. We should avoid any covering of "productive" natural bay bottom whenever possible.

3. Relative to the suggested placement of dredge material on the west side of the channel in an effort to prevent channel siltation and reduce erosion on the bay shoreline. We should consider where the real source of erosion exists. In my view, it is primarily somewhere other than ship impacts. Although surges are noticeable when ships pass in the Alamo Beach/Indianola/Magnolia Beach area, when an overall assessment of bay erosion impacts is done, it will reflect significant impacts to areas not affected by ship passage at all. I have included photos of 1990 land masses not directly impacted by ship traffic and how they look today (2017). There is dramatic

evidence that something else is impacting land loss beyond ship impacts. Before we go to great lengths to address the ship erosion issue, we should spend time validating the real cause. As one who has seen this impact directly, in several locations, including ship passage, I would suggest there is much more going on than simple ship impact.

Further to this point, is the fact that the original dredge material placement "islands" created during the original channel construction have now been eroded away and have virtually disappeared. I would suggest the proposed placement "protective islands" will suffer the same fate.

In my view, the best solution to the erosion issue is protection of the land and channel by armored physical means. (The current policy of the Texas General Land Office is counter-productive to landowner protection of erosion in my view by preventing ANY reclamation of submerged lands by the owner. This act disincentivizes anyone from trying to protect property economically.) I do believe we could do all that is proposed by the MSC Project "intended to protect" the channel from siltation and land from erosion, to find, in the long-term, it did no good. Until we understand the complete reason for the siltation, erosion, and land loss in Lavaca Bay, we will continue to spend money with little long term result.

If the project does choose to use channel-adjacent placement sites, they should be armored land-locked sites, such as Atkinson Island on the Houston Ship Channel.

4. The extent of the wide-reaching and acclerated erosion issue in Lavaca Bay, coupled with the specific expense directed at correcting it in this project, may warrant a complete hydraulic study of the bay system to get at the real causes and most effective solution. In my experience, the Waterways Experiment Station and their experise at modeling, has been extremely effective at identifying multiple concerns on projects such as the MSC.

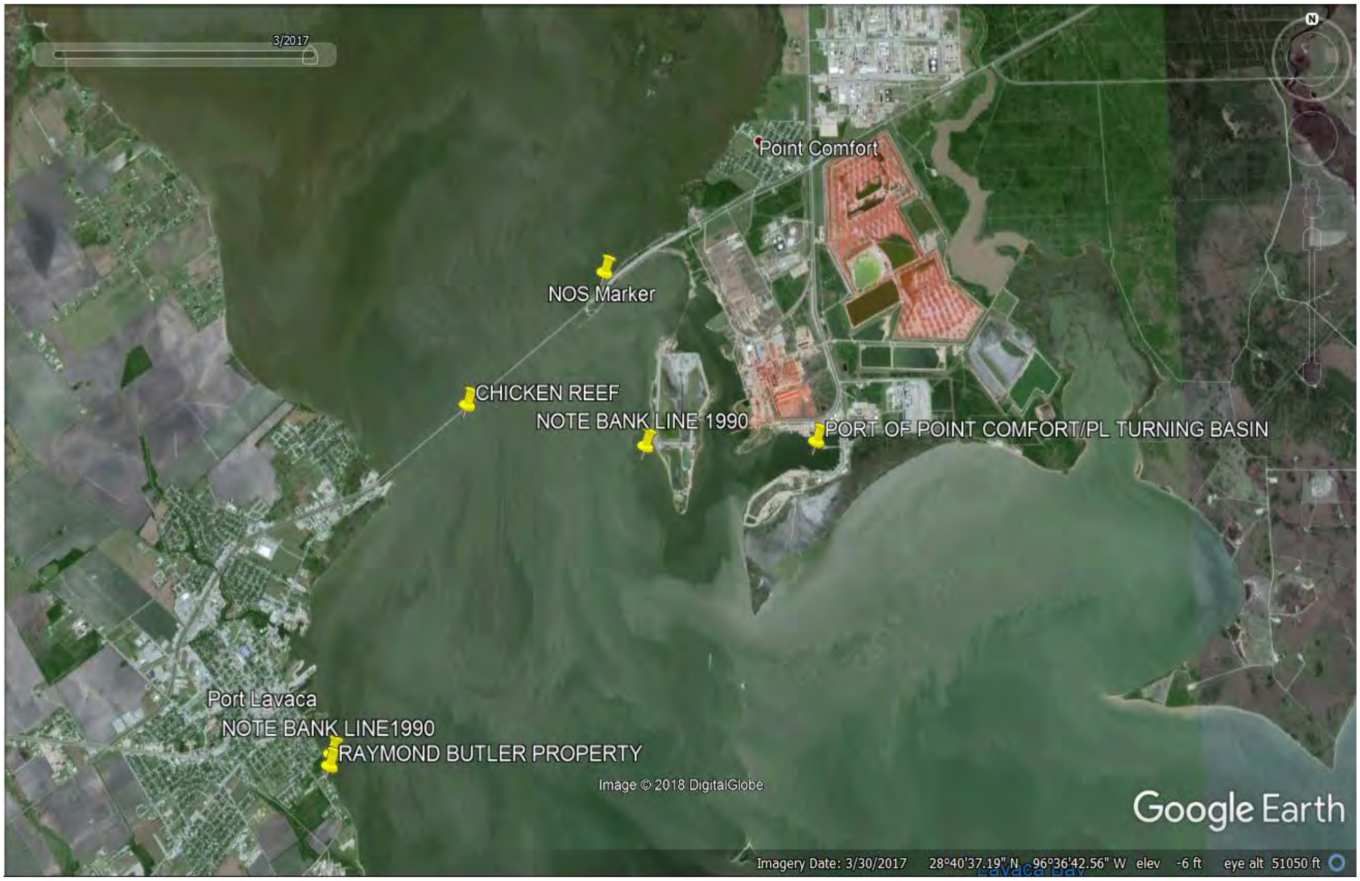
Please find attached photos illustrating land mass erosion from 1990-2017 in areas remote from MSC impacts.

This concludes my comments on the MSC Project. Thank you for providing the opportunity to offer them.
Respectfully Submitted,

Raymond Butler, P.E.

EROSION AT TWO SELECTED LAVACA BAY LOCATIONS

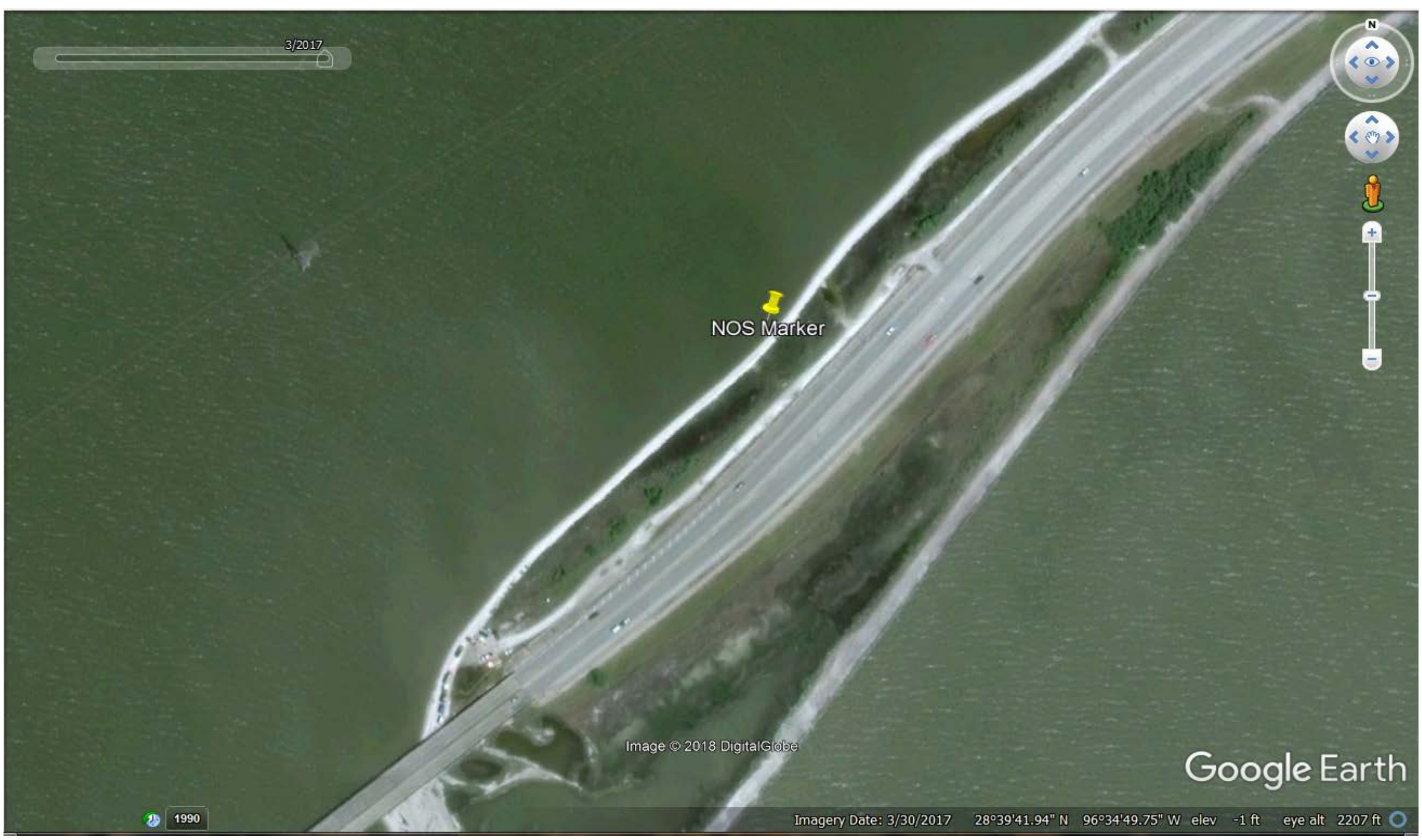
SELECTED LAVACA BAY EROSION BENCHMARK
LOCATIONS
MINIMUM TO NO SHIP WAKE IMPACT



LAVACA BAY CAUSEWAY, EAST SIDE APPROACH

1990-2017

NOS MARKER PLACED 1990 ON DRY GROUND



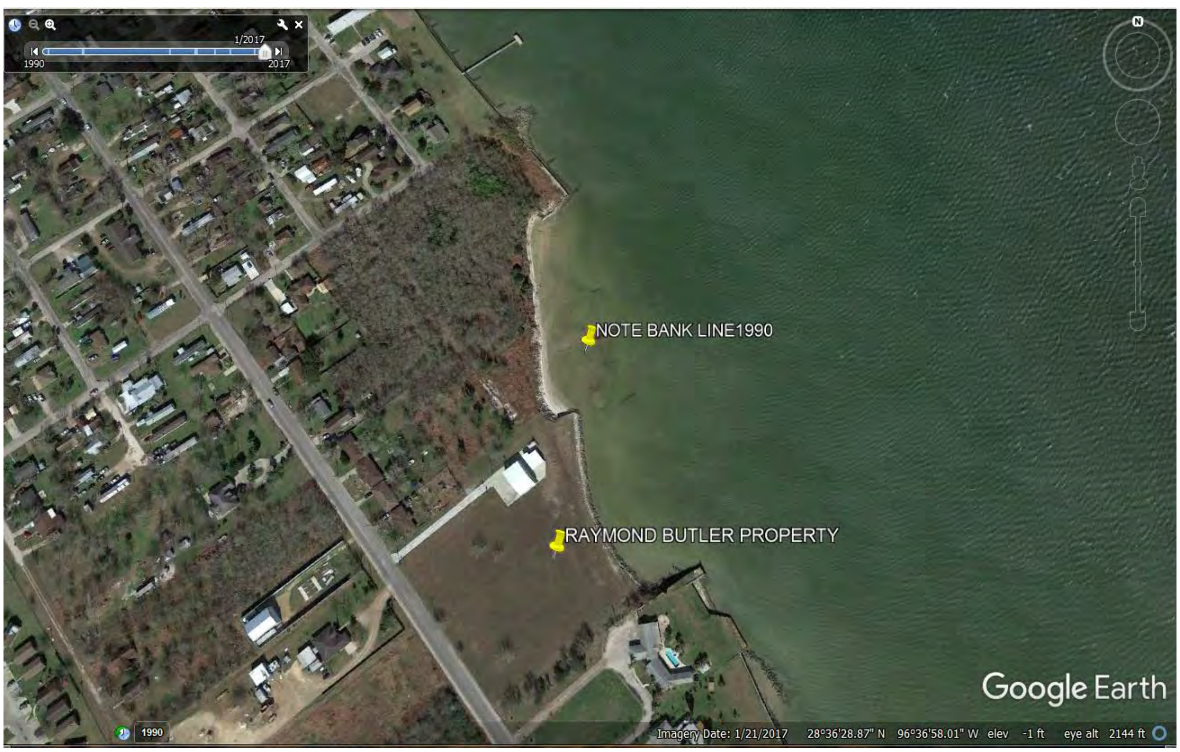
NOS MARKER 20 FEET OFFSHORE IN 2017.

NOS MARKER PHOTO TAKEN FEBRUARY 27, 2018, LOW TIDE
LAVACA BAY CAUSEWAY, EAST SIDE APPROACH
WAS ON DRY GROUND AT ORIGINAL PLACEMENT IN 1990

NOS MARKER PHOTO TAKEN, FEBRUARY 27, 2018

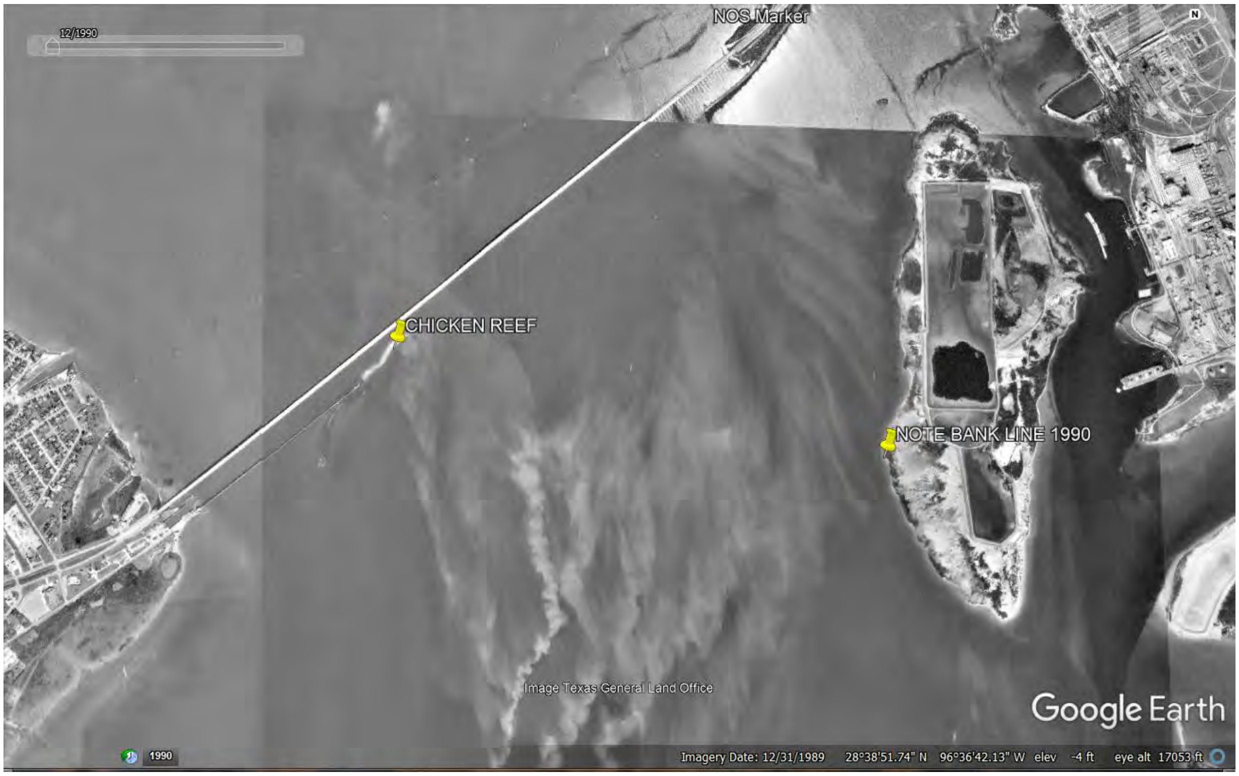
1120 SOUTH VIRIGINIA ST., PORT LAVACA
1990 BANK LINE LOCATION

2017 BANK LINE LOCATION REFLECTS LOSS OF OVER 60 FEET OF PROPERTY DEPTH



CHICKEN REEF ALCOA PLACEMENT SITE EROSION

1990-2017



NOTE EROSION OF ALCOA PLACEMENT AREA AND DISAPPEARANCE OF CHICKEN REEF TOTALLY

1990-2017

-----Original Message-----
From: Brian Franck [mailto:brianjfranck@gmail.com]
Sent: Wednesday, May 23, 2018 11:27 AM
To: Finn, Lisa M CIV USARMY CESWG (US) <Lisa.M.Finn@usace.army.mil>
Subject: [Non-DoD Source] Matagorda ship channel - Guad M2

Howdy -

I've noticed over the years that Pass Cavallo seems to be shoaling in and getting narrower, but the water depth around the POC jetties is increasing. It also seems like more water is moving through the jetties and less through the pass. I've got no way of measuring, just observations based on time fishing in the area.

What impacts on the pass are expected on Pass Cavallo after the ship channel is modified?

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

July 20, 2018

Dr. Harmon Brown, Biologist
Environmental Compliance Branch
Regional Planning & Environmental Center
Galveston District CESWG-PE-RE
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Draft Integrated Feasibility Study and Environmental Impact Statement for the Proposed U.S. Army Corps of Engineers Matagorda Ship Channel Project

Dear Dr. Brown:

As described in the Joint Notice of Availability, dated May 2, 2018, the U.S. Army Corps of Engineers Galveston District (Corps) has prepared the Draft Integrated Feasibility Report and Environmental Impact Statement (DEIS) for the Matagorda Ship Channel (MSC) Project, in partnership with the Calhoun Port Authority. The MSC extends from the Port of Port Lavaca-Point Comfort Turning Basin in Lavaca Bay, through Matagorda Bay and into the Gulf of Mexico via Matagorda Peninsula. The current length of the ship channel is approximately 26 miles. The in-bay channel is authorized to a current depth of -38 feet Mean Low Low Water (MLLW) with a bottom width of 200 feet. The Entrance Channel is maintained at -40 feet MLLW. The MSC Project would widen the in-bay channel to 350 feet and deepen the channel to -47 feet MLLW. The Entrance Channel would be widened to 600 feet and deepened to -47 feet MLLW. Impacts to oyster reef, and high and low marsh are expected due to widening of the channel and placement of dredged material. The project is located in Calhoun and Matagorda Counties, Texas.

In addition to the information contained in the public notice and DEIS, the following information is needed for review of the proposed project. Responses to this letter may raise other questions that will need to be addressed before a water quality certification determination can be made.

1. The Corps has proposed creating semiconfined and unconfined dredge material placement areas. However, the DEIS does not provide information on how the suspended material exiting the sites will be minimized, or the potential impacts to surrounding aquatic resources. Please submit a plan to minimize the suspended solids exiting these placement areas to minimize potential adverse impacts to surrounding resources, and estimate and address the unavoidable impacts in a compensatory mitigation plan.

US Army Corps of Engineers®

CALHOUN Port Authority
POINT COMFORT, TEXAS • USA

Comment Form

Please return your completed form before you leave. You may also mail your comments to:

USACE – Galveston District
Attn: RPEC Coastal Section
P.O. Box 1229
Galveston, TX 77533-1229

Comments are due by June 21, 2018.

1.Name / Representing: KEITH SCHMIDT / PROPERTY OWNER

2.Address [Optional]: 871 BAY MEADOW DR PORT LAVACA, TX 77979

3.Email [Optional]: KEITH.SCHMIDT@ALCOA.COM

4.Please provide your comments concerning the Matagorda Ship Channel, Texas Feasibility Study in the blanks below.

REQUEST THAT IF SAND/SHELL IS AVAILABLE NEAR BNI THAT IT BE PUMPED ONTO MAGNOLIA BEACH.
PLEASE ADD ADDITIONAL BORINGS IN BETWEEN THE AREA OF STA 75+000 AND STA 88+000 TO BETTER UNDERSTAND AMOUNT OF SAND/SHELL THAT WILL BE DREDGED NEAR THE BNI PROJECT AREA.
IF NO SAND/SHELL, THEN PLEASE INCLUDE ROCK GROINS TO KEEP BEACH FROM FURTHER EROSION, WE VALUE MAGNOLIA BEACH AS A PUBLIC RECREATIONAL AREA.

MATAGORDA SHIP CHANNEL, TEXAS
NEPA Public Meeting 15 May 2018

US Army Corps of Engineers®

CALHOUN Port Authority
POINT COMFORT, TEXAS ★ USA

Comment Form

Please return your completed form before you leave. You may also mail your comments to:

USACE – Galveston District
Attn: RPEC Coastal Section
P.O. Box 1229
Galveston, TX 77533-1229

Comments are due by June 21, 2018.

1.Name / Representing: Lance Toler

2.Address [Optional]:

3.Email [Optional]: lanmar.woodhi@gmail.com

4.Please provide your comments concerning the Matagorda Ship Channel, Texas Feasibility Study in the blanks below.

Concerning the entrance to Powderhorn Lake (erosion). Hurricane Cut going into Powderhorn lake needs to be closed back in some or spoil banks placed appropriately to protect the entrance into Powderhorn Lake. There is a huge oyster reef in Powderhorn Lake that needs to be protected. The LaSalle monument needs protection on Ocean Drive, Magnolia Beach. The erosion has taken part of the paved road around the monument completely away and the erosion continues. Eventually the monument will end up in the Bay if something is not done for protection.

Need to replenish eroded beach from Alamo Beach to Powderhorn Lake. Or at least from Magnolia Beach to Powderhorn Lake (Hurricane Cut).

If possible add protection for Keller Bay with spoil bank.

Add a ship passing lane in the channel.

MATAGORDA SHIP CHANNEL, TEXAS
NEPA Public Meeting 15 May 2018

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August 31, 2017

Ms. Lisa Finn
Environmental Section – Navigation Branch
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

401 Coordinator
Mail Code 150
TCEQ
P.O. Box 13087
Austin, Texas 73711-3087

Re: Public Notice No. GUAD-M-2
Draft Environmental Assessment Matagorda Ship Channel Upper Reach Placement Area Relocation Project

Texas Parks and Wildlife Department (TPWD) has reviewed the Public Notice (PN) No. GUAD-M-2, dated July 26, 2017 regarding U. S. Army Corps of Engineers (USACE) preparation of a draft environmental assessment (EA)for the evaluation of potential impacts associated with the relocation of dredged material placement areas (PAs))- specifically PAs 14, 15, and 16 - from the east side of the Matagorda Ship Channel (MSC) to the west side in order to reduce channel shoaling in the upper reaches of the MSC and lengthen the time between dredging cycles in this area. Subsequent to receiving the PN, TPWD has reviewed the EA and supporting documents, including the Regional Sediment Management Study (RSM) for the Upper Matagorda Bay prepared by USACE, Galveston District and the Engineer Research and Development Center (ERDC). The project is located adjacent to a Federally-maintained channel in the vicinities of Port O'Connor, Port Lavaca, and Point Comfort in Matagorda and Calhoun Counties.

In reviewing USACE Permit Application Number 24071 for the Calhoun County Navigation District, TPWD previously commented on the direct and indirect impacts that would result from the proposed continuation of placement of unconfined dredge material in the bay. As stated by letter of June 26, 2007 (copy attached), TPWD continues to strongly recommend that the unconfined placement or open bay disposal of dredge material be discontinued.

Additionally, on 04/13/2017 TPWD submitted comments (attached) on the USACE notice of the intent to implement the RSM recommendation to relocate PAs 14, 15, and 16 from the east side of the MSC to the west side of the channel. TPWD continues to have concerns regarding the potential impact of the placement of unconfined dredge material in close proximity to Gallinipper Reef, as well as other oyster habitat in the vicinity of the proposed PAs. The ecosystem services of oyster reef habitat is discussed in previous comments.

TPWD appreciates that the USACE has modified the location and shape of the proposed PAs in an effort to avoid oyster impacts. However, TPWD is concerned the abundance and characterization of oyster habitat in the project area is

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underestimated. The MSC Oyster Resources Survey (Appendix C) and Oyster Avoidance Map (Figure 4) included in the DEIS categorize Gallinipper Reef as live scattered oysters. TPWD coastal fisheries data shows this to be the most productive reef in the Lavaca Bay system and therefore subject to intense harvest pressure (Harper 2017, personal communication). Due to a combination of several years of suboptimal environmental conditions (including drought, followed by freshwater flooding) and heavy harvest pressure, the reefs of Lavaca Bay do not display the relief and rugosity typically associated with oyster reef (Hartman and Harper 2017, personal communications). Additionally, TPWD is concerned with the methodology used to compute the Catch-per-unit-effort (CPUE) on sampled reefs. Page 2-5 of the Survey report states that CPUE "was calculated for each dredge tow by dividing the total numbers of live oysters collected by the volume of substrate sampled along each dredge transect." The volume is then calculated as a product of the length of the transect, the width of the dredge, and the height of the dredge. However, due to the fact that dredges bounce over shell substrate and do not capture every oyster present, a dredge cannot be used to measure density; rather, quadrat sampling should be conducted (Jensen 2017, personal communication). Quadrat sampling also would capture the true abundance of those reefs located in water too shallow to access with a dredge, which makes them less vulnerable to harvest pressure. TPWD also notes that the oyster survey was conducted in January, February, and March, a time period that is late in the public harvest season and therefore most likely to present a lower abundance of oysters. TPWD recommends oyster surveys be conducted just prior to the beginning of the public harvest season (November 1) to obtain data more representative of the ecologic and economic value of an oyster reef.

TPWD also is concerned that the anticipated impacts of the proposed action that are presented in the DEIS do not sufficiently address the potential indirect, long-term ecological impacts. Page 13 of the DEIS states the western PA alternative would cover shallow, open-water bottoms with dredged material "as a direct impact of each placement event". The DEIS then states the areas "would remain open water, although with shallower depth contours on a **temporary** basis after each dredging event." This implies that the dredged material is not expected to remain in place. While the alternative analysis states that oyster reef could be subjected to increased turbidity and siltation temporarily during disposal of material, the potential impact of the transport and deposition of re-suspended sediment on oyster habitat in close proximity to the PAs is not discussed. In addition, while Page 5 of the DEIS states that "utilization of the Western PAs should not cause circulation issues because they are submerged", Page 14 of the DEIS states the open-water placement of dredged material "would be expected" to alter the elevation of the substrate and consequently directly impact "water circulation, current pattern, and water fluctuation within the disposal areas and areas adjacent to the proposed" PAs. TPWD is concerned that the subsequent impact of the altered water circulation and currents on the oyster reefs near the placement areas is not analyzed and discussed. As filter feeders, oysters are dependent upon water circulation and currents to carry nutrients to the reef. Therefore, the location and orientation of oyster reefs are a direct result of the ambient circulation patterns in a water body. Alteration of these patterns likely will impact the health of a reef and perhaps impact the ability of the reef to survive.

TPWD offers the following Recommendations:

- Conduct comprehensive hydrologic analysis of the impact of the proposed Western PAs on the existing water circulation and current patterns in Lavaca Bay.
- Include an analysis of the transport and fate of unconfined dredged material as a result of wind-driven waves, ship wakes, and anticipated water circulation patterns and currents.
- Provide an analysis of the potential impacts of the alteration of water circulation and currents and the transport and settlement of sediment on reefs and other oyster habitat in close proximity to the proposed Western PAs.

In addition, TPWD stands by the recommendations provided in the comment letter dated July 26, 2017.

- Utilize improved hydrographic surveying technologies, such as the SILAS and RHEOTUNE systems described in the RSM, to better determine nautical depth of the channel and improve efficiency of dredge cycles.
- Avoid creation of new unconfined, open bay dredge material disposal areas.
- Develop a dredge material management plan (DMMP) that is consistent with the MSCIP FEIS.
- Incorporate beneficial use of dredge material, such as marsh or rookery island creation, in any DMMP.
- Conduct comprehensive habitat surveys for any area being considered as a new PA.
- Provide a plan for compensatory mitigation for any proposed direct and indirect impacts to critical habitat, including oysters.
- Calculate permanent and temporal impacts to recreational and commercial harvest of oysters.
- Provide a compensation plan for impacts to recreational and commercial harvest of oysters.

TPWD appreciates the opportunity to provide comments for the proposed Matagorda Ship Channel Placement Area Relocation and looks forward to future coordination for the reduction of potential impacts to fishery resources. Questions can be directed to Ms. Colleen Roco (281-534-0139) in the Dickinson Marine Lab.

Sincerely,

Rebecca Hensley

Rebecca Hensley
Regional Director, Ecosystem Resources Program
Coastal Fisheries Division

RH:CR

References:

Harper, J. 2017. TPWD Upper Coast (Palacios) Coastal Fisheries Biologist. Personal communication with Colleen Roco. August 23, 2017.

Hartman, L. 2017. TPWD Upper Coast (Palacios) Ecosystem Leader. Personal communication with Colleen Roco. August 21, 2017.

Jensen, C. 2017. TPWD Upper Coast (Dickinson) Coastal Fisheries Biologist. Personnel communication with Colleen Roco. August 23, 2017.

PBS&J. 2009. Final Environmental Impact Statement for the Proposed Matagorda Ship Channel Improvement Project Calhoun and Matagorda Counties, Texas. Document No. 060146. Prepared for U. S. Army Corps of Engineers.

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April 13, 2017

Ms. Lisa Finn
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Galveston, Texas 77553-1229

401 Coordinator
Mail Code 150
TCEQ
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Re: Agency Coordination
Matagorda Ship Channel Placement Area Relocation

Texas Parks and Wildlife Department (TPWD) has received notification from the U. S. Army Corps of Engineers (USACE) of the intent to implement the Regional Sediment Management Study (RSM) for the Upper Matagorda Bay prepared by USACE, Galveston District and the Engineer Research and Development Center (ERDC). The RSM recommends relocation of select dredged material placement areas (PA)- specifically PAs 14, 15, and 16 - from the east side of the Matagorda Ship Channel (MSC) to the west side in order to reduce channel shoaling in the upper reaches of the MSC and lengthen the time between dredging cycles in this area. In considering this proposal, TPWD has reviewed the RSM and portions of the Final Environmental Impact Statement for the Proposed Matagorda Ship Channel Improvement Project, Calhoun and Matagorda Counties, Texas (MSCIP FEIS) prepared for USACE Galveston District by PBS&J (2009).

In reviewing USACE Permit Application Number 24071 for the Calhoun County Navigation District, TPWD previously commented on the direct and indirect impacts that would result from the proposed continuation of placement of unconfined dredge material in the bay. As stated by letter of June 26, 2007, TPWD continues to recommend that the unconfined placement or open bay disposal of dredge material be discontinued.

The TPWD data sets, maps prepared for the MSCIP FEIS (from Volume II, Exhibit 4, attached), and Google Earth aerial imagery indicate that portions of the area proposed for the placement of maintenance dredge material on the west side of the MSC are covered by oyster reef, scattered oysters, and shell on mud habitat. The oyster reef off Gallinipper Point is a public reef that is harvested by recreational and commercial oyster fisherman when conditions are suitable, as seen in the attached Google Earth aerial imagery. In addition to having harvest value, oyster reefs provide a number of ecosystem services including stabilization of sediments and the horizontal and vertical stratification of bare bay bottom. The complexity offered by reef structure provides refuge for a number of invertebrates and finfish species, as well as settling habitat for sessile species. Oysters also filter and clarify bay waters, removing bacteria, phytoplankton, and fine sediments. Oyster reefs also provide foraging grounds for numerous aquatic and avian species and are, therefore, attractive fishing grounds for recreational anglers. Due to the high productivity and diversity of organisms supported by the reef complex, this area is listed as a Priority Protection Area under the Oil Spill Planning and Response Atlas (2016, see attached Port Lavaca East map). Additionally, oyster reefs are considered critical areas under the Texas Coastal Management Plan (CMP) (31 TAC §501.3). CMP Policies for Development in Critical Areas state that adverse effects on critical areas are to be avoided to the greatest extent possible and it should be demonstrated that no practicable alternative with fewer adverse effects is available (31 TAC §501.23).

According to Figure 35 on page 51 of the RSM, the area with the greatest sediment accumulation is Reach 1, which is adjacent to PAs 17, 18, and 19. Studies conducted in preparation of the MSCIP-FEIS indicate that the potential cross current affecting this part of the channel would be perpendicular to the channel, while the cross current along Reach 2 (which is adjacent to PAs 14, 15, and 16) would be parallel to the channel (from Volume II, Exhibit 2, attached). Therefore, it is not clear how the relocation of PA 14, PA 15, and PA 16 will relieve sedimentation in Reach 1. In fact, the MSCIP FEIS included the elimination of PAs 14, 15, 16, and 17, the expansion of PAs 18 and 19 into a larger, contained placement site and creation of additional contained placement areas along with beneficial use of material along eroding shorelines (from Volume II, Exhibit 13, attached). TPWD supports the beneficial use of contained dredge materials in creating habitat and protecting infrastructure.

TPWD offers the following Recommendations:

- Utilize improved hydrographic surveying technologies, such as the SILAS and RHEOTUNE systems described in the RSM, to better determine nautical depth of the channel and improve efficiency of dredge cycles.
- Avoid creation of new unconfined, open bay dredge material disposal areas.
- Develop a dredge material management plan (DMMP) that is consistent with the MSCIP FEIS.
- Incorporate beneficial use of dredge material, such as marsh or rookery island creation, in any DMMP.
- Conduct comprehensive habitat surveys for any area being considered as a new PA.
- Provide a plan for compensatory mitigation for any proposed direct and indirect impacts to critical habitat.
- Calculate permanent and temporal impacts to recreational and commercial harvest of oysters.
- Provide a compensation plan for impacts to recreational and commercial harvest of oysters.

TPWD appreciates the opportunity to provide comments for the proposed Matagorda Ship Channel Placement Area Relocation and looks forward to future coordination for the reduction of potential impacts to fishery resources. Questions can be directed to Ms. Colleen Roco (281-534-0139) in the Dickinson Marine Lab.

Sincerely,

Rebecca Hensley

Rebecca Hensley
Regional Director, Ecosystem Resources Program
Coastal Fisheries Division

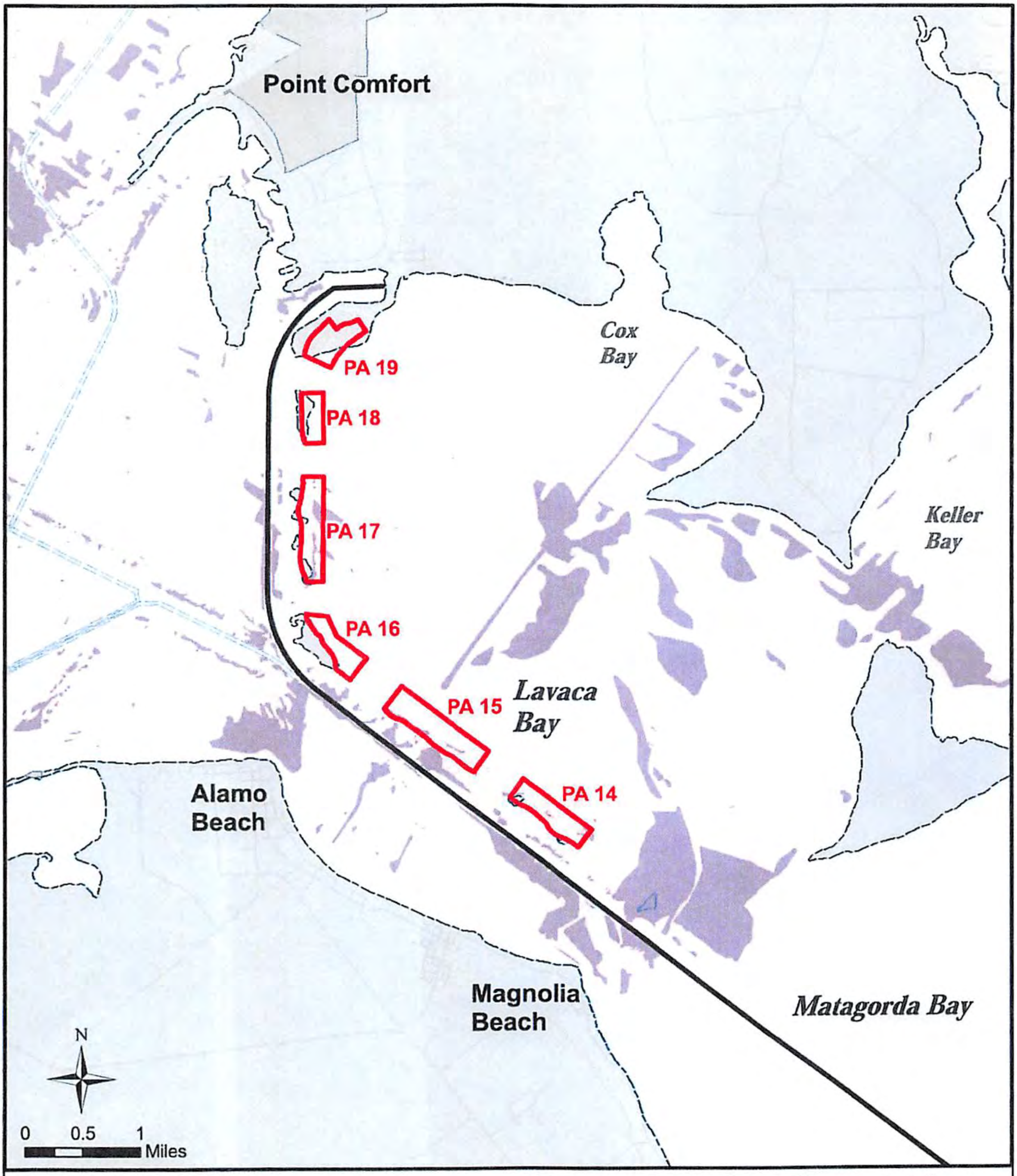
RH:WD:CR

Attachments: 5

References:

PBS&J. 2009. Final Environmental Impact Statement for the Proposed Matagorda Ship Channel Improvement Project Calhoun and Matagorda Counties, Texas. Document No. 060146. Prepared for U. S. Army Corps of Engineers.

Texas General Land Office. 2016. Oil Spill Planning and Response Atlas. Accessed from the Oil Spill Toolkit on 04/12/2017:
http://www.glo.texas.gov/ost/responsemaps/texas/texasesi/matagorda/ESIAtlas_139.pdf



Existing Unconfined Placement Areas and Oyster Reefs in Lavaca Bay

Legend

- Placement Area
- Oyster Reef
- Ship Channel

Matagorda Ship Channel Improvement Project

Matagorda and Calhoun Counties, Texas

Calhoun County Navigation District

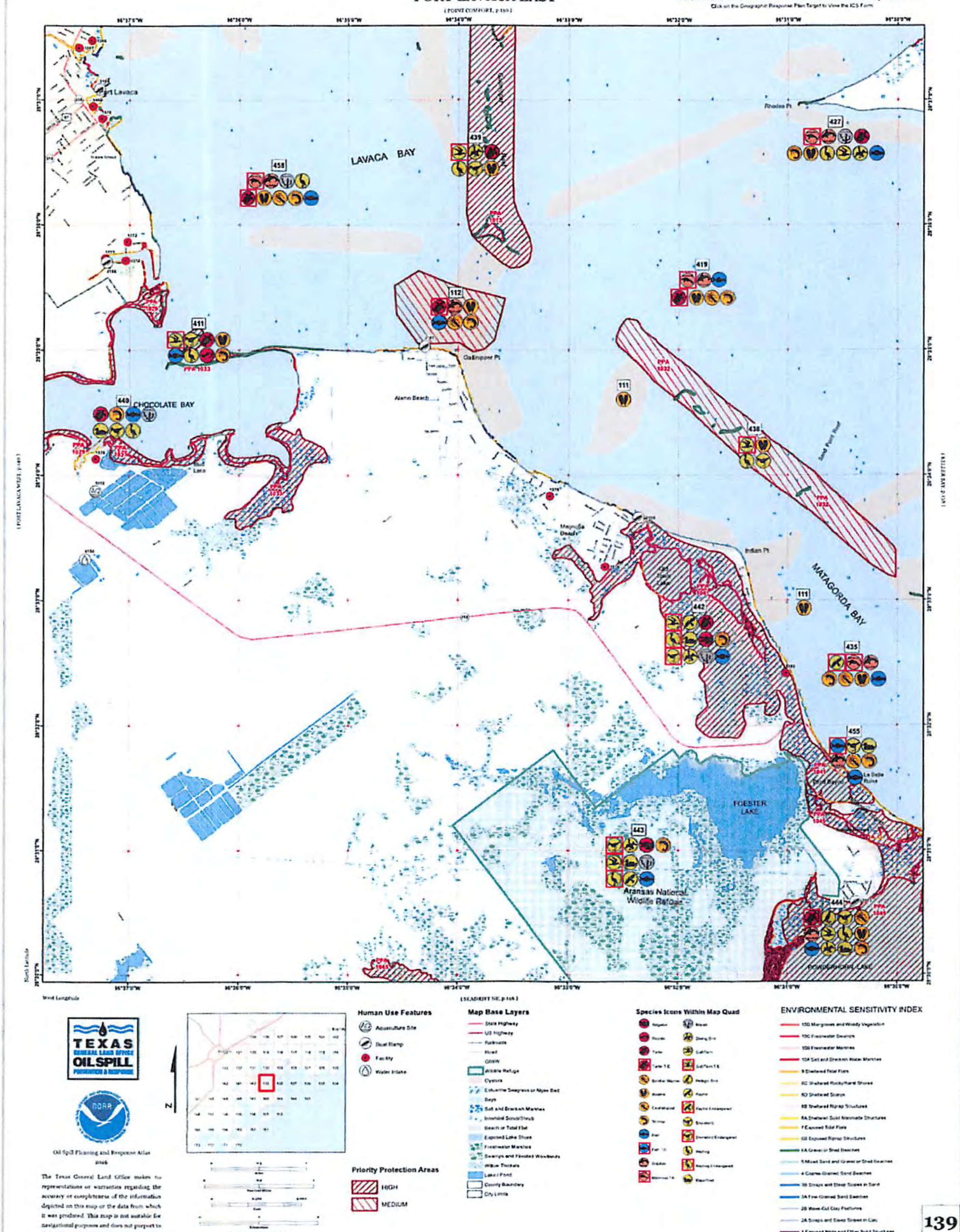
URS

Exhibit 4


Gallinipper Point, Lavaca Bay
Oyster Harvesting 2009 TX 21
Legend
2717
Finis
Google Earth
Image Texas General Land Office
N
2000 ft

PORT LAVACA EAST

Click Here or Scroll Down for Associated Map Data



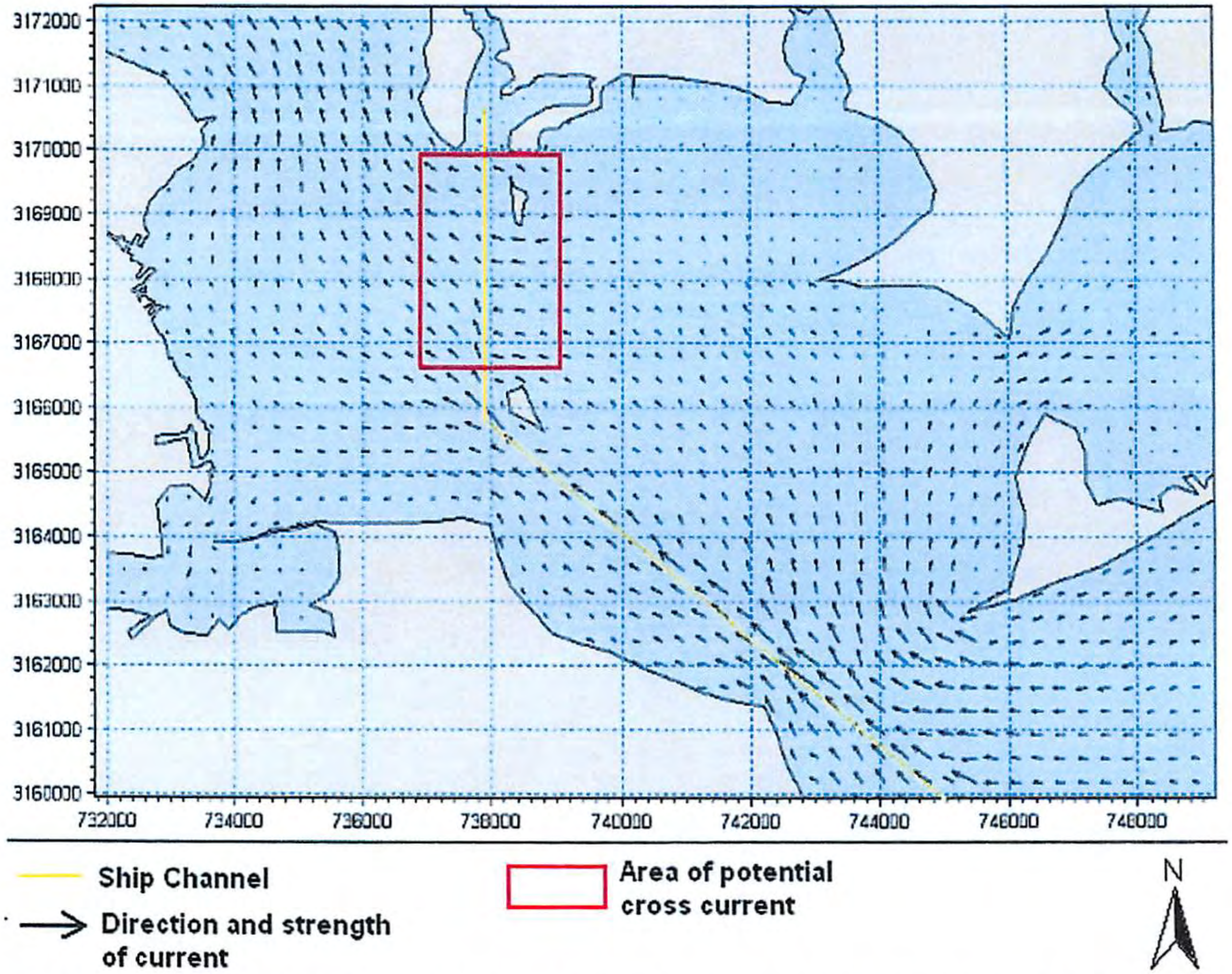
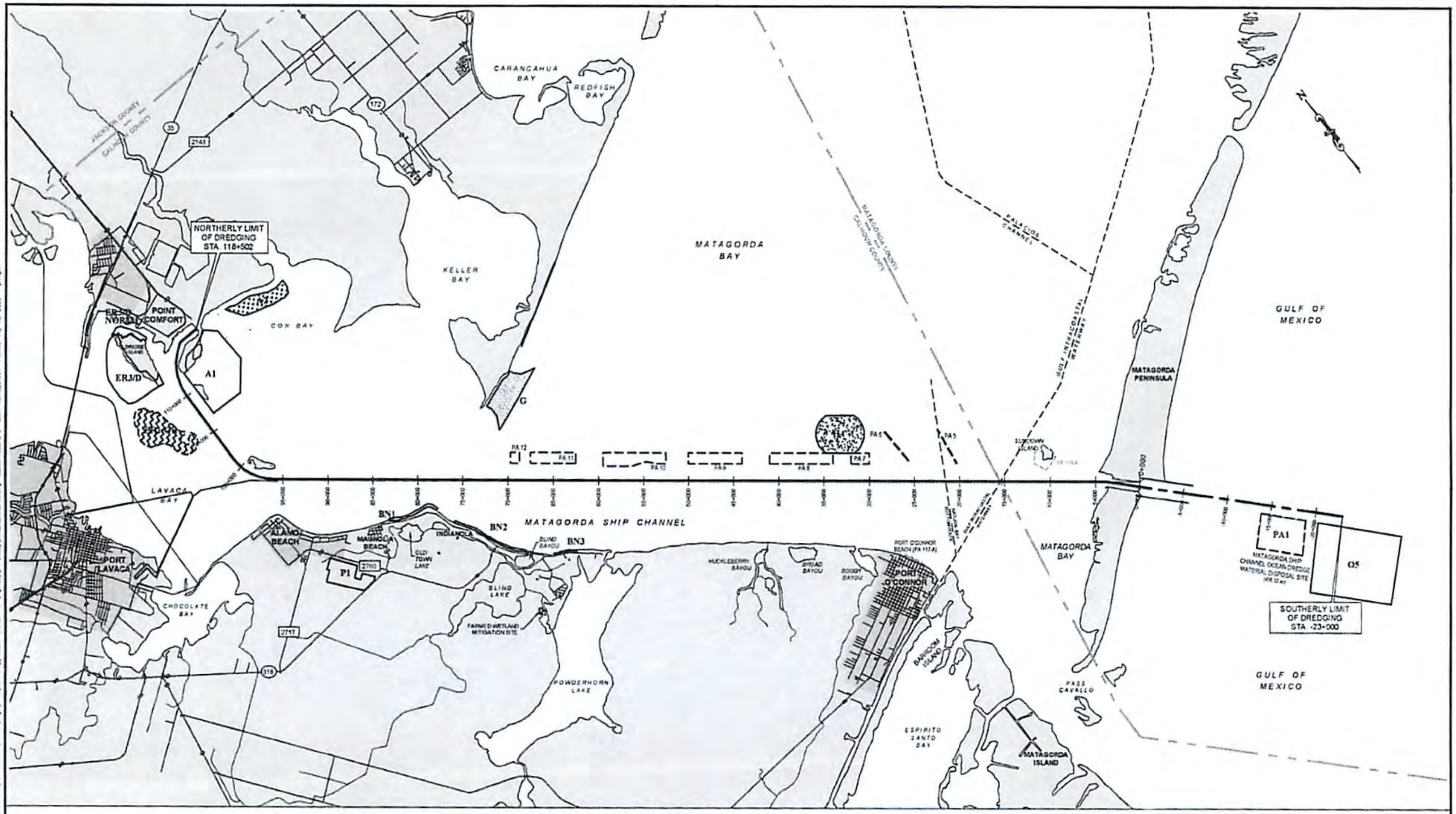


Exhibit 2. Tidal Flood flow currents in Lavaca Bay. Adapted from Moffatt and Nichol (2006).



0 3333 6666 10000 20000

APPROXIMATE SCALE IN FEET

NOTES:

1. COORDINATE SYSTEM BASED ON NAD83, TEXAS STATE PLANES, SOUTH CENTRAL ZONE, US FOOT.
2. SUNDOWN ISLAND AND THE PORT O'CONNOR BEACH ARE POTENTIAL PLACEMENT AREAS. ANY MATERIAL PLACED ON EITHER OF THE PAs WILL BE DONE IN ACCORDANCE WITH THE CURRENT PLACEMENT LIMITATIONS FOLLOWED BY THE USACE, AND UTILIZE THE EXISTING AUTHORIZED FOOTPRINTS. ONLY BEACH QUALITY SAND WILL BE PLACED. MATERIAL WILL ONLY BE PLACED ON SUNDOWN ISLAND BETWEEN SEPTEMBER 1 AND FEBRUARY 28, AND LOCAL COORDINATION WILL BE DONE PRIOR TO PLACING MATERIAL ON PORT O'CONNOR BEACH.

LEGEND:

- MARSH PLACEMENT AREA
- PA 17 EXISTING PLACEMENT AREA
- G OR D POTENTIAL PLACEMENT AREA
- MARSH/AQUATIC PLACEMENT AREA
- SUBMERGED OYSTER REEF

RECOMMENDED PLAN

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT

MATAGORDA AND CALHOUN COUNTIES, TEXAS

PERMIT NO. 24071

EXHIBIT 13

June 21, 2018

Dr. Harmon Brown
Environmental Compliance Branch
Regional Planning & Environmental Center
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

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Re: Joint Notice of Availability
Draft Integrated Feasibility Study and Environmental Impact Statement for the Proposed U.S. Army Corps of Engineers Matagorda Ship Channel Project, Calhoun and Matagorda Counties, Texas

Texas Parks and Wildlife Department (TPWD) has reviewed the Joint Notice of Availability, dated May 2, 2018, regarding U. S. Army Corps of Engineers (USACE) preparation of a Draft Integrated Feasibility Study (DIFS) and Environmental Impact Statement (DEIS) for the evaluation of the Federal interest in alternative plans, along with potential benefits and impacts associated with those plans, for the proposed Matagorda Ship Channel Project (MSCP). The non-Federal partner for the MSCP is the Calhoun Port Authority. The MSCP presents plans for the deepening and widening of the existing 26-mile channel, construction of a deep turning basin, and establishment of a dredge material management plan (DMMP) for a 50-year time period, all of which are designed to meet the Port's need to accommodate larger modern vessels in order to increase navigation safety and to remain economically competitive. The MSCP study area is located 125 miles southwest of Galveston, Texas and 80 miles northeast of Corpus Christi, Texas in Matagorda and Calhoun Counties. The existing MSC extends from offshore in the Gulf of Mexico (GOM) through a man-made cut in the Matagorda Peninsula and across Matagorda Bay and Lavaca Bay, terminating at Point Comfort. It is intersected by the Gulf Intracoastal Waterway approximately 2.5 miles north of the Matagorda Peninsula cut.

The MSC is comprised of an approximately 4-mile long GOM entrance channel that is maintained at a depth of 40-feet Mean Lower Low Water (MLLW). As with all existing and proposed channel depths, an increase of two feet for advance maintenance and a two-foot over-depth are authorized. The entrance channel has a bottom width of 300 feet and is flanked by rock jetties that extend from the Matagorda Peninsula shoreline. Under the Tentatively Selected Plan (TSP), this portion of the channel would be deepened to 49 feet MLLW and widened to 600 feet (bottom width). Currently, the 22-mile channel that traverses Matagorda and Lavaca Bays is maintained at 38-feet-deep MLLW and has a bottom width of 200 feet. Under the TSP, the channel would be deepened to 47 feet and widened to 350 feet (bottom width). Due to constraints, in lieu of expanding the existing turning basin the TSP proposes dredging of a new 1,200-foot diameter, 41-feet-deep MLLW turning basin to the northwest side of the ship channel where it curves into the existing turning basin at Point Comfort. Under the TSP, approximately 46.5 million cubic yards (mcy) of new work material would be generated, with an additional 257.5 mcy of maintenance material generated over a 50-year time-span following completion of construction.

Currently, maintenance dredged sediments from the MSC are placed in one unconfined ocean dredge material disposal site (ODMDS), a series of unconfined open-water placement areas in Matagorda Bay on the eastern side of the channel, and unconfined or semi-confined PAs east of the channel in Lavaca Bay near Point Comfort. Under the TSP, new work dredged material would be deposited in a new, larger ODMDS (05), the existing Chester Island PA, an expanded in-bay confined upland PA (ER3/D), one terrestrial confined upland PA (P1), and a series of unconfined in-bay PAs on the west side of the MSC. Maintenance dredge material from the channel through Matagorda Bay would be placed in additional unconfined in-bay PAs located between the new work PAs and the shoreline.

Based on information presented in the DEIS, the TSP for the proposed deepening and widening of the MSC would convert 594 acres of open bay bottom and approximately 200 acres of offshore bottom into deep-ship channel bottom. The proposed in-bay unconfined PAs would cover 2,670 acres of bay bottom, while the new ODMDS would cover 1,600 acres offshore. (The existing 453-acre ODMDS would continue to receive maintenance material.) The existing in-bay confined PA/Dredge Island (ER3/D) would be expanded to cover an additional 272 acres of bay bottom (for a total of 575 acres of in-bay uplands). The TSP would result in a direct loss of directly impact 129.2 acres of oyster reef habitat by dredging and 3.4 acres of oyster reef through sediment disposal. Approximately 19.5 acres of estuarine wetland habitat would be impacted by the addition of dredge material to the ER3/D site, while terrestrial disposal of dredge material would convert 248 acres of agricultural land (mainly rice field) – including 1.5 acres of freshwater wetland – to an upland PA.

In-Bay Unconfined Disposal of Dredge Material

Previously, Calhoun County Navigation District submitted Permit Application Number 24071 and a DEIS for a similar Matagorda Ship Channel Improvement Project. In reviewing that proposal, TPWD commented by letter dated June 26, 2007 (attached) that the DEIS did not adequately evaluate or address the direct and indirect impacts to fish and wildlife resources that would result from the proposed continuation of placement of unconfined dredge material in the bay. Additionally, on April 13, 2017 and August 31, 2017 TPWD submitted comments (attached) in response to the USACE Notice of Intent and Public Notice Number GUAD-M-2 (Draft Environmental Assessment for Matagorda Ship Channel

Upper Reach Placement Area Relocation Project) regarding the proposal to implement the Regional Sediment Management recommendation to relocate PAs 14, 15, and 16 from the east side of the MSC to the west side of the channel. TPWD continues to have concerns that the DEIS does not discuss the potential impact of the placement of unconfined dredge material in close proximity to Gallinipper Reef, as well as other oyster and estuarine habitat and fish (Wenger etal. 2017) in the vicinity of the proposed PAs. The placement of the proposed unconfined PAs for new work material are described in section 5.7 of Appendix F (Dredged Material Management Plan) as *being at least greater than 1500 feet from the channel toe* and having widths of *approximately 2400 feet.* Based on current Google Earth aerial imagery, the MSC is approximately 3,500 feet from Gallinipper Point. The PA dimensions given in Appendix F of the DEIS would suggest the placement would be on, or very close to, reef habitat. Further, placement areas for the maintenance dredge material, depicted in Plate D-05 of Appendix F, are even closer to shore and definitely in oyster reef habitat. Additionally, depending on the propensity of the deposited material to migrate, sediment from the proposed PAs parallel to the shoreline between Powderhorn Lake entrance and Port O'Connor may have impact on seagrass beds. Since this shoreline has some of the highest rates of erosion along the coast due to prevailing winds and fetch across the bay, transport of sediment toward shore seems likely. Seagrass beds also occur along the Matagorda Peninsula shoreline in close proximity to the MSC and another proposed PA. According to Appendix G (Draft Engineering Appendix) of the DEIS, this area experiences swift currents and high wave action. An additional concern would be the impact of ship wakes from larger vessels on the stability of the unconfined PAs.

In addition to the potential impact of the unconfined open-water PAs on habitat, TPWD is concerned that these placement areas could impact other commercial or recreational fishing efforts. Appendix F of the DEIS states the new PA "island height" would be approximately 8 feet, with the top surface of the PA being 2 feet below the water surface at MLT. Spoil deposits of the footprints and heights described would remove significant acreage of bay bottom from trawling grounds and could impact navigation for recreational watercraft, as well as favored recreational fishing grounds.

Recommendations: The Environmental Impact Statement should include:

- Comprehensive habitat surveys for any area being considered as a new PA and areas in close proximity to a proposed PA.
- Comprehensive hydrologic analysis of the impact of the proposed unconfined in-bay PAs on the existing water circulation and current patterns in Lavaca and Matagorda Bays.
- Analysis of the transport and fate of unconfined dredged material as a result of wind-driven waves, ship wakes, and anticipated water circulation patterns and currents.

- Analysis of the potential impacts of the alteration of water circulation and currents and the transport and settlement of sediment on reefs, other oyster habitat, and seagrass beds in close proximity to the proposed unconfined in-bay PAs.
- Comprehensive analysis of the potential impact of dredging, open-bay sediment disposal, and potential sediment migration on all life stages of fish and invertebrates.
- Analysis of the potential impacts of the alteration of water circulation and currents on transport and migration of larval or juvenile stages of fish and invertebrate species.
- Assessment of the potential impacts on commercial fishing activities due to the reduction of open bay bottom available for trawling.
- Identification of important recreational fishing and boating areas in the bay and assessment of the potential impacts of the unconfined in-bay disposal of material on those uses.

Salinity Changes and Oyster Impacts

TPWD is concerned that the DEIS underestimates the impacts to oyster reef and oyster reef habitat due to an underestimate of the impacts the proposed deepening and widening will have on the salinity regime of the estuary. Hydrodynamic and salinity models prepared for the Calhoun County Navigation District (CCND) (Moffat & Nichol 2007) predicted that deepening of the MSC would allow deep density currents in the bottom of the channel to transport an increased volume of higher salinity GOM water into the upper bay. While the salinity differences between existing and proposed conditions were predicted to be < 1 PSU during low flow periods, this is not the case for median and high flow events, where the differences between bottom and surface salinities are predicted to be significantly greater. Following freshwater inflow events the deeper channel is expected to reduce the time required for the density current to move higher salinity water into Lavaca Bay, bringing higher salinities back to upper reaches of the bay more quickly. Thus, the overall average salinity in the upper Matagorda and Lavaca Bays would be expected to increase, since freshets would be of shorter duration. Based on the models, page 4-82 of the 2009 FEIS states *with the improved channel, an overall rise in salinity of about 2 to 4 ppt could be expected.* Since increases in salinity are a factor in the incidence of Dermo in oysters and predation by oyster drills, it was estimated that the changes in the salinity regime would negatively impact a net 30.1 acres of oyster reef (PBS&J 2009). The current DEIS does not utilize salinity models or the previous Oyster Reef Impact Assessment (URS 2007) to consider indirect losses of oyster habitat. Additionally, the DEIS does not consider temporal losses of functions and services provided by oysters, or the temporal loss of commercial value of impacted oyster reefs.

Recommendations: The Environmental Impact Statement should include:

- Analysis of available studies on the predicted increases in salinity regime (concentration and duration) and potential impacts of those increases on oysters and other estuarine-dependent species.
- Analysis of the propensity of the deeper, wider channel to alter the residence time of freshwater in the estuary.
- Calculation of temporal impacts to functions and services provided by affected oyster reef.
- Calculation of permanent and temporal impacts to recreational and commercial harvest of oysters due to alterations in salinity regime.
- A plan for compensatory mitigation for any proposed direct and indirect impacts to critical habitat, including oysters, due to altered salinity regimes caused by the channel modifications.
- A compensation plan for impacts to recreational and commercial harvest of oysters.

Sediment Quality

TPWD is concerned that the deepening and widening of the MSC will expose legacy mercury contamination sequestered in the "new work" sediments and create new sources of bioavailable mercury. In a 2012 sampling and testing effort, the Seafood and Aquatic Life Group of the Department of State Health Services found mercury in all 657 organisms collected (DSHS 2013). While the majority of organisms collected outside of the "Prohibited Area" in Lavaca Bay contained levels below the health-based assessment comparison value (HAC) for mercury (0.700 mg/kg), a significantly higher percentage of organisms collected in and near the Prohibited Area had levels that exceeded the HAC (DSHS 2013). Mercury is known to be bio-concentrated and bio-accumulated by organisms. While DSHS assesses the risk for human consumption, concern remains regarding the impact of chronic mercury exposure on numerous species, including fish and avian and terrestrial species that prey upon them. Early analysis of Matagorda Bay sediments indicated that elevated levels of mercury were not confined to Lavaca Bay, but also occurred in a concentrated area along the MSC (McGowan et al 1979). Decades later, this mercury likely occurs in an inorganic speciation and is bound to sulfides and clay particles beneath the surface. However, dredging and open-bay disposal of the dredge material could enhance methylation and release bioavailable mercury to the food web (Narragansett Bay Estuary Program 2017). The DEIS is unclear as to the extent and methods of sediment sampling and testing that have been completed recently and does not present current test results.

Recommendations: The Environmental Impact Statement should include:

- Review of current sampling and testing of sediments along the MSC in areas that are to be dredged. Test results should include analysis of mercury concentration in elutriate.
- Results from chronic toxicity testing and bioaccumulation tests utilizing Matagorda Bay sediments proposed to be dredged.

Pass Cavallo

Appendix G (Draft Engineering Appendix) of the DEIS predicts a continuing shrinkage of Pass Cavallo as a result of further transfer of tidal discharge to the deeper and larger Matagorda Ship Channel. The velocity of currents within the MSC Entrance Channel is expected to increase as Pass Cavallo becomes smaller. The Environmental Impact Statement should discuss the potential impact this will have on migration of estuarine/marine species, larval transport, and recruitment of fishery species to the Matagorda Bay estuary.

Pipeline Relocations

The DEIS states that *approximately 22 pipelines would need to be removed or relocated* from the MSCP area. The locations of the pipelines are not included in the DEIS and potential impacts from removal or relocation are not addressed. Any impacts to estuarine resources from the removal or relocation of pipelines necessitated by the proposed project should be included in the DEIS for evaluation.

Mitigation

The DEIS presents only very conceptual mitigation plans. TPWD is willing to continue to coordinate with the USACE and other resource agencies in development of mitigation plans. However, TPWD notes deficiencies in the assessment of both oyster and wetland impacts and the resulting calculation of compensatory mitigation requirements. As stated, TPWD is concerned that oyster impacts have been underestimated and is also concerned that impacts to wetlands due to altered salinity regimes and shifts in tidal amplitude also may be underestimated. TPWD also finds the following statement in Section 4.10 of Appendix B (Environmental Resources), regarding the conversion of high marsh to low marsh due to predicted increases in tidal amplitude, to be misinformed: *Since low marshes are generally considered better habitat for fish and wildlife, this would not necessarily be considered a negative impact.* Each marsh type has different functions and services and supports a different suite of organisms uniquely adapted to that environment. Additionally, hydrodynamic shifts that may convert high marsh to low may also drown existing low marsh or convert ecologically crucial freshwater marshes to brackish marsh. All anticipated conversions of wetland habitat due to the proposed project should be evaluated for impacts to functions and services.

TPWD also is concerned that the DEIS overestimates the habitat that will be created as a result of the project. Section 2.5 of Enclosure 1 (Ecosystem Mitigation) of Appendix B states: *A total of 1540 acres of bay bottom and mercury-impacted bottom would be enhanced by habitat creation.* Yet, the only habitat creation proposed in the DEIS is the creation of 133 acres of oyster reef and 26 acres of wetlands as compensatory mitigation. Support for the statement is lacking.

Recommendations: The Environmental Impact Statement should include:

- A reassessment of oyster impacts and compensatory mitigation for all impacts, both direct and indirect, that cause loss of oyster reef habitat.
- A reassessment of wetland impacts and compensatory mitigation for all impacts, both direct and indirect, that cause loss of wetland habitat.
- An evaluation of the functions and services of the impacted wetlands utilizing the Interim Hydrogeomorphic (iHGM) assessment tools required by the Galveston District.
- A complete compensatory mitigation plan for wetland impacts that contains all of the required components identified under 33 CFR 332.4(c)(2) through (c)(14) in Compensatory Mitigation for Losses of Aquatic Resources (73 Federal Register 19596, April 10, 2008), including in-kind compensatory mitigation.
- Comprehensive justification for conclusions indicating that conversion of one habitat type to another results in enhance of ecological function and value.

Ultimately, TPWD stands by the recommendations consistently provided in previous comments:

- Avoid creation of new unconfined, open bay dredge material disposal areas.
- Develop a dredge material management plan (DMMP) that is consistent with the MSCIP FEIS (PBS&J 2009), the Texas Coastal Management Plan, USACE Coastal Texas Study, and the Texas General Land Office Coastal Resiliency Plan.
- Incorporate beneficial use of dredge material, such as marsh or rookery island creation, in any DMMP.

TPWD appreciates the opportunity to provide comments for the Draft Integrated Feasibility Study and Environmental Impact Statement for the Proposed U.S. Army Corps of Engineers Matagorda Ship Channel Project, Calhoun and Matagorda Counties, Texas and looks forward to future coordination for the reduction of potential impacts to fishery resources. Questions can be directed to Ms. Colleen Roco (281-534-0139) in the Upper Coast Ecosystem Resources Program.

Sincerely,

Rebecca Hensley

Rebecca Hensley
Regional Director, Ecosystem Resources Program
Coastal Fisheries Division

RH:CR

References:

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June 26, 2007

Ms. Denise Sloan
Regulatory Branch
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Mr. Mark Fisher, 401 Coordinator
Mail Code 150
TCEQ
P.O. Box 13087
Austin, Texas 73711-3087

Re: Draft Environmental Impact Statement (DEIS) for Calhoun County Navigation District's (CCND) Proposed Matagorda Ship Channel Improvement Project

Texas Parks and Wildlife Department is submitting comments and concerns of the Proposed Matagorda Ship Channel Improvement Project Draft Environmental Impact Statement.

Calhoun County Navigation District is requesting permission, Permit application Number 24071, to construct a new 1,650-foot circle turning basin at the intersection of the MSC and the Alcoa Channel, construct a new berthing area, and deepen the existing turning basin to -44 feet Mean Low Tide (MLT) at the port of Port Lavaca-Point Comport (port). Additionally, the applicant is requesting permission to deepen and widen the existing 26.6 mile long Matagorda Ship Channel (MSC).

The authorized channel dimensions of the MSC from the Port to Matagorda Peninsula is 200 feet wide (bottom width) by -36 feet MLT deep, the applicant proposes to enlarge this reach to 400 feet wide (bottom width) by -44 feet MLT deep (plus 2 feet advanced maintenance depth and 2 feet of over depth). The authorized channel dimensions through the Matagorda Peninsula are 300 feet wide by -36 MLT deep, the applicant proposes to enlarge this reach to 600 feet wide (bottom width) by -46 feet MLT deep (plus 3 feet advanced maintenance depth and 2 feet of over depth). In the Gulf of Mexico, the authorized channel dimensions through the Matagorda Peninsula are 300 feet wide by -38 MLT deep, the applicant proposes to enlarge this reach to 600 feet wide (bottom width) by -46 feet MLT deep (plus 3 feet advanced maintenance depth and 2 feet of over depth). Approximately 46.5 million cubic yards of new work dredge material would be generated from the proposed widening and deepening project. Maintenance dredging of the proposed channel would generate approximately 257.5 million cubic yards of material during the first 50-years of the project. The project is located in the MSC, Calhoun and Matagorda Counties, Texas. The proposed project site extends from the existing CCND berthing facilities at the Port, through Lavaca Bay and Matagorda Bay, and ending offshore in the Gulf of Mexico.

The proposed deepening and widening by dredging would convert 704 acres of existing open bay bottom and 213 acres of offshore bottom into deepship channel bottom and dredge 129.2 acres of oyster reef. The applicant also estimates an additional 105.7 acres of lost oyster production from indirect impacts caused by predicted increases in salinity from the proposed channel deepening and widening described in the Oyster Impact Assessment for Matagorda Ship Channel Improvement Project (URS 2006b).

The proposed placement of dredge material would impact an additional 19 acres of oyster reef at four locations, 8.4 acres of low marsh at three locations, 28 acres of high marsh at two locations, 1,350 acres of bay bottom from the placement of unconfined dredge material, 2,053 acres of offshore bottom from the placement of unconfined dredge material, 974.6 acres of bay bottom from the placement of confined dredge material to construct uplands, and 1,1395.6 acres of bay bottom from the placement of unconfined and confined dredge material for habitat construction.

Additional impacts include impacts to a proposed upland disposal area, P1, described by the applicant as agricultural land containing prior convert cropland, artificial wetlands, and farmed wetlands. A wetland determination or wetland delineation has not been completed on this parcel. Additionally, a site visit by the resource agencies to assess the habitat value of this parcel has not occurred.

Texas Parks and Wildlife Department has reviewed the DEIS for the proposed project and proposed mitigation plan. The DEIS does not accurately evaluate potential impacts and underestimates the total impacts that will occur to fish and wildlife resources and their habitat as a result of the proposed project. Particularly, the direct and indirect impacts that would result from the continual placement of unconfined dredge material in Matagorda Bay and the lost services (functions and values) of all oyster reefs as a result of predicted increases in salinity from the proposed channel deepening and widening and not solely the amount of production (the amount of oyster meat produced) lost. TPWD reviewed and provided written comments on the Oyster Impact Assessment for Matagorda Ship Channel Improvement Project dated January 19, 2007 via e-mail on February 22, 2007 (attached) and has reviewed the Oyster Evaluation provided in the DEIS dated March 9, 2007. Some comments from our earlier review were incorporated into the March 2007 assessment however; most were dismissed and not considered in the analysis to determine potential impacts to oysters in the Lavaca Bay area as a result of the proposed project. As proposed, the Mitigation Plan is inadequate and does not adequately compensate for the impacts to fish and wildlife resources by the proposed project. The Mitigation Plan lacks detailed information on a mechanism to protect and manage the beneficial use (BU) areas for fish and wildlife habitat during and after construction, a description of target habitat types particularly for the proposed upland areas (i.e. vegetation types and elevations, goals, objectives, performance standards, monitoring methods, and remedial actions), and technical information of the capability of the desired vegetation to grow and survive on dredge material.

Some of the impact assessments are one dimensional and only assess direct impacts. For instance, impact to the bay bottom is the only impact considered to occur from the in-bay placement of unconfined dredge material. There is no assessment on the potential of the unconfined material to be a constant sediment source increasing suspended solids within the water column and what potential impacts may occur from the increased turbidity, frequency of occurrence, or size of the plume. These are all potential impacts that should be considered in the EIS. Without this analysis the total impacts of the proposed project are not known. The Oyster Evaluation of the DEIS makes determinations on what is and is not a significant impact and excludes potential impacts from the analysis and review. All the information on potential impacts should be presented in the DEIS for public review and comment.

The National Environmental Policy Act (NEPA) is a law of disclosure; Agencies (the applicant) must disclose to the decision makers and the public what society gains or loses with each decision. Therefore, the EIS should include all known and reasonable potential impacts, including impacts to natural resources, so that the decision makers can determine if mitigation or additional mitigation (avoidance, minimization, and compensation) is necessary. If all impacts, potential impacts, and mitigative features are not made public, decision-makers are not able to make informed decisions about the project and over all impacts on the environment or to society.

This document is incomplete and does not allow for a meaningful review of the project and overall project impacts.

Comments regarding inadequacies in the proposed Mitigation Plan can be found in our letter on Permit Application 24071.

Questions can be directed to Cherie O'Brien in the Coastal Habitat Program at 281-534-0132.

Sincerely,

Jarrett O. Woodrow, Jr.
Director of Habitat Conservation Program

JOW:COB

2. Discharge of return water from confined upland disposal areas should not exceed 300 mg/l total suspended solids (TSS).

3. The DEIS states that expanding the MSC will likely increase tidal amplitude. The effect of increasing the tidal range is unknown, but may produce tidal currents that could erode sensitive areas, and could change the extent and nature of existing intertidal areas. This is not directly addressed in the DEIS as a possible impact. The DEIS should more thoroughly address impacts from increased tidal range potentially resulting from this project.

4. The DEIS states that increased flow through the MSC would likely result in reduced flow in Pass Cavallo. Historically, Pass Cavallo was an existing large natural pass that was self-maintaining before the MSC was dredged. Pass Cavallo has shoaled and has decreased from an original width of approximately 3 miles to only about 1,500 feet. The decrease in size is thought to be due to the capture of the tidal prism by the existing MSC. It is unclear what would happen to Pass Cavallo with the reduced flow, but it is likely the pass would adjust to the reduced flow regime, shoal further, and perhaps close entirely. Pass Cavallo is one of only two natural major barrier island passes in Texas. Natural passes have hydrological differences from the artificially maintained passes that now dominate our estuarine systems. Furthermore, unlike freshwater systems, marine organisms are almost ubiquitous in having planktonic stages in the life cycle. These planktonic stages typically allow organisms to be distributed from spawning areas to nursery habitats on a regional scale, and it has been shown that the hydrological attributes of natural passes are actively exploited by planktonic larva for transport. These hydrologic features of natural passes therefore have ecological value. The DEIS should include an analysis of the hydrodynamic effect of lowering flow through Pass Cavallo, and the loss in ecological value that could result.

5. The DEIS states that deepening the MSC would allow an increased volume of higher salinity Gulf of Mexico water into upper Matagorda bay. During dry periods when salinity levels are relatively high and more uniform throughout the bay, density differences would be small, and thus the deeper channel would have relatively little effect. The DEIS states enlarging the MSC as proposed would result in salinity changes of less than one partial salinity unit on an annual average. However, the DEIS further states that moderate to large effects on the salinity structure of the estuary are expected to occur following freshwater inflow events when there is a strong salinity gradient from the upper to the lower bay. In this case, the deeper channel is expected to greatly reduce the time required for the density current to move higher salinity Gulf water to Lavaca Bay, and more quickly bring the bay back to higher salinities. Although not strictly presented, this can also be expected to increase the average salinity in the upper Matagorda and Lavaca Bays, as freshets would be of shorter duration.

The DEIS should more thoroughly address predicted salinity changes resulting from the proposed MSC widening and the possible effects these changes may have to the flora and fauna of the existing estuaries that might be impacted.

6. The project outlined in the DEIS includes maintenance dredging. Exact dredging intervals are not set out, but this project will result in multiple dredging events across the life of the project, which may disturb the area. While some species such as fish are motile and will avoid the turbidity, the recovery of the species composition of long-lived sessile benthic communities may take one to several years to fully recover from an event. The frequency of these events may force a species composition change in these communities. It is possible that there will be a localized substantial loss of species within any existing long lived benthic community due to this project. This potential loss should be addressed in the DEIS.

7. This project by design will result in the improvement of deep water navigation in Matagorda Bay. This is intended to allow the use of the area for deep waterborne transportation, and thus the area could be increasingly impacted by navigation activities. This may result in the value of any proposed mitigation areas being somewhat compromised. The amount of compensatory mitigation should reflect the lowered values imposed by the increasing frequency of disturbance from the surrounding activities.

8. The Texas Commission on Environmental Quality (TCEQ) looks forward to reviewing a detailed mitigation plan when drafted.

The TCEQ appreciates the opportunity to comment and looks forward to receiving and evaluating other agency or public comments. Please provide any agency comments, public comments, as well as the applicant's comments, to Mr. Peter Schaefer of the Water Quality Division MC-150, P.O. Box 13087, Austin, Texas 78711-3087. Mr. Schaefer may also be contacted by e-mail at *peter.schaefer@tceq.texas.gov*, or by telephone at (512) 239-4372.

Sincerely,

David W. Galindo, Director
Water Quality Division
Texas Commission on Environmental Quality

DWG/PS/fc

June 21, 2018

COMMENT FORM regarding Matagorda Ship Channel, Texas NEPA Public Meeting 15 May 2018

To: USACE - Galveston District
Attn: RPEC-Coastal Section
Box 1229
Galveston, TX 77533-1229

From: Jan Regan, Broker Associate, Russell Cain Real Estate, LLC.
2025 Highway 35 North
Port Lavaca, TX 77979

The feasibility study and the underlying Environmental Impact Assessment are seriously flawed. First, they completely ignore the economic importance of real property development and future development around Lavaca Bay.

As one who deals in real estate professionally, I can assure you that while Calhoun County may be classified by the Federal Government as rural, it is developed and developing. Developing, that is, barring the destruction of the resources which waterfront and waterview property owners seek.

No attempt has been made to address the negative impact on property values and future development on the west side of Lavaca Bay by the proposed new spoil dumpng sites. While there may be no immediate visual impact at "normal" tide levels, these will appear as unsightly mud banks during seasonal low water. Additionally, boating and fishing interests will be negatively impacted, even at high tide. These bay waters are already shoal enough, with mud piles here and there, previously dumped by the USCOE.

While the development and maintenance of the Matagorda Ship Channel has brought industry to Calhoun County, that has already exacted a heavy price. The Alcoa Superfund Site is no secret. Who is to say that the spoil to be deposited on the west side of the channel in these new disposal areas is not also tainted? Or will not be at some point in the future? How many times has the USACE admitted an engineering error and removed a spoil deposit, once placed?

Our bay has already been defiled by the creation of spoil islands on the east side of the channel. During the extensive permitting studies conducted in 2007, it was concluded that no spoil should ever be dumped on the west side of the channel. That plan contained extensive research which seems to have been completely ignored in this most recent hasty move to fill the bay with mud. Our Port Authority even purchased, at considerable local taxpayer expense, an upland spoil disposal site to insure that no more open bay spoil disposal would be permitted in Lavaca Bay.

As an associate of the largest and oldest real estate firm (over 30 years) in Calhoun County, I find it totally shocking that a decision as grave as the one under consideration would be undertaken without so much as a casual inquiry concerning the impact on Calhoun County real estate.

Jan Regan

June 20, 2018

COMMENT FORM regarding Matagorda Ship Channel, Texas NEPA Public Meeting 15 May 2018

To: USACE - Galveston District
Attn: RPEC-Coastal Section
Box 1229
Galveston, TX 77533-1229

From: Ed Campbell, The Walter Eden Company, Inc.
233 E. Main Street
Port Lavaca, TX 77979

The assumptions and studies underlying the proposed project to create new spoil disposal areas on the west side of the Matagorda Ship Channel (MSC) are seriously and terminally flawed. They almost completely ignore the considerable studies done in 2007. I am disappointed.

When I was involved in the final planning and engineering of the Houston-Galveston Ship Channel Improvement Project in the late 1990's, I was assured by both engineers and enviromentalists that open bay spoil disposal was dead. It was a fixture of the 20th century which would not be allowed in the next. Why are we now seriously considering such a thing?

In 2006-7, when the project to improve the Matagorda Ship Channel came to the fore, the idiotic idea to use spoil on the west side of the channel north of Indianola for "beneficial wetlands" was roundly defeated by Calhoun County residents for a number of reasons. The visual impact from shore was only one. An upland spoil disposal area was purchased by the Port Authority in response to electoral action which replaced several Port Authority board members, members who were ignorant of their dual responsibilities. They are obviously charged with operating the Port, but since the State of Texas awarded the Port ownership of the Lavaca Bay bottom, they also hold the considerable responsibility to conserve the resources of the bay for all current and future users. That would include pleasure boaters, fishermen, property owners and related businesses.

Although the Corps information fails to include this data, a deep-draft pleasure boat marina is currently operated by the City of Port Lavaca. It is very likely this operation will be expanded considerably over the near term. A decade ago, prior to the 2007 economic downturn, I was involved in planning a 1200 slip marina for Port Lavaca. It would have specifically catered to deep-draft sailing craft. "Deep-draft" on the Texas coast means vessels requiring as much as 6 feet of water in which to operate. Much of Lavaca and Matagorda Bays allows that, except where the USCOE has previously dumped spoil. Areas which were once easily avoided have eroded below the normal water level to lie as unmarked hazards for deep-draft pleasure craft.

Port Lavaca is uniquely situated to cater such a facility. Within a hundred feet of dock space at the Nautical Landings Marina is land which stands more than 22 feet above sea level. The proximity of land with such an elevation to water for deep-draft yachts cannot be found elsewhere on the Texas Gulf

Coast. Corpus Christi is a near second, but that area has already been maturely developed. And like Corpus Christi Municipal Marina, any facility at Port Lavaca would have no overhead clearance restrictions all the way to the deep-blue sea.

Additionally, placement of the proposed new spoil areas west of the MSC will create a navigational hazard for commercial shipping utilizing the channel. The spoil will impede the safe passage of yachts through the area, such that pleasure vessels and commercial vessels, both draft-constrained to some degree or another, will be forced to share the MSC. A good deal of additional engineering was committed in the Houston-Galveston project to avoid this situation. While the traffic during the present time may seem minimal, it will increase considerably in the near future. The economy is on the upswing and Houstonians find Lavaca and Matagorda Bays attractive.

As a sailor and author, I have had the opportunity to see much of the work of the USCOE. I have seen works of brillance and also utter failures. Unfortunately, the latter are seldom corrected, but allowed to decay in plain sight. New open bay spoil disposal areas west of the MSC will not stand any reasonable test of cost-benefit, once the facts are fully examined. Please do not create another engineering failure.

Ed Campbell

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

July 03, 2018

Colonel Lars Zetterstrom
District Commander
Attention: Ms. Kelly Copes-Burke
Galveston District, U.S. Army Corps of Engineers
Post Office Box 1229
Galveston, Texas 77553-1229

Dear Colonel Zetterstrom:

Thank you for the opportunity to participate in and provide comments on the U.S. Army Corps of Engineers (Corps) Matagorda Ship Channel, Port Lavaca, Draft Texas Feasibility Report and Environmental Impact Statement (DEIS). Located in Matagorda and Calhoun counties, the Corps and the non-federal sponsor, Calhoun Port Authority, propose to deepen the main channel and entrance channels to 47 and 49 feet respectively, widen the main and entrance channel to 350 and 600 feet respectively, construct an entrance channel extension, and construct a new 1,200 foot turning basin. The Corps proposes to dredge 30.22 million cubic yards (MCY) of new work material and 257.5 MCY of maintenance material to be placed in upland confined placement, open bay disposal, offshore disposal, and used beneficially over the 50-year span of the project.

Our comments are provided under Section 2(b) of the Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the provision of the Endangered Species Act of 1973 (87) Stat. 884, as amended; 16 U.S.C. 703 et seq.). The Service has reviewed the DEIS and has the following comments:

Chester Island

- Provide additional analysis of how the Tentatively Selected Plan (TSP) will affect the shorelines of Chester Island. Proximity to the Matagorda Ship Channel and increases in size and frequency of vessel traffic will undoubtedly affect wave action. Should the analysis indicate direct impacts (increased erosion) to Chester Island shorelines, we recommend the Corps fully fund the preferred restoration plan selected by Texas Audubon to protect and preserve this valuable natural resource. The implementation of Texas Audubon's preferred plan (construction of strategically placed breakwater structures and shoreline armoring) would mitigate increases in wave fetch and erosion.

- **Section 2.3.4** Chester Island serves as the largest rookery in Matagorda Bay providing nesting habitat for 10+ species of colonial waterbirds, supporting upwards of 20,000 nesting pairs, and is a significant contributor to the Gulf-wide population of the brown pelican *Pelecanus occidentalis*. We recommend any beneficial use on the island take place during the non-nesting season and are fully coordinated with Audubon Texas prior to any construction.

- **Section 1.7.4** The TSP will provide for the relocation or removal of 22 pipelines to accommodate dredging associated with the deepening and widening. Additionally, there is a certain expectation that increases in import and export of shipments of crude oil, condensate and other liquid petrochemicals are reasonable. We recommend the development of a robust environmental response plan in the event of a hydrocarbon spill to include increased capability to quickly and strategically deploy boom around Chester Island and other environmentally sensitive areas in the bay.

- **Section 4.10.17** The Corps anticipates storing or stacking new work dredge material on Chester Island. While this might be considered beneficial use, we recommend the Corps provide additional details on the term "storage" identified in this plan. Storage of any material should be closely coordinated with Audubon Texas as new work and maintenance dredge material are key resources of the Chester Island restoration plan. Additionally, this island is intensely managed for nesting colonial waterbirds and any construction activities should be coordinated with and complement existing management actions

Oyster

- Complete a side scans sonar analysis of the MSC TSP footprint (including potential placement areas) to quantify impacts to oyster habitat.

- Mitigation will be addressed under the detail phase of the project. Full compensation with a ratio of 1:1 is necessary for all direct and indirect oyster impacts caused by direct dredging and indirect salinity impacts. The Service agrees with the use of the Swannack (2014) model to identify suitable oyster restoration sites within Matagorda Bay.

- Continued coordination with state and federal resource agencies is crucial to determine how and where to best mitigate these impacts.

New Work Dredging and Placement Areas

- **Sections 4.10.17 and 4.10.17** DEIS mentions Tables 6-5 and 6-7; however, they are not included in the main report for evaluation.

Threatened and Endangered Species

- **Section 5.3.1.4** The West Indian manatee *Trichechus manatus* is a secretive mammal and its presence not always detectable; however, there are sightings reported for Matagorda Bay. We recommend the Corps incorporate conservation measures designed to avoid impacting the species during construction.

- The Service does not anticipate any beneficial effects for listed sea turtle species from the placement of material on Chester Island. Sea turtles are frequently found in Matagorda Bay; however, nesting activities are limited to barrier island beaches. Matagorda Island and Matagorda Peninsula are both known to support nesting sea turtles; however, there are no known nesting occurrences on Chester Island due to a lack of suitable habitat.

- **Section 5.4.2.2** The DEIS states potential benefits resulting from the GIWW re-route include "benefits to the endangered brown pelican." The brown pelican was removed from the Endangered Species list in 2009.

Jetty Stabilization Project

- **Section 5.4.2.1** Conduct comprehensive hydrodynamic and tidal amplitude modeling of the TSP and the Jetty Stabilization Project to determine potential effects of the combined projects on aquatic natural resources and shorelines.

- Conduct ship simulator modeling including parameters such as increases in size and frequency of vessel traffic and evaluate how wave action will affect mainland and island shorelines.

GIWW Re-route

- **Section 5.4.2.2** The Service was not aware of the Corps' intent to construct a test marsh near Palocios Point using material from Reach 1 of the MSC as part of the GIWW Re-route. We encourage the Corps to coordinate with state and federal agencies to develop a design for the test marsh that is best suited for that location and will benefit aquatic and terrestrial wildlife.

Submerged Aquatic Vegetation (SAV)

- **Section 5.4.4.6** The Corps states no significant cumulative effects are expected as a result of the TSP, the permanent impact to 5,000 acres of bay bottom, and the loss of submerged aquatic vegetation (SAV). However, there is a significant loss of ecosystem services from the time of direct impact until a SAV bed is fully functioning sometime in the future. SAV occurs in the shallow waters of Matagorda Bay and are known to occur along Pass Cavallo, the back side of Matagorda Island, up into Lavaca Bay and highly productive and diverse ecosystems. They provide nutrient cycling and prevent large scale algal blooms. In addition, they stabilize sediment improve water clarity and prevent erosion, while sustaining oxygenation of the water column. Many aquatic fish and turtle species depend on the SAV beds in Matagorda Bay and the surrounding area as foraging, shelter, and breeding habitats. The Service recommends the Corps conduct sea grass surveys during the next phase of the Study to identify and map all SAV beds avoiding impacts during future construction. Surveys should be conducted again if lag time between initial surveys and construction is greater than 5 years as SAV bed dynamics can change.

- Complete hydrodynamic modeling specific to the TSP detailing the direct and indirect impacts to SAVs and wetlands. Results should be shared with natural resource agencies for further consideration, planning, and mitigation recommendations.

Appendix F DMMP

- Sundown Island As Open Water Unconfined Placement Area - The Plan states the island is approximately 442-acres; however, the current estimate is 86 acres.

- Replace data in Table 5-3 with current dredging estimates and not those of 2009.

- Only sand that meets the specifications of the local beach quality (e.g. grain size, color, and mineralogy) will be used for fill and maintenance activities. Beach quality sand will be tested in accordance with ASTM D422. Beach quality sand will have an average mean grain size greater than or equal to .10 mm and less than 1.0 mm, a silt content passing #200 sieve (0.074 mm) of less than 10 per cent, and a final composite gradation curve that fits within the following gradation range:

Sieve Designation U.S. Standard Square Mesh	Percentage by Weight Passing
3-8 inch	100
No. 4	94-100
No. 8	84-100
No. 16	60-100
No. 30	45-100
No. 50	17-65
No. 70	5-27
No. 100	3-15
No. 140	0-10
No. 200	0-10

- Further coordination with the natural resource agencies regarding the features labeled as H4 in Table 5-5 should be conducted prior to any construction. These agencies can provide the expertise to maximize feature design and location to benefit fish and wildlife.

We appreciate this opportunity to comment on the Corps' proposed Matagorda Ship Channel Improvement Project. If you have any questions about our comments or recommendations, please contact staff wildlife biologist, Ms. Donna Anderson at 281/286-8282 of this office.

Sincerely,

acting for

Charles Ardizzone
Project Leader

Cc: Rusty Swafford, NOAA, Galveston
Rebecca Hensley, TPWD, Dickinson, TX
Leslie Hartman, TPWD, Rockport, TX

Attachment K – Responses to Draft FR-EIS Public Comments

Draft Report Public Comments

Following the public meeting to present the Draft Integrated Feasibility Report/Environmental Impact Statement eleven comments were received regarding the Matagorda Ship Channel, TX project. There were two supportive comments included in those letters and emails. These comments will not be addressed below, though we appreciate the support and the commenters taking time to reach out to us. The remaining comments will be addressed below. Some comment letters included multiple topics and many of the letters contained similar comments. The comments are addressed by topic and not by individual commenter below. The comment topic is in bolded type, while the response is below the comment in italicized text.

The most comment topic was in regards to shoreline erosion on the western side of the Matagorda Bay, in particular the Alamo Beach area.
The concern regarding the erosion of the shoreline along the western side of Matagorda Bay is an important topic. We believe the widening and deepening project, as currently designed, will not exacerbate the erosion. The placement of the dredged material on the western side of the channel should help to tamp down the ship wakes and result in lower force wave action. To address this concern a ship wake analysis was performed by USACE. The model estimated an increase of ship wake wave heights of only 0.1 feet. This minimal increase in ship wake should not exacerbate shoreline erosion (See Main Report Section 3.1.1 and Appendix F – Section 2.6.2).

A few of the commenters asked about the suitability of the dredged material for placement within the bay or in upland placement areas. This comment concerned the presence of toxins in the sediments and in relation to the Alcoa Superfund site.
To address this concern USACE will coordinate with EPA prior to the widening and deepening of the ship channel to develop a sediment sampling and analysis plan. This testing is required for placement of materials offshore and in the waters of the bay. This testing includes bioassays of material for offshore placement, testing of the sediments and elutriate testing. The specific pollutants to be tested will be determined in discussion with the US EPA. For further discussion of this plan see Main Report - Section 5.3.12 and Appendix B – Section 4.9.4.

One commenter does not want the non-sandy dredge material placed on the beaches as part of a beneficial use plan.
T The Dredged Material Placement Plan (DMMP) was developed with multiple goals in mind. One of those was to be environmentally acceptable. Placement of non-sandy dredge material on the beach would not be environmentally acceptable and, therefore, there is no plan to place material on the beaches. See Main Report – Section 4.11.10 and Appendix E for more discussion on the DMMP.

One commenter was concerned with the impacts to Pass Cavallo. The current trend is shoaling around the pass and a decrease in water passing through the pass.
The closure of Pass Cavallo is not a part of the current project. Hydrologic analysis for the study do not indicate any danger of the Pass closing (See Main Report – Section 5.1.2 and Appendix F – Section 2.6.4).

One commenter offered multiple suggestions of where beneficial use could be done to help protect existing resources that are in danger.
The US Army Corps of Engineers is always willing to find beneficial use for dredged material. This is the preferable use of dredged material whenever possible. In the current Dredged Material Management Plan (DMMP) approximately 2.3 mcy of new work material and 12.9 mcy of maintenance material will be used beneficially on Chester Island. Since the development of the Draft Report an additional beneficial use site was developed. Approximately 1.4 mcy of new work material and 9.0 mcy of maintenance material will be placed just offshore and to the west of the Entrance Channel jetty in a sand engine to feed the peninsula's south side beach. For more information on the project's DMMP and its development see Main Report – Section 4.11.10 and Appendix E.

One commenter has suggested that the impacts resulting from a possible increase in storm surge that may result from the deeper and wider channel were not analyzed.
The potential for increased storm surge will be modeled by the Hydrology and Hydraulics section at the Galveston District during the pre-construction and design phase of the project.

One commenter has suggested that the models used to estimate impacts to wetlands and oysters are not sufficient or are outdated. The commenter has suggested alternate models.
The US Army Corps of Engineers Civil Works group is limited to models that have been certified by the ECO-PCX. The models selected for this study are certified and their use has been supported by the ECO-PCX. The model suggested by the commenter is not certified for use in Civil Works studies. For more information about the models use and their application see Main Report – Section 6.3, Appendix B – Section 4.12.13, and Appendix B, Enclosure 1.

One commenter has suggested that mitigation has either not been proposed or does not sufficiently account for temporal ecological functional losses.
Since the preparation of the Draft Report the mitigation plan has been more thoroughly examined and methodologies proposed. The impacts of the project were estimated using HSI models and acreages of required mitigation estimated. For more information on the mitigation plans for this project see Main Report – Sections 4.12.3 and 6.3, and Appendix B – Section 4.12.13 and Enclosures 1 and 10.

Enclosure 5 – USFWS Coordination

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

December 2018

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
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Houston, Texas 77058
281/286-8282 / (FAX) 281/488-5882

In Reply Refer To:
FWS/R2/02ETT
X00-2017-CPA-
0007

September 25, 2017

Colonel Lars Zetterstrom
District Commander
Attention: Ms. Janelle Stokes
Galveston District, U.S. Army Corps of Engineers
Post Office Box 1229
Galveston, Texas 77553-1229

Dear Colonel Zetterstrom:

The U.S. Fish and Wildlife Service (Service) is collaborating with the U.S. Army Corps of Engineers (Corps) on the evaluation of the "Matagorda Ship Channel Expansion Channel Improvement Project (MSC ECIP)" located in Calhoun and Matagorda Counties, Texas. This project aims to improve ship movement throughout the 27-mile channel for the purpose of reducing maritime transportation costs, increase operational efficiencies of commodities moving through the Port of Port Lavaca-Point Comfort, and to improve navigation safety. The alternatives under evaluation are similar to those previously evaluated by the 2009 Matagorda Ship Channel Improvement Project Environmental Impact Statement; however, new impacts, mitigation modeling, and a revised dredge material management plan are expected under the new project. A Notice of Intent was subsequently filled on December 23, 2016 to begin the current MSC ECIP. Improvement features to be considered under the current study include:

- Turning basin improvements
- Vessel passing lanes
- Environmental analysis of the bay reach (48 feet deep by 400 feet wide)
- Dredge material management plan

The Corps will evaluate an array of ship channel improvement alternatives that may include: deepening and widening portions of existing channels; relocation of existing or creation of new turning basins; addition of jetty/hard structures; and creation of passing lanes. Our comments are of a general nature and focused on the overall project footprint instead of evaluating each of the currently proposed improvements which will be described in the forthcoming Fish and Wildlife Coordination Act Report (FWCAR).

The purpose of this letter is to provide the Service's comments and recommendations regarding the MSC ECIP while identifying planning constraints that may influence the Service's ability to fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act

(FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This PAL is prepared under the authority of the FWCA; however, it does not constitute the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA. The Service will provide copies of this letter to the National Marine Fisheries

Service (NMFS) and the Texas Parks and Wildlife Department (TPWD); if any comments are received on this letter they will be forwarded under a separate cover. Comments in this letter are also provided under the National Environmental Policy Act (NEPA) of 1969 (83 Stat. 852; 42 U.S.C. 4321 et seq.) as a cooperating agency for the MSC ECIP and the Endangered Species Act (Act of 1973.

The Service bases this evaluation on the current data, modeling, and analyses made available by Corps sources and Service files. The Service understands construction of the project is subject to Congressional approval and the Tentatively Selected Plan funding will occur sometime in the future with or without project modifications. Additional Service involvement is necessary for subsequent detailed planning, habitat analysis, engineering, design, and construction phases of each planning effort is required to fulfill our responsibilities under the FWCA. Since there may be a significant time lag between the study and construction phases, the Service recommends the Corps reinitiate coordination under a separate FWCA agreement when construction funding is made available. This will allow the Service to conduct a comprehensive review of the project footprint, impacts, and update recommendations based on environmental conditions at the time of construction.

Background

The Calhoun Port Authority of Calhoun County (CPA) requested the Corps evaluate the need for improvements to the existing Matagorda Ship Channel (MSC) given no major improvements have occurred since original construction in 1910 (U.S. Fish and Wildlfe Service, 2001). The MSC has undergone incremental improvements with the current 36-ft deep channel configuration completed in 1966. Since then, the Corps conducted two reconnaissance studies that identified present configuration as a constraint to maritime commerce. Currently, the bay reach of the MSC is maintained between a depth of -36 and -38 feet and vessels currently calling on the port and adjacent businesses must light-load to reach final port destinations. This deep draft channel is ranked 46th nationally in terms of total tonnage, 34th in foreign trade, and 68th in domestic trade (TxDOT, 2017). The Port receives approximately 420 ships, 1,000 barges, and 3,600 railcar transits annually with an annual economic impact of $12.3 billion. CPA currently has five deep water berths, six brown water barge berths, a port-owned multi-user pipeline corridor from Victoria Barge Canal to public docks, 39,000 acres of port-owned bay bottom, and 1,000+ acres of green-field land for future development. The CPA is expanding their facility and is in the permitting and design phase for three deep water petrochemical berths and four barge berths (TxDOT, 2017). Channel improvements are warranted based on the increases in channel users, a significant increase in size of maritime vessels, and an increased need for a port by nearby Eagle Ford Shale. The CPA handles a variety of products including petroleum, aluminum ore, chemicals, and allied products. Several local industrial plants: Alcoa World Alumina, L.L.C., INEOS Nitriles, Formosa Plastics Corporation, Invista, J.R. Simplot and crude oil/condensate users: North Star Midstream, NGL Energy Partners, and Arrowhead Offshore Pipeline use the MSC and would benefit from channel modifications. The Corps identified the study area as outlined below in **Figure 1**.

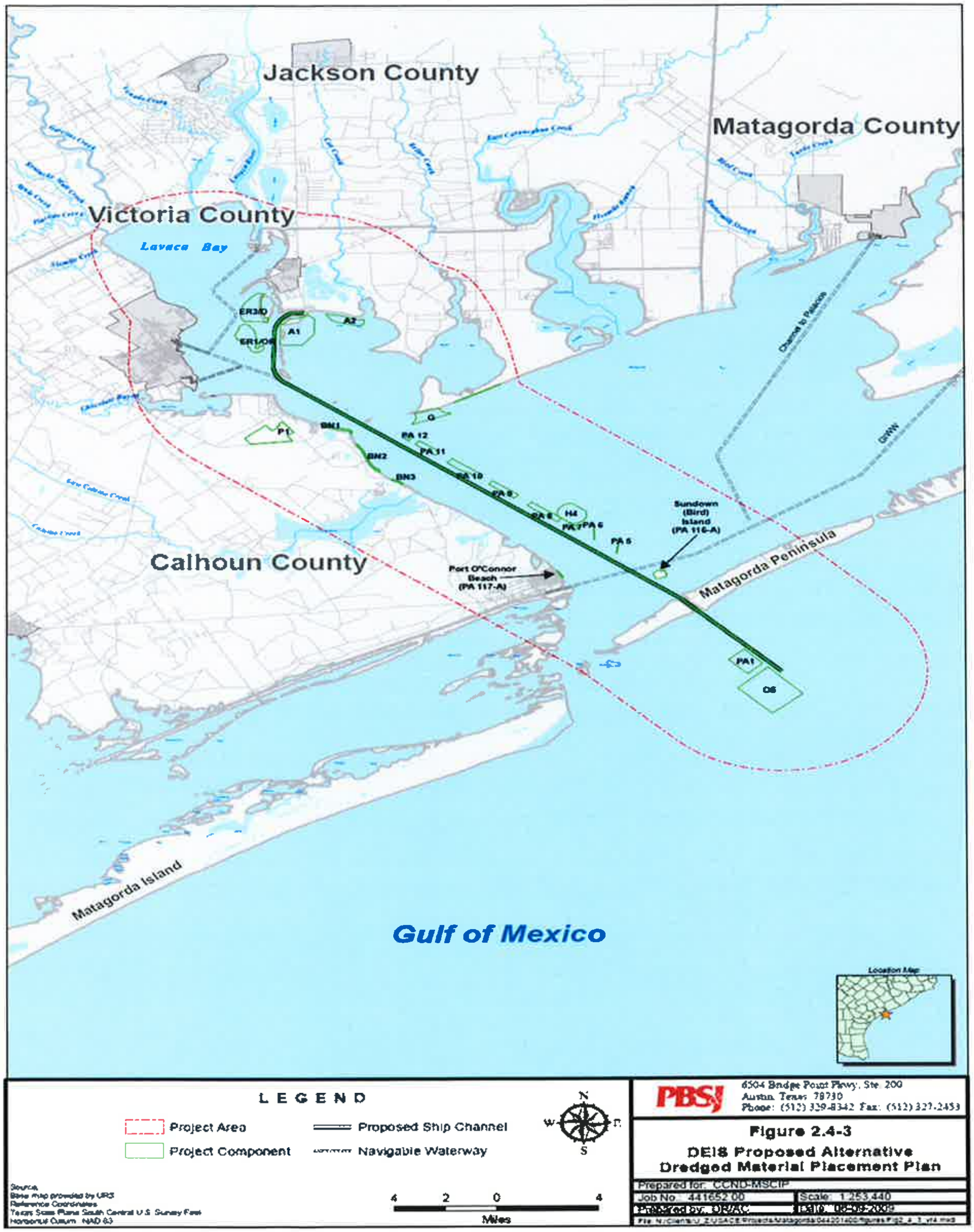

Figure 1 Matagorda Ship Channel Expansion Channel Improvement Project Study Area
Source: U.S. Army Corps of Engineers, 2009

The Service provided recommendations to the Corps throughout previous planning efforts on MSC projects as seen in **Table 1**.

Table 1 Previous Service involvement with the Corps and the MSC

Document Name	**Year**
Recommendations for Dredge Material Maintenance for the MSC	2001
Department of Army Permit 24071 Scoping Comments	2006
Department of Army Permit 24071 Response Letter (U.S. Fish and Wildlife Service, 2007)	2007
Draft Environmental Impact Statement Response Letter (U.S. Fish and Wildlife Service, 2007)	2007
Department of Army Permit 24071 Additional Comment Letter (U.S. Fish and Wildlife Service, 2007)	2007
Revised Biological Assessment Response Letter (U.S. Fish and Wildlife Service, 2008)	2008
Biological Assessment Response Letter (U.S. Fish and Wildlife Service, 2009)	2009
Permit Application SWG-2006-00092 Letter (U.S. Fish and Wildlife Service, 2009)	2009

Alcoa/Point Comfort Lavaca Bay National Priorities Listed Site

The 3,500 acre Alcoa facility functions as an aluminum refining and manufacturing facility located on the east shore of Lavaca Bay, a sub bay system of the larger Matagorda Bay. Between 1948 and the present, Alcoa constructed and operated several types of manufacturing process at this location including alumina refining, aluminum smelting, carbon paste and briquette manufacturing, gas processing, and chlor-alkali processing. The site (Alcoa Plant, Dredge Island, portions of Lavaca Bay, Cox Bay, Cox Creek, Cox Lake, and western Matagorda Bay) was added to the National Priorities List under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) on March 25, 1994 based on levels of mercury found in several species of finfish and crabs in Lavaca Bay in 1988. As a result of the elevated mercury levels in shallow sediments and fauna close to the facility, Alcoa entered into a Memorandum of Agreement (MOA) with the Texas Trustee Council (representatives from state and federal natural resource agencies) in 1997. The resulting MOA identified and implemented restoration actions aimed at making the environment and public whole for the resource injuries or losses caused by releases of hazardous substances from the Alcoa facility. Temporarily and permanently affected habitats in this area included tidal flats, salt marshes, oyster reefs, shallow soft-bottom sediments, terrestrial uplands associated with islands and shorelines, and resulted in a fish closure of the immediate area.

Ongoing efforts by Alcoa to remediate and restore the affected area included sediment removal, sediment monitoring, and sampling conducted in open and closed areas of Lavaca Bay, sampling mercury levels in red drum *Sciaenops ocellatus* and blue crab *Callinectes sapidus*, hydraulic containment system, removal actions at Dredge Island, natural recovery of areas not dredged,
and marsh removal north of Dredge Island (located in Lavaca Bay, west of the facility buildings and is approximately 420 acres). These actions focused on one goal: to reduce levels of mercury in finfish so

the fish closure can be lifted (Texas Trustees, 2001). Most recent findings indicate (Environmental Protection Agency, 2017):

- remedial actions are effective in reducing mercury levels in sediment
- mercury levels in prey blue crab show downward trends
- levels of mercury in red drum continue to remain elevated in the closed area
- residual sources of mercury impacting sediment may exist
- adjacent marshes are potential areas of enhanced methylation even when total mercury levels are low

As a result of these findings, EPA believes there are possible ongoing sources of contamination and these include, but may not be limited to, sloughing of the Alcoa and Witco Channel walls, erosion along Dredge Island edges, possible shipping induced resuspension of sediments at Witco Harbor, erosion of Mainland Shoreline #3 (MS3), and resuspension of open water sediments particularly in Causeway Cove. Consequently, Alcoa will take the following actions during 2017: excavate marsh habitat sediment (15,000 cubic yards) at Causeway Cove, dredge 61,000 cubic yards of sediment from MS3, and dredge an additional 300,000 cubic yards from the Witco Channel, MS3 marshes, and adjacent areas. Alcoa will continue conducting annual sediment and fish/shellfish sampling to determine if additional response is required (Environmental Protection Agency, 2017).

Habitats within the Project Area

Matagorda Bay, located on along Texas mid coast, is the third largest estuarine system in Texas behind Galveston Bay and Laguna Madre and covers approximately 422 square miles. Generally, Matagorda Bay is two meters deep and includes Lavaca Bay, Tres Palacious Bay, and East Matagorda Bay. Smaller outlets include Turtle Bay, Carancahua Bay, Keller Bay, and Cox Bay. Matagorda Bay is separated from the Gulf of Mexico by Matagorda Peninsula and is the mouth of the larger Lavaca and Colorado Rivers. Five saltwater inlets connecting to the Matagorda Bay system to the Gulf are: Pass Cavallo, the MSC landcut, Greens Bayou, the Colorado River Delta Complex, and Brown Cedar Cut. Freshwater inflow into Matagorda Bay occurs through the Lavaca-Navidad Rivers and other smaller rivers and creeks.


Aquatic Resources within the Matagorda Ship Channel Improvement Project
Legend
Matagorda Ship Channel
<all other values>
WETLAND_TY
Estuarine and Marine Deepwater
Estuarine and Marine Wetland
Freshwater Emergent Wetland
Freshwater Forested/Shrub Wetland
Freshwater Pond
Lake
Other
Riverine
Seagrasses
Oyster Locations
Matagorda Island
N
W
E
S
0 1.25 2.5 5 7.5 10 Miles
Produced by: Donna Anderson
Texas Ecological Services Office
Projection: WGS 1984
Datum: WGS 1984
September 11, 2017
Some datasets provided by TNRIS
Map image is the intellectual property of ESRI and is used herein under license. Copyright 2017and its licensors. All rights reserved.

Figure 2 Aquatic resources within Matagorda Bay

Open Bay Bottom
The open bay bottom habitat of Matagorda Bay is the second largest habitat type in the bay and is made up of mostly soft rippling mud and silt that is not covered by oysters and vegetation. Over the years, the area of open bay bottom has increased mainly due to oyster removal and dredging activities. Biological decomposition, a major function for the breakdown of plant material, occurs in this habitat, where it is eventually re-suspended in the water column to provide food for fish and other wildlife species. Wildlife usage of and negative impacts by deepening and widening construction of Matagorda's Bay's open bay bottom were recognized in Service's letters noted in **Table 1** (USFWS 2001, 2007, 2009).

Submerged Aquatic Vegetation
One of the most biologically productive, recreationally and economically valuable habitats, seagrass beds provide feeding and nursery habitat for waterfowl, fish, shrimp, crabs and other important estuarine species as well as sea turtles, manatees, and countless invertebrates that are produced within, or migrate to seagrasses (U.S. Fish and Wildlife Service, 2015). Seagrass helps to dampen the effects of strong currents, prevent erosion, enhance water clarity, provide protection to fish and invertebrates, and prevent scouring of bay bottom areas. Sea grasses are usually found in calm, shallow Gulf waters where higher salinities, light, and nutrients are plentiful. Excessive freshwater inflows into a bay system can decrease salinities to near brackish conditions, and depending on the duration of the fresh conditions, some seagrass species are not physiologically capable of tolerating extreme conditions and may die. Accordingly, species richness and diversity may be lost resulting in colonization by one or two persistent species creating a uniform bed of seagrasses. The reduced diversity of seagrass beds may affect usage by commercial and recreationally important finfish species and limit sea turtle and manatee foraging.

The majority of Texas seagrass meadows occur along the middle and lower Texas coast where waters are warm, clear, and have higher salinities. Almost 80% of the remaining seagrass habitat in Texas is located in the Laguna Madre System and however currently abundant, this resource remains threatened. In 1994, surveys revealed only 1.7% or 3,830 acres of Texas seagrasses occur north of Pass Cavallo in Matagorda Bay. Biotic and abiotic threats to seagrasses such as storms, excessive grazing by herbivores, disease, and anthropogenic threats due to point and non-point sources of pollution, decreasing water clarity, excessive nutrient runoff, sedimentation, sea level rise, and prop scarring negatively affect these diverse communities.

Shoalgrass *Halodule wrightii*, widgeongrass *Ruppia maritima*, and turtlegrass *Thalassia Testudinum*, have been documented in Matagorda Bay (White, Tremblay, Waldinger, & Calnan, 2002). Shoalgrass and wideongrass are mapped in Keller Bay and Carancahua Bay to the east of Matagorda Bay and north of Port O'Connor in Boggy Bayou. The Seagrass Conservation Plan of Texas (Texas Parks and Widlife Department, 1999) documents the presence of shoalgrass, widgeongrass, and clovergrass *Halophila engelmannii* in the Matagorda Bay system.

Restoration efforts to benefit seagrasses have some success along the Texas coast. The Service along with other federal, state, and local partners work cooperatively to restore seagrass meadows along the coast utilizing a combination of hand planting and specially designed boats which rapidly injects nutrients, plant growth hormones and sprigs of seagrass in the bottom substrate. Although there are strong restoration efforts underway, continued damage from prop scaring, anchors, and ill-timed dredge material deposition threaten coastal seagrass beds all along the Texas coast.

The Service recognizes the importance of dredge material placement to the overall resiliency of seagrass bed ecosystems. Strategically placed and timed dredge material deposition can provide elevational lift in light of sea level rise. However, it is critically important to note that destruction of sea grass beds is also attributed to dredging. Mechanical processes disturb sea grasses and deposition or burial of sea grasses with excessive amounts of dredge material have had detrimental effects along the Texas coast. Close coordination with resource agency staff is critical when proceeding with dredge material deposition in sea grass habitat and should not be attempted until a fully developed and vetted sea grass management plan is made available.

Oyster Reef

Most oyster reefs are found in subtidal or intertidal areas, near passes, cuts, and along the edges of marsh habitat. Historically, oyster reefs dominated by Eastern oyster *Crassostrea vircinic,* were prominent (approximately 40,000 acres) in Lavaca and Matagorda Bays. However oyster populations in Matagorda Bay have declined as a result of over harvesting, disease, storm events, and human induced impacts. As a result of the Corps previous deepening and widening efforts in 2009, the CPA mapped oyster reefs in Matagorda Bay **(Figure 3)**. The lower portions of the MSC appear to be void of oyster reef while scattered reefs are more prominent along the upper portions of the channel and beyond into the bays. Oyster reef is as an essential habitat for finfish and is known to support a higher abundance, biomass and species richness of most fish species than either marsh or shallow non-vegetated bay bottoms. Additionally, reefs may attenuate wave energy and reduce erosion, provide protection for other nearby habitats such as submerged aquatic vegetation or salt marsh.

Oyster habitat should be avoided during construction activities; however, should the Corps find that avoidance of oyster shell and reef habitat is not in the best interest of the CPA, the Service strongly urges the Corps to coordinate with the Studies' Inter –agency Coordination Team (ICT), and specifically TPWD to identify oyster reef restoration opportunities in Matagorda and adjacent bay systems. The Service recommends mitigation efforts with full in-kind compensation for any impacts to oyster habitat. The Corps plans to conduct oyster modeling and the Service understands and approves of the Corps choice of the Swannack (Swannack, Reif, & Soniat, 2014) oyster model in the evaluation of direct and indirect impacts to oyster habitat within the study area. The Service will evaluate the Swannack model and results in the FWCAR.

Oyster restoration is ongoing in the Matagorda Bay complex. The most recent addition of 54 acres of oyster reef habitat was created on Half Moon Reef in Matagorda Bay. After 3 years of monitoring, this restoration project demonstrates a thriving oyster reef community with average oyster sizes increasing by more than 550 percent between January 2014 and May 2016. Additionally, biodiversity on the reef tends to be 40% higher than on adjacent bay bottom (The Nature Conservancy, n.d.). The reef's diversity attracts larger prey species to the reef making Half Moon Reef a well-known fishing destination in Matagorda Bay.

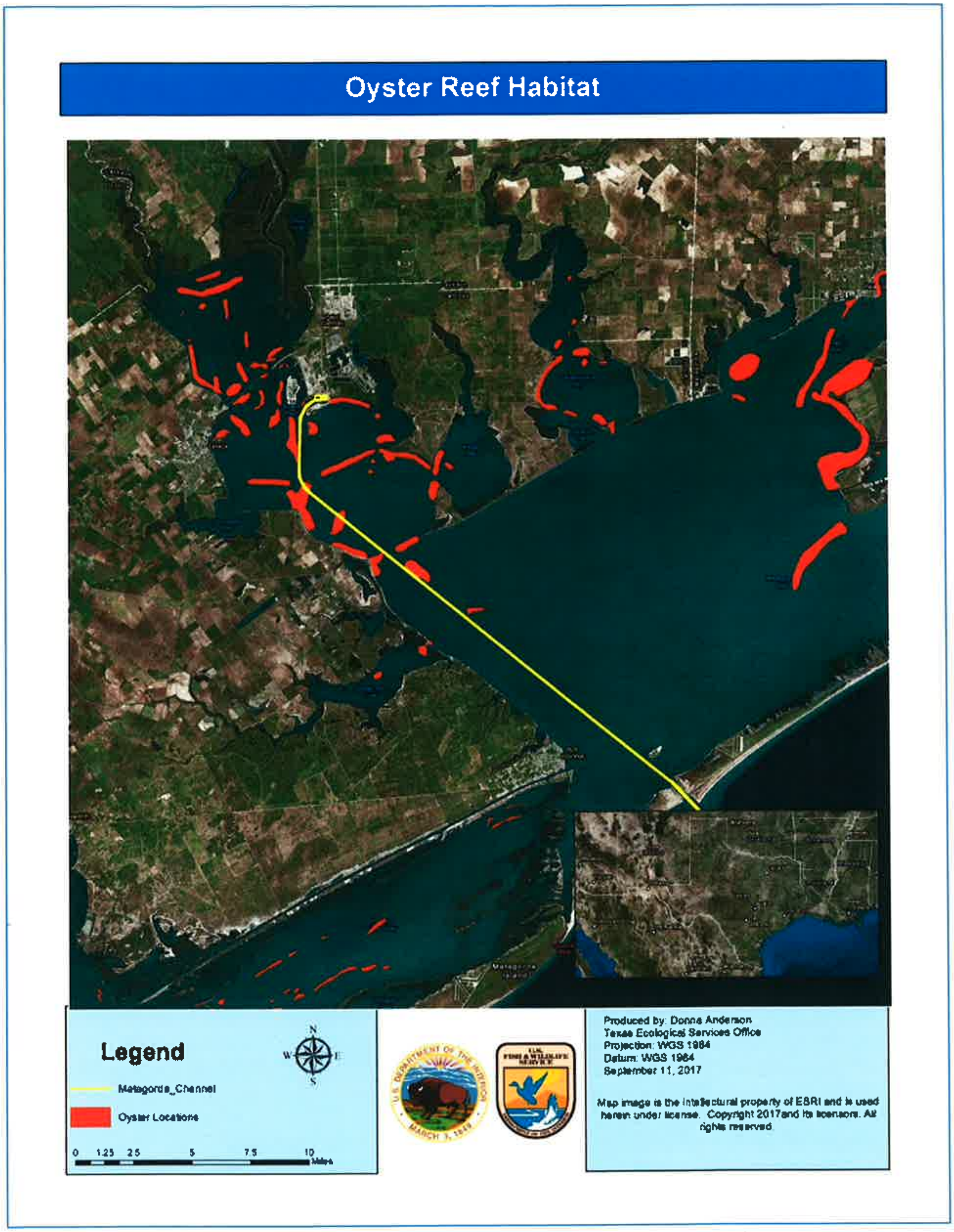

Figure 3 Matagorda and associated bays mapped oyster reefs

Coastal Marshes
Coastal marsh habitat armors shorelines from erosion, filters pollutants, enhances water quality and promotes primary production (Mitsch & Gosselink, 1993). In general, coastal marshes serve as nurseries for fish and shellfish and serve as buffer zones helping to slow and absorb storm surges that might otherwise do greater damage farther inland. Coastal marsh and wetland habitats within the project area are well documented by the Service in the reports listed in **Table 1** and the continued loss of this signifcant natural resource remains a concern. Maintaining the economic values, fish and wildlife resources, and aesthetic qualities of the Texas Coast depends on re-establishing and restoring its wetlands. The Service continues to support creation and restoration efforts by the CPA, other natural resource agencies, non-governmental organizations, and the public. Should the Corps not be able to avoid impacts to coastal marsh habitat, we recommend the Corps engage the ICT to determine appropriate habitat impact modeling and restoration or mitigation site selection.

Estuarine and marine wetlands
Fringe or estuarine wetlands are tidal in nature, are extremely productive, occur along the edges of Matagorda Bay and some of the land features found within the bay. Prevalent flora of the estuarine and marine wetlands include smooth cordgrass *Spartina alterniflora*, saltwort *Batis maritime*, saltgrass *Distichlis spicata* and glasswort *Salicornia* spp. Estuarine wetlands are valuable for commercial and recreational fishery species with most species completing all or part of all of its life cycle in this habitat. We encourage the Corps to avoid this habitat during construction activities to the greatest extent practicable. However, if the Corps decides that avoidance is not possible, the Service recommends appropriate modeling and analysis with complete in-kind compensation to fully offset impacts to the existing functions and values of wetland habitat.

Freshwater Emergent Wetlands
Freshwater wetlands are primarily found in areas where rainfall runoff accumulates in relic depressions and stream channels. Closer to the coast, this wetland type can be found inland of salt or estuarine wetlands and intertidal swales (Dick & Hunt, 2012). These wetlands tend to have reduced salinties and are suitable for plants such as sedges, rushes, and coastal arrowhead *Sagittaria lancifolia*. While many freshwater wetlands are found on the mainland within the project area, some of the dredge placement and disposal areas (filled placement areas not currently being used or upgraded) provide excellent freshwater emergent wetlands. These wetlands provide valuable stop-over habitat for many migrating species such as waterfowl, raptors, shorebirds, and should be avoided during construction activities. However, if the Corps deems that avoidance is not possible, the Service recommends mitigation with full in-kind compensation for any impacts.

Fish and Wildlife Impacts
Threatened and Endangered Species

According to Section 7(a)(2) of the Act and the implementing regulations, it is the responsibility of each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species. Based upon an inventory of listed species and other current information, the federal action agency determines if any endangered or threatened species may be affected by the proposed action. The Service's Consultation Handbook (http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm) is available online for further information on definitions and process.

The Service recommends the Corps conduct a review for threatened and endangered species two years prior to construction. In order to obtain information regarding fish and wildlife resources concerning a specific project or project area, we recommend the Corps first utilize the Service developed Information, Planning, and Conservation (IPaC) System. The IPaC system is designed for easy, public access to information about the natural resources for which the Service has trust or regulatory responsibility such as threatened and endangered species, migratory birds, National Refuge lands, and the National Wetland Index. One of the primary goals of the IPaC system is to provide this information in a manner that assists project proponents in planning their activities within the context of natural resource conservation. The IPaC system can also assist people through the various regulatory consultation, permitting and approval processes administered by the Service, helping achieve more effective and efficient results for both the project proponents and natural resources. The IPaC system can be found at:https://ecos.fws.gov/ipac/

Critical Habitat
Critical habitat is defined as the specific areas within the larger geographic area, occupied by the species at the time it was listed that contain the physical or biological features essential to the conservation of the endangered and threatened species. Critical habitat may also include areas not occupied by the species at the time of listing but are essential to its conservation. The Act requires Federal agencies to use their authorities to conserve endangered and threatened species and to consult with the Service about actions that they carry out, fund, or authorize to ensure that they will not destroy or adversely modify critical habitat. The prohibition against destruction and adverse modification of critical habitat protects such areas in the interest of conservation.

We have reviewed our files and determined that critical habitat for the federally endangered piping plover lies within the study area boundaries and is outlined in red in **Figure 4**. During MSC interagency meetings, Corps staff indicated that adverse modifications to critical habitat will not occur as a result of this proposed project; however, these modifications will be fully considered during an upcoming Matagorda Ship Channel Jetty Modification Study. The Service strongly recommends the Corps evaluate the cumulative effects that all MSC modifications may have on critical habitat.

The whooping crane *Gus americanus* winters on the Aransas National Wildlife Refuge (ANWR) and its critical habitat lies southwest of the project area, however the whooping crane may utilize wetlands within the project boundaries (**Figure 5**).

Figure 4 Piping plover critical habitat

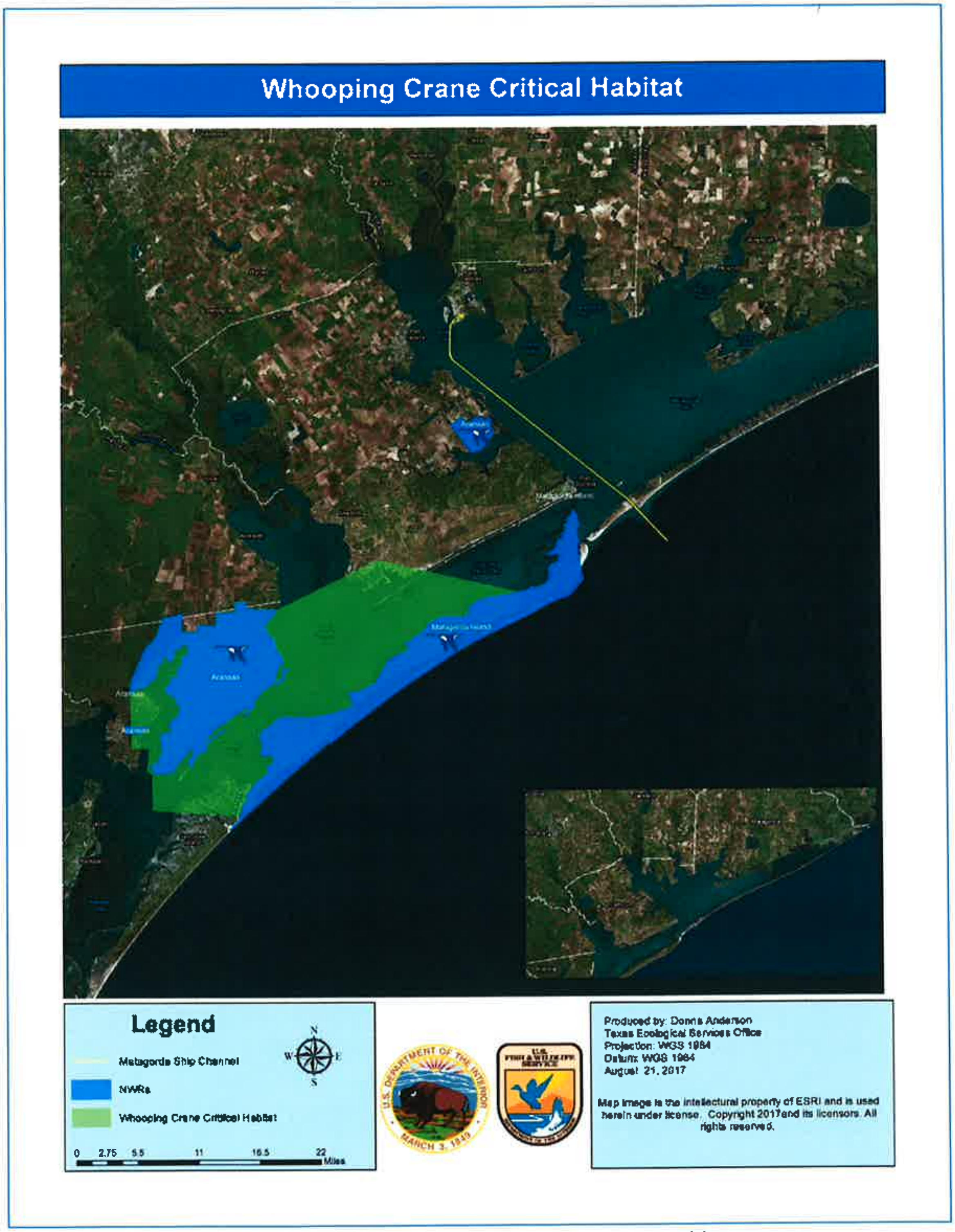

Figure 5 NWRs and whooping crane critical habitat

Finfish and Shellfish
Close to 95 percent of all finfish and shellfish are dependent in some way on the coastal areas where fresh water from streams and rivers mix with salt water from the Gulf of Mexico creating food rich estuaries (USEPA, 1999). Many aquatic species migrate into the estuaries to spawn, while others send young to the estuaries for protection against predators with most fish and shellfish migrating back to the Gulf of Mexico as adults. Almost 85% of recreationally important fish species use coastal wetlands and estuarine habitats during at least one life stage (Lellis-Dibble, McGlynn, & Bigford, 2008). Marshlands adjacent to the bay systems tend to provide significant quantities of organic material which forms the base of the food chain in the estuaries. Matagorda and the surrounding bays are critically important to commercial and recreation users. Recreational and commercially important species such as Gulf menhaden *Brevoortia patronus*, bay anchovy *Anchoa mitchilli*, white shrimp *Litopenaeus setiferus*, brown shrimp *Farfantepaneus aztecus*, hardhead catfish *Arius felis*, blue crab *Callinectes sapidus*, Atlantic croaker *Micropogonias undulatus*, and sand seatrout *Cynoscion arenarius* are abundant within the Matagorda Bay marsh and estuary complexes (Armstrong, Brody, & Funicelli, 1987).

Texas routinely accounts for almost a quarter of the red snapper harvested in the Gulf of Mexico and one quarter of all domestic shrimp landed in the United States. In Texas, shrimping accounts for 85% of both the landings and overall economic value in the commercial fishing industry (Audubon Nature Institute, 2017). In 2015, 52.6 million pounds of brown shrimp and 16.6 pounds of white shrimp were landed resulting in revenues of $96.8 million and $46.6 million (National Oceanic and Atmospheric Administration, 2015; Texas State Historical Association, 2015) respectively in Texas. Brown shrimp landing in Texas account for 49% of the total harvest in the Gulf of Mexico.

Finfish are usually highly mobile and the Service believes any impacts to those species will be minimal and temporary. However, increases in suspended sediments and turbidity levels from dredging and disposal operations, could under certain conditions, result in adverse effects on marine animals and plants by reducing light penetration into the water column and by the actual physical disturbance. Likewise, shellfish can suffer from breathing problems associated with clogged and damaged feeding apparatus and young fish can have increased fatalities when sediments become trapped in their gills from heavily turbid waters (Wilbur & Clarke, D.G., 2001).

Whooping crane
The whooping crane is the tallest North American bird with males approaching 1.5 meters in height, is snowy white with black primary feathers on the wings, and a bare red face and crown. These birds form monogamous pairs for life and all whooping cranes return to the same breeding territory in Wood Buffalo National Park, Canada to nest in late April or May. Most birds reenter the wintering grounds of ANWR by late October to mid-November where they migrate singly, in pairs, in family groups or in small flocks. The flock is closely monitored on the wintering grounds as climactic events, food resources, and human disturbance can interfere with spring migration. Due to the location of the project within the coastal salt marsh, the Service is informing you of the potential for occurrences of the federally listed endangered whooping crane. The ANWR is comprised mainly of salt marshes dominated by salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye daisy. Whooping cranes in recent years, have been observed utilizing similar salt marshes outside of the historic wintering grounds in and around the critical habitat designated areas and may be encountered within the project area.

Colonial Waterbirds
In general, natural and dredge spoil islands host nesting colonies for most North American seabirds as well as many of the last populations of endemic landbird species (Golder, Allen, Cameron, & Wilder, 2008). The Texas Colonial Waterbird Society recognizes five historic and three active colonies within the

project area. Several of these sites lie along the MSC (highlighted with an * below in **Table 2**) and direct and indirect impacts to these sites resulting from construction activities should be avoided during the breeding season. The Service defines the breeding season for colonial waterbirds as February 1 to September 1: however, this can vary from colony to colony necessitating site inspections to confirm that all nestlings have fledged.

Approximately 23 species of colonial-nesting waterbirds (gulls, terns, herons, egrets, spoonbills, and skimmers) occur in the Matagorda Bay estuary, feeding in wetland and bay areas and nesting during the April – July period, primarily on two large offshore nesting islands, Sundown and Lavaca Bay Spoil (Snake) Islands. The average number of breeding pairs for Lavaca Bay and western Matagorda Bay indicate a downward trend since 2001 (2001-2011 24,872 pairs and 2012-2017 20,781 pairs). Average number of species and total number of nesting pairs for these two important islands the previous five years (2013 – 2017) are as follows: Sundown Island (TCWC 609-300) avg. 17,618 breeding pairs, 19 species; Lavaca Bay Spoil (63-770) (TCWC 609-121) avg. 4,172 breeding pairs, 20 species. These two nesting islands, lie along the MSC, are two of the largest and most diverse nesting colonies in coastal Texas, and rival, in terms of size, diversity, and complexity, any along the Gulf of Mexico.

On most islands, invasive predators such as rats, raccoons, and coyotes depredate nests and pose a severe threat to nesting bird populations. Actions to eradicate predators have prevented extinction of vulnerable bird populations. Continued comprehensive restoration of priority islands for breeding birds is needed as many islands are still overrun by invasive species. The Service has identified 8 historic colonial waterbird colonies within the project area. These islands or sites are no longer suitable due to the presence of invasive predator species, overgrown vegetation, lack of open ground nesting habitat, erosion or subsidence, or the lack of available forage sites in close proximity to nesting habitat.

Table 2 Colonial Waterbird colonies in or near the project area

Colony Name	TCWBS Code
Mouth of Lavaca River	609-122
Point Comfort-Alcoa	609-120
Mouth of Chocolate Bayou	609-221
Lavaca Bay Spoils 51-63	609-220
*Lavaca Bay Spoils 63-77	609-121
Matagorda Bay Spoil 39-51	609-240
*Sundown Island	609-300
Olivia Shell Bars	609-143

The construction of bird islands using new work dredged matieral is well documented, but it was not until the 1970s that the importance of this dredged material to nesting waterbirds was realized (Golder, Allen, Cameron, & Wilder, 2008). Dredge spoil islands created out of local sand and clays provide immediate nesting opportunties for bare ground nesters such as terns and skimmers. Successional vegetation including mangroves, bacharris, and other shrub spieces provide suitable nesting habitat for three species of egrets, five species of herons, white ibis *Eudocimus albus*, and rosette spoonbills *Platalea ajaja*. This and subsequent projects could positively contribute to the colonial waterbird populations across the Gulf of Mexico.

The Service published the *Birds of Conservation Concern (BCC) 2008* (U.S. Fish and Wildlife Service, 2008) with the overall goal to accurately identify the migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent our highest conservation priorities and to draw attention to species in need of conservation action. The following are five species (**Table 3**) on the BCC list that may utilize the habitat types within the study area:

Table 3 BCC species within the MSC ECIP study area

Reddish egret	*Egretta rufescens*	coastal marshes and ponds
American Oystercatcher	*Haematopus palliatus*	sandy beaches, mudflats, and occasionally rocky shores where mollusk prey can be found
Gull billed tern	*Sterna nilotica*	sandy beaches and mudflats
Sandwich tern	*Thalasseus sandvicensis*	sandy beaches and mudflats
Black skimmer	*Rynchops niger*	sandy or gravelly bars and beaches, shallow bays, estuaries, and salt marsh pools
Least tern	*Sterna antillarum athalassos*	broad, level expanses of open sandy or gravelly beach, dredge spoil and other open shoreline areas, and more rarely, inland on broad river valley sandbars

Marsh, bird islands, and placement areas created by large scale Corps projects are suitable habitat for shorebirds to forage, nest, and may play a critical life cycle role as other coastal habitats erode and become less suitable. The recent State of North America's Birds 2016 (North American Bird Conservation Initiative, 2016) identifies the seabird guild as declining. This guild continues to be severely threatened by: invasive predators on nesting islands; accidental bycatch by commercial fishing vessels; overfishing of forage fish stocks; pollution; and climate change. By adopting broad best management practices such as the continued building of bird islands, managing invasive species and vegetation on existing islands and placement areas, the Corps will help to ensure the growth of colonial waterbird populations and shorebirds along the Texas mid-coast and at the broader Gulf of Mexico level for years to come.

Other Migrating Birds

Annual migration or large scale movements of birds between their breeding (summer) homes and their nonbreeding (winter) grounds occurs mainly due to availability of food resources and nesting locations. The coastal and bay shorelines provide stop over and fall-out habitat for many neotropical birds migrating across the Gulf of Mexico to their breeding grounds in the northern United States and Canada. These weary and energy-drained birds seek wooded areas to feed and recharge before taking flight again. Most Texas birds are not year-round residents and are considered to be seasonal residents or migrants. The Texas mid-coast, located within the Central flyway, is critically important habitat for migrating birds due to their use of uplands, wetlands, beaches and marshes as feeding, resting and nesting sites. There are 338 Neotropic North American species and 333 have been documented in Texas (Haggerty & Meuth, 2015). Various species of hawks and raptors are common on the landscape throughout the year, however most are considered migrants with greatest concentrations found primarily during the winter months. South of the project area, Hawk Watch (2016) reports 488,559 migrants in Corpus Christi, Texas in September 2016 and broad-winged hawks comprised greater than 95% of the total count. The Service has extensively documented the importance of the Texas coastal habitats to resident and migratory birds throughout the letter and reports listed in **Table1** and continues to recommend avoiding migratory bird habitat all together.

The Service documents 1,026 species protected under the Migratory Bird Treaty Act (MBTA) of 1918. The MBTA protects most North American native bird species (except games birds, including ducks, geese, doves and some shorebirds) even those that are not considered long-range migrants. Further, the MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nest, or eggs of such a bird except under the terms of a valid permit issued pursuant to the Federal regulations.

Sea turtles

Five species of sea turtles are found in U.S. waters and nest on U.S. beaches: leatherback *Dermochelys coriacea*, hawksbill *Eretmochelys imbricata*, loggerhead *Caretta caretta*, green *Chelonia mydas*, and Kemp's ridley *Lepidochelys kempii*. The leatherback, hawksbill and green sea turtles rarely nest in the southeastern U.S., but offshore waters are important feeding, resting, and migratory corridors. Texas sea turtle nesting season begins March 15 and ends on October 1 and includes the Kemps ridley, loggerhead, and green sea turtles (Shaver, 2017). Should the Corps determine that beach nourishment or shoreline protection are viable options for dredge material on Matagorda Island, the Service recommends the Corps evaluate these actions for specific impacts to nesting sea turtles under Section 7 of the Act. As per the Memorandum of Understanding dated July 18, 1977 between the Service and NMFS where NMFS shall have sole jurisdiction over sea turtles when in the marine environment including waters adjacent to sea turtle nesting beaches and the Service shall have sole jurisdiction over sea turtles when on land. We recommend the Corps contact NMFS for guidance on evaluating impacts to sea turtles pursuant to their legal responsibilities.

Essential Fish Habitat

Estuarine wetlands and associated shallow waters within the project area have been identified as Essential Fish Habitat (EFH) for postlarval, juvenile and sub-adult stages of brown shrimp, white shrimp, and red drum. EFH in the nearshore, marine-portion of the project area and in the lower portions of the estuary has also been designated as EFH for an array of other species. EFH requirements vary depending upon species and life stage. Categories of EFH in the project area include estuarine emergent wetlands, estuarine water column, submerged aquatic vegetation, and estuarine water bottoms. Detailed information on federally managed fisheries and their EFH is provided in the 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council (GMFMC). That generic amendment was prepared in accordance with the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA), (P.L. 104-297).

We recommend the Corps initiate consultation with National Marine Fisheries Services, Southeast Regional Office in St. Petersburg, Florida at (813) 348-1630 to determine specific impacts to EFH as a result of the proposed MSC ECIP.

Beneficial Use of Dredge Material

The development of a well thought out plan addressing how dredge material will be used over the life of this project (50 years) is critical to a successful and environmentally responsible outcome. The Corps has historically included the Service and other natural resource agencies in the development of past MSC DMMPs. The Service recommends the Corps adopt an aggressive dredge material policy aimed at using a minimum of 50% and preferrably 75% of the dredge material beneficially. The Corps has supported numerous research projects aimed at identifying uses for dredge material in lieu of costly upland placement areas and boasts several projects where sucessful dredged material placement has restored or replaced lost wetland habitat and function. However, the Corps only beneficially used 11 % (1.64 million cubic yards [mcy]) of the 14.58 mcy of material dredged in FY15 in Texas (Frabrotta, 2016). We urge the Corps to develop a DMMP identifing markets for commerical and other end users of dredge material products as well as identifying technologies that will aid in pumping/or barging the material greater distances with reduced costs. Developing costly upland placement areas assures that sediment removed during initial construction and subsequent maintenance phases are permanetly removed from the system ultimately disrupting natural processes that help sustain local marsh habitats.

Maintenance material can be used to create wetland features that buffer the effects of increased vessel size and frequency from the widening of the MSC. We recomend all features consider some type of levee armoring to mitigate excessive wave action or have a design using sacrifical berms until a functioning mature marsh is established. New work material, while suitable for levee construction, could be beneficaliy used to create bird islands ultimatley supporting thousands of nesting colonial waterbirds throughout Matagorda Bay and the Gulf of Mexico. In other areas along the Texas coast, bird islands closer to mainland shorelines are more likely to expereince predator disturbance and could lead to island abandonment. Bird island design should incorporate large areas of marsh, uplands, beach, and sea grass beds (bird usage of these habitats are well documented throughout the seasons), distance to foraging grounds, optimal island size, vegetation, and distance to nearest mainland shoreline.

Strategically placed earthen terraces (also uses new work material) can successfully control wave action promoting shoreline stabilization and marsh growth over time. New work material can be transported to oustide of the traditional six miles pumping radius to other areas of Matagorda Bay or other bay systems where an island(s) or terracing project may be of need. The Service strongly supports long term creative solutions where sediments are responsibly returned to the aquatic ecosytem and wildlife habitats are restored, enhanced, and protected. Considerations of sea level rise and the evolving science surrounding the beneficial use of dredge material, particulary for the creation and maintenace of colonial waterbird nesting islands should be incorporated into the project design in order to optimize the positive environmental goals for a placement area (Frederick, 2006). The Service will continue to coordinate with the ICT to determine suitable placement of wetland and island features should this option become available.

Recommendations

As a result of the previous extensive coordination efforts on the MSC between the Service and the Corps, numerous hydrodynamic, oyster, salinity, and sedimentation studies were conducted resulting in a better understanding of the complex ecosystem dynamics of Matagorda Bay. While most of these surveys are outdated and not applicable for this study effort, the Service supports the Corps desire to include future modeling efforts to determine potential impacts with the associated alternatives. The Service requests access to the modeling data, reports, and summaries as they become available and understands that not all of the modeling or surveys may not be completed and reviewed in time for the final FWCA report. As such, Service recommendations may be limited and only reflect what information is made available. Should surveys and modeling reports become available after the final FWCA report is submitted, the Service recommends a supplemental FCWA report aimed at addressing those additional modeling and mitigation issues not previously accounted for in the first FWCA report.

The Service does not object to the Corps providing greater accessibility and safety measures for shipping traffic to access the Matagorda Ship Channel provided the following fish and wildlife recommendations are incorporated into future project planning and implementation:

1. Conduct oyster sampling efforts in coordination with the ICT to confirm live shell and cultch material presence/absence in areas of the MSC that lie within Matagorda Bay. Should live oyster shell be found, the Service recommends complete avoidance of the shell or reef. If avoidance is not possible, the Service recommends the Corps minimize dredging and siltation impacts within 500-ft of the project area and fully coordinate with the ICT prior to the commencement of any dredging activities. Mitigation for any direct or indirect oyster impacts will be fully compensated as coordinated with the ICT.
2. The Service agrees with the Corps' use of the Swannack (2014) model to quantify unavoidable impacts to shell and oyster habitat within the study area. Results from the modeling efforts shall be used to develop a mitigation plan to be coordinated with the ICT.
3. Provide data/modeling reports documenting the hydrodynamic changes forecasted in Matagorda Bay as a result of the preferred alternatives for the Service's evaluation.
4. The Service urges the Corps to adopt a policy/standard operating procedure to use at least 50 % and preferably 75% of maintenance dredge and new work material beneficially over the 50-year time period of this federal project. As such, we recommend the Corps re-evaluate the DMMP to include beneficial use opportunities in lieu of disposing of the material offshore or to confined upland disposal sites. Additionally, we urge the Corps to evaluate transporting new work and maintenance material to areas outside of the typical 6-mile pump distance to other areas along the Matagorda Bay shoreline and along the Gulf Inter-coastal Waterway (GIWW) as cost alternatives to placement area construction and levee rising. Dredged material can be used to combat changes in water levels, erosion, and subsidence in most marsh habitats found along Matagorda Bay and the entire GIWW.
5. The Service strongly urges the Corps to continue coordination with EPA and Alcoa to assess the ongoing mercury contamination issues associated with the Alcoa/Point Comfort facility. Future restoration associated with the Matagorda Channel Improvement Project could be negatively impacted as a result of the ongoing contamination and we request the Corps provide timely updates regarding the results of ongoing monitoring efforts.
6. All new work and maintenance material should be thoroughly tested for contaminants using the standards outlined in the EPA's Inland Testing and Ocean Dumping Manuals prior to being used in any beneficial use projects, placement in upland confinement, or offshore disposal sites. Should data suggest toxic levels of contaminants are present, the Service recommends disposal of the material in accordance to EPA guidelines and within an approved landfill site.
7. The Service strongly supports long term solutions where sediments are responsibly returned to the aquatic ecosytem. New material from deepening or widening measures is usually suitable for island construction, while finer dredged materials and sands may be used for marsh or sand mound creation or restoration. The Service can assist with appropriate location and design of new island(s), marsh, mound, or terracing projects within and outside of the immediate study area. Island specifics may include construction of a 2 to 12-acre island, approximately 8ft above mean high water or flood stage at least one half mile (preferably one mile) or offshore in a nearby bay. The island should include a sloping sand beach, preferably protected by a rock breakwater structure similar in design to Evia Island in Galveston Bay. Fully coordinate and vet all island and marsh design plans through the ICT prior to commencement of any construction.
8. We recommend presence/absence seagrass surveys be conducted in areas where seagrass habitat is suspected prior to construction or dredging for any project elements. Survey findings should be submittedto the Corps MSC and Seagrass ICTs for reveiw. Impacts to seagrass habitat should be avoided. Coordination with the Corps'Seagrass ICT will ensure proper survey protocols and protection measures are implemented. Additionally, any dredge material identifyed as beneficial use for seagrass habitat should be coordinated with the ICT prior to the depostion of matieral.

9. Any beach nourishment features will be thoroughly coordinated and vetted through the ICT and specifically the Service as critical habitat modifications would likely need to undergo formal consultation pursuant to Section 7 of the Act. However, general beach placement guidelines will need to be adhered to (and may not be limited to the following): material placed on the beach will be beach quality sand consistent in grain size, color and composition with the existing beach, and free of hazardous contaminants with a gradual slope to minimize scarping.
10. Specific to the whooping crane, the Service has the following general recommendations: no work is to be done in designated critical habitat. Project equipment that may be a collision hazard (guy wires that support dredging equipment, telecommunication towers on dredges, antenna or similar items located on dredges) will be marked using red plastic balls or other suitable marking devices sized and spaced, and lighted during inclement weather conditions when low light and/or fog is present and implemented from October 1 through April 30. A Spill Response Plan will be prepared and implemented prior to the onset of construction activities. These actions do not alleviate the Corps responsibility of evaluating project actions and initiating formal Section 7 consultation and should not be construed as such.
11. The Service encourages the Corps to initiate coordination during the design phases of the project and prior to the commencement of any construction activities in Matagorda Bay so the site specific best management practices (BMPs) can be developed. Measures should be implemented to avoid or minimize the adverse effects of pollution, sedimentation, and erosion by limiting soil disturbances, scheduling work when the fewest number of fish are likely to be present, managing likely pollutants, and limiting the harm that may be caused by accidental discharges of pollutants and sediments. BMPs attempt to minimize impacts to fish and wildlife species within the immediate construction and nearby areas and may consist of floating turbidity curtains, limiting certain construction activities to daylight hours, limiting the use of or shielding lights at night, no vegetation removal or soil disturbance should be allowed outside of the project area, removal of mature trees providing soil or bank stabilization should be coordinated with the Service and TPWD, erosive banks should be stabilized using bioengineering solutions and minimize the use of riprap, and using monitors in open water areas to identify sensitive species.
12. Construction of any improvement features (as defined on page 1) shall occur at least 1,000 feet away from a colonial waterbird rookery site during the breeding season of February 1 to September 1.
13. Avoid contact with any colonial waterbird rookery sites that may be within the project area. These sites are most likely active February 1 through September 1.
14. Newly created marsh sites shall be planted as early as possible to minimize erosion. Plants and planting schedules should be fully vetted and coordinated with the ICT. The Service may recommend delayed plantings so as to allow for natural vegetative recruitment and threatened and endangered species utilization when possible.
15. Any newly created sand mound projects shall be placed in low energy wave environments, include wave protection measures (e.g. temporary erodible berms), and be constructed to mitigate wave fetch.
16. Avoid impacts to all existing marshes. If the Corps deems impacts to be unavoidable, the Service recommends mitigation for any direct or indirect wetland impacts with full compensation as coordinated with the ICT.
17. The Corps shall initiate coordination with NMFS regarding EFH, sea turtle impacts, and mitigation issues within the project area.
18. Cumulative effects from this and the Texas Coastal Study project must be considered when developing project features and mitigation plans. We recommend the federal sponsor along with the Corps work in coordination with counterparts from the Texas Coastal Study to develop complimentary project features and mitigation plans.

19. The Service supports acquisition, restoration and preservation of natural resources within the project area and is willing to assist the Corps in identifying suitable areas in need.
20. Should this project move to the design and construction phases, the Service recommends the Corps evaluate the project's effects on threatened and endangered species and other natural resources by using the IPaC system at http://ecos.fws.gov/ipac/and initiate any necessary consultation procedures pursuant to Section 7 of the Act.
21. The Corps should identify and protect areas where shoreline erosion is imminent as a result of the channel's widening efforts. Modeling of current and future anticipated vessel traffic along with projected hydrodynamics should provide a fundamental analysis identifying shoreline impacts from the proposed project. The Service supports protecting shorelines using non-structure or living shoreline methods as an alternative to hard structures such as bulkhead or riprap. However, we are not opposed to the use of hard structures should the identified shorelines need additional protection from increased wave fetch and future erosion. The Service further recommends the Corps coordinate with the MSC ICT when making these shoreline protection determinations.
22. The Corps and the CPA should work with local industry and shipping companies to develop a comprehensive and environmentally responsible MSC wide DMMP that uses sediment responsibly for the foreseeable future. The creation and modification of placement areas are costly alternatives and more times than not, is the preferred alternative. The Service's National Wildlife Refuge System has nearby refuges that would greatly benefit from dredge material and barging the material out of the study area should be considered as an alternative to upland or offshore disposal.
23. We recommend the Corps evaluate the selected improvement measures for impacts to units protected under the Coastal Barrier Resource Act of 1982.

We appreciate the opportunity to identify and highlight key natural resources within the project area and the fish and wildlife that inhabit them. The Service believes the recommendations in this letter will guide the Corps in developing an environmentally sound project that eliminates or significantly reduces negative impacts natural resources within the project area. We look forward to working with the Corps and our partners on the ICT to further define the alternatives and develop a Tentatively Selective Plan that meets the goals of the project while remaining environmentally responsible. Please contact staff biologist, Donna Anderson or myself at 281-286-8282 with any questions.

Sincerely,

Charles Ardizzone
Field Supervisor

Cc: Winston Denton, TPWD
Rusty Swafford, NMFS
Barbara Keiler, EPA

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In Reply Refer To:
FWS/R2/02ETT
X00-2017-CPA-
0007

July 10, 2019

Colonel Lars Zetterstrom
District Commander
Attention: Mr. Harmon Brown
Galveston District, U.S. Army Corps of Engineers
Post Office Box 1229
Galveston, Texas 77553-1229

Dear Colonel Zetterstrom:

The U.S. Fish and Wildlife Service (Service) is collaborating with the U.S. Army Corps of Engineers (Corps) on the evaluation of the "Matagorda Ship Channel Expansion Channel Improvement Project (MSCIP)" located in Calhoun and Matagorda Counties, Texas. This project aims to improve ship movement throughout the 26-mile channel to reduce maritime transportation costs, increase operational efficiencies of commodities moving through the Port of Port Lavaca-Point Comfort, and to improve navigation safety. The alternatives under evaluation are similar to those previously evaluated by the 2009 Matagorda Ship Channel Improvement Project Environmental Impact Statement; however, new impacts, mitigation modeling, and a revised dredge material management plan are expected under the new project. A Notice of Intent was subsequently filled on December 23, 2016 to begin the current MSCIP. The Corps evaluated an array of ship channel improvement alternatives including: deepening and widening portions of existing channels; relocation of existing or creation of new turning basins; addition of jetty/hard structures; and creation of passing lanes. The need for changes to the MSC is derived from the Corps analysis of current and projected vessel transits, cargo tonnage, and capacity at existing and proposed terminal facilities. With the MSC improvements, the local sponsor, Calhoun Port Authority (CPA), hopes to eliminate inefficiencies associated with light loading allowing larger cargo vessels previously unable to access port facilities in Matagorda Bay.

The enclosed Fish and Wildlife Coordination Act Report (FWCAR) is presented herein to provide the Service's comments and recommendations regarding the MSCIP Study while identifying planning constraints that may influence the Service's ability to fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This FWCAR is prepared under the authority of the FWCA; and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA. The Service will provide copies of the FWCAR to the National Marine Fisheries Service (NMFS) and the Texas Parks and Wildlife Department (TPWD); if any comments are received, we will forward them under a separate cover. Comments in this

FWCAR are also provided under the Endangered Species Act (Act) of 1973 and the Migratory Bird Treaty Act (MBTA) of 1918.

The FWCA identifies and highlights key natural resources and provides avoidance and minimization measures for fish and wildlife within the Study area. The Service believes the recommendations in this report will guide the Corps in significantly reducing negative impacts to natural resources within the project area while still promoting the navigation goals of the study. We look forward to working with the Corps to refine the Tentatively Selected Plan during the Planning, Engineering, and Design phase of the Study. Please contact staff biologist, Donna Anderson, or myself at 281-286-8282 with any questions.

Sincerely,

Charles Ardizzone
Field Supervisor

Cc: Rusty Swafford, NMFS
Rebecca Hensley, TPWD
Paul Kaspar, EPA

United States Department of the Interior

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In Reply Refer To:
FWS/R2/02ETT
X00-2017-CPA-
0007

June 6, 2019

Colonel Lars Zetterstrom
District Commander
Attention: Mr. Harmon Brown
Galveston District, U.S. Army Corps of Engineers
Post Office Box 1229
Galveston, Texas 77553-1229

Dear Colonel Zetterstrom,

The U.S. Fish and Wildlife Service (Service) is collaborating with the U.S. Army Corps of Engineers on the evaluation of the "Matagorda Ship Channel Expansion Channel Improvement Project (MSCIP)" located in Calhoun and Matagorda Counties, Texas. This project aims to improve ship movement throughout the 26-mile channel reducing maritime transportation costs, increase operational efficiencies of commodities moving through the Port of Port Lavaca-Point Comfort, and to improve navigation safety.

In May 2019, our office coordinated with National Marine Fisheries Services (NMFS) regarding bay bottom impacts resulting from the MSCIP Tentatively Selected Plan (TSP). Although we cannot not represent or speak for NMFS, we are expressing our concerns related to impacts to Service trust resources associated with TSP. For many years, the Service voiced concerns relating to the Corps' continued use of in-bay unconfined disposal of dredge material and the detrimental effects this practice has on fish and wildlife resources in Texas bays. With respect to the MSCIP, our concern lies with the Dredge Material Management Plan and the newly developed Least Cost Plan (Plan) that seeks to use unconfined disposal for the majority of dredged material over the project's 50-year life span. The Plan proposes to create 17 new unconfined in-bay disposal sites covering nearly 3,000 acres of open bay bottom and oyster reef/shell habitat. The new sites will accommodate 66% (14 mcy) of the new work material and 75% (114.2 mcy) of the maintenance material over the life span of the project. Currently, the Corps disposes of dredge material using in-bay placement areas located on the east side of the MSC, off-shore ocean disposal sites, and occasional placement at Chester Island to nourish eroding shorelines.

The current Plan removes the majority of restoration, all marsh creation, and beach nourishment features negotiated with the natural resource agencies during previous channel deepening and widening efforts. When assessing impacts associated with large navigation channel deepening and widening projects, the Service looks for an overall gain of ecological benefits across the landscape typically fostered by the creation of features benefiting trust fish and wildlife species over the life of the project. After reviewing the MSCIP and the Plan, the Service is not able to identify any provisions for ecological gain proposed within Matagorda Bay as a result of this project. However, there are impacts to almost 3,000 acres of bay bottom. We believe there has been inadequate or incomplete modeling assessing impacts: to fish and wildlife and their habitat; designs for a placement area located on top of oyster reef; potential significant impacts to seagrasses along the western Matagorda Bay shoreline; and salinity and hydrodynamic impacts to shoreline wetlands, oysters, fish, and wildlife within the Bay system. The Plan identified one provision for the beneficial use of dredge material over the 50-year life of the project where 11% (2.3 mcy) of the total new work and 8% (12.9 mcy) of the total maintenance material will be placed on Chester Island. While this material is needed to compensate for the severe erosion caused by MSC vessel traffic, the Corps failed to propose additional long-term stabilization measures to protect Chester Island as recommended by a recent study commissioned by the Texas Audubon Society and requested by the Service.

According to the Plan, the newly proposed sand engine (SE) is necessary to protect and stabilize land surrounding the jetty. This feature will dispose of both new work (2.3 mcy) and maintenance (9.0 mcy) material off shore of Matagorda Peninsula. We are not aware of any studies demonstrating the need for the SE nor have we reviewed a cumulative effects analysis for the SE, jetty deficiencies, or the channel improvements. While the Corps claims the SE will provide nourishment to Matagorda Peninsula, we have not found any evidence to support the claim and therefore assume little ecological benefit from this feature. In any case, the Service has adamantly recommended beneficial use of dredge material to mitigate the impacts to bay bottom and wetland habitats, which have been largely ignored under both the MSCIP and Matagorda Bay Jetty Stabilization studies.

The Corps own Engineering with Nature (EWN) initiative provides for sustainable delivery of economic, social, and environmental benefits associated with water resource infrastructure (Bridges, et al., 2014; Gerhardt-Smith & Banks, 2014; EWN, 2016). Environmental restoration elements are an integral element of any project as the method of disposing of the dredged material and can consist of beaches, dunes, seagrass beds, coral and oyster reefs, barrier islands, salt marshes, freshwater wetlands and fluvial flood plain, and maritime forests. These landscape features provide habitat for fish and wildlife, recreational opportunities, and reduced coastal erosion and land loss due to natural and anthropogenic influences. Continuing the practice of open in-bay disposal in Matagorda Bay given the Corps recent emphasis to create nature based landscape features is a contradiction in principles and should be reevaluated and revised in the Least Cost Plan.

To mitigate impacts associated with the deepening and widening of the MSC and provide an overall net benefit to the ecosystem, the Service recommends the Corps develop a plan incorporating marsh, bird island, seagrass bed creation, beach nourishment, oyster reef restoration or creation, and Chester Island stabilization features. Combined, these features could utilize the majority of new work and maintenance material budgets and minimize the need for in-bay unconfined dredge material placement.

Thank you for your coordination with the Service on this project. If you have questions or need additional information regarding these comments, please contact Donna Anderson, staff biologist, at 281/212-1505.

Sincerely,

Charles Ardizzone
Field Supervisor

Cc: Rusty Swafford, NMFS
Rebecca Hensley, TPWD

Citations

Bridges, T., Lillycrop, J., Wilson, J. R., Fredette, J. T., Suedel, B. C., Banks, C. J., & Russo, E. J. (2004). Engineering with nature promotes triple-win outcomes. *Terra et Aqua*(135), 17-23.

EWN (Engineering with Nature). (2016). *Engineering with nature*. Retrieved May 7, 2019, from Engineering Research and Development Center: https://ewn.el.erdc.dren.mil/

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Matagorda Ship Channel Expansion Channel Improvement Project
Feasibility Study, Calhoun and Matagorda Counties

Fish and Wildlife Coordination Act Report

Submitted to:
Galveston District
U.S. Army Corps of Engineers

Prepared by:
Texas Coastal Ecological Services Field Office
Houston, Texas

Reviewed by:
Chuck Ardizzone
Project Leader

U.S. Fish and Wildlife Service
Region 2
Albuquerque, New Mexico
July 10, 2019

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List of Acronyms

Act	Endangered Species Act
BMP	Best management practices
CPA	Calhoun Port Authority
Corps	U.S. Army Corps of Engineers
DEIS	Draft Environmental Impact Statement
EPA	Environmental Protection Agency
FWCAR	Fish and Wildlife Coordination Act Report
GIWW	Gulf Intercoastal Water Way
GOM	Gulf of Mexico
ICT	Interagency coordination team
IPaC	Information for Planning and Consultation
MSC	Matagorda Ship Channel
MBTA	Migratory Bird Treaty Act
MLLW	Mean Lower Low Water
NAWMP	National American Waterfowl Management Plan
NER	National Ecosystem Restoration
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRDA	Natural Resource Damage Assessment
NWR	National Wildlife Refuge
ODMDS	Ocean dredge material disposal site
PED	Planning, Engineering and Design
PAL	Planning Aid Letter

Plan	Least Cost Plan
SE	Sand engine
Service	U.S. Fish and Wildlife Service
TPWD	Texas Parks and Wildlife Department
TSP	Tentatively Selected Plan
TxGLO	Texas General Land Office
WRDA	Water Resources Development Act
WMA	Wildlife Management Area

Executive Summary

Matagorda Bay, the third largest bay system in Texas, historically rich in natural resources, has a 26-mile ship channel with the northern reach located in Calhoun County and the southern reach and entrance channel in Matagorda County. The Matagorda Ship Channel (MSC) is comprised of an entrance channel approximately four miles long from the Gulf through a man-made cut across Matagorda Peninsula, with dual jetties at the entrance from the Gulf. The Gulf Intracoastal Waterway (GIWW) intersects the channel approximately 2.5 miles north of the cut through Matagorda Peninsula. The bay-side channel is approximately 26 miles long, across Matagorda and Lavaca Bays with a turning basin at Point Comfort. The channel is currently authorized to a project depth of 38' plus two feet of advance maintenance depth and an additional two feet of allowable over-depth.

The Calhoun Port Authority (CPA) of Point Comfort, Texas is designated as the non-Federal sponsor and cost shares this study with the Corp of Engineers (Corps). Channel width and depth, available berthing, and increased vessel size led to navigational challenges and economic issues affecting the CPA. The Corps analyzed three alternatives, including the no action alternative, where the remaining alternatives differed with regard to channel depth and the construction of passing lanes. The Tentatively Selected Plan (TSP) will construct a new 1,200' diameter by 41' deep turning basin, dredge the MSC to a depth of 47' and width of 350' for the main channel and a depth of 49' (plus two feet of advanced maintenance depth and an additional two feet of allowable over-depth) and width of 600' at the Gulf entrance. The CPA is supportive of features selected in the TSP thus allowing Port users to import and export products via larger vessels. The MSC lies within a critically important landscape known for its ecological and economic significance on both local and national scales.

Based on information presented in the Draft Environmental Impact Statement (DEIS) (Corps, 2018), the Corps estimates the conversion of 594 acres of open bay bottom and approximately 200 acres of offshore bottom into deep-ship channel bottom will occur as a result of the TSP and the Least Cost Plan (Plan) for the proposed deepening and widening of the MSC. The proposed in-bay unconfined Placement Areas (PA) would cover 2,673 acres of bay bottom, while the new ocean dredged material disposal site (ODMDS) would cover 2,663 acres offshore (the existing 453-acre ODMDS would continue to receive maintenance material.) The DEIS also indicates the Sand Engine located at the entrance channel southwest of the jetties would impact 165 acres of ocean bottom. Construction of the TSP would result in a direct loss of 129.2 acres of oyster reef habitat by dredging and the Corps indicates a mitigation plan will be developed during the PED phase of the Study.

Overall, we do not anticipate a positive environmental gain to the natural resources (wetlands, bay bottom, sea grasses, oysters, beach, including piping plover critical habitat) in Matagorda Bay due to the Corps selections of the TSP and the "Least Cost Dredge Material Management Plan." This is in stark contrast to previously coordinated efforts during the 2009 MSCIP where the Corps agreed to a suite of environmental restoration and creation features including in-bay marshes, beach nourishment, shoreline protection, oyster reef creation, and bird island nourishment that aimed to offset the negative impacts from the proposed navigation improvement project. Navigation expansion projects such as the Houston Ship Channel mitigate for direct and indirect impacts to the Service's trust resources providing offsetting or a net gain in environmental benefits in Galveston Bay while avoiding in-bay unconfined dredge material disposal.

This MSCIP Fish and Wildlife Coordination Act Report (FWCAR) provides the Service's comments and recommendations while identifying planning constraints that may influence the Service's ability to fulfill our reporting responsibilities under Section 2(b) of the Fish and Wildlife Coordination Act (FWCA, 48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This FWCAR is prepared under the authority of the FWCA; and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA. The Service will provide copies of the FWCAR to the National Marine Fisheries Service (NMFS) and the Texas Parks and Wildlife Department (TPWD); if any comments are received, they will be forwarded under a separate cover. Comments in this letter are also provided under the Endangered Species Act (Act) of 1973 and the Migratory Bird Treaty Act (MBTA) of 1918.

Our evaluation is based on the current data, modeling, and analyses made available by Corps sources and Service files. The Service understands construction of the project is subject to Congressional approval and TSP funding will occur sometime in the future with or without project modifications. Additional Service involvement is necessary for subsequent detailed planning, habitat analysis, engineering, design, and construction phases of each planning effort is required to fulfill our responsibilities under the FWCA. Since there may be a significant time lag between the study and construction phases, the Service recommends the Corps reinitiate coordination under a separate FWCA agreement when Planning, Engineering, and Design (PED) phase funding is available. This will allow the Service to conduct a comprehensive review of the project footprint, impacts, and update recommendations based on environmental conditions at the time of construction.

Introduction

Regulatory Background

The U.S. Fish and Wildlife Service (Service) is mandated to provide expertise during the planning and development of major federal projects, to ensure fish and wildlife resources are conserved, and that impacts to these resources are avoided or minimized. The Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; the Act of March 10, 1934; Ch. 55; 48 Stat. 401), requires consultation with the Service and State fish and wildlife agencies where the "waters of any stream or other body of water are proposed or authorized, permitted or licensed to be impounded, diverted or otherwise controlled or modified" by any agency under a Federal permit or license. Consultation is to be undertaken for the purpose of "preventing loss of and damage to wildlife resources." Second, The Rivers and Harbors Act of 1938 (33 U.S.C. 540, and other U.S.C. sections; Chapter 535, June 20, 1938; 52 Stat. 802), provides for wildlife conservation to be given "due regard" in planning federally authorized water resource projects.

The Fish and Wildlife Coordination Act (FWCA) provides a basic procedural framework for the orderly consideration of fish and wildlife conservation measures to be incorporated into Federal and federally permitted or licensed water development projects. The principle provisions of the Coordination Act include:

1. A statement of Congressional purpose that fish and wildlife conservation shall receive equal consideration with other project features;
2. Mandatory consultation with wildlife agencies to achieve such conservation;
3. Full consideration by action agencies of the recommendations resulting from consultations;
4. Authority for action agencies to implement such recommendations as they find acceptable.

Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531-1544, 87 Stat. 884, as amended) requires Federal agencies to insure that any action authorized, funded or carried out by them is not likely to jeopardize the continued existence of listed species or modify critical habitat. The Migratory Bird Treaty Act of 1918 (16. U.S.C. 703-712; Ch. 128; July 13, 1918; 40 Stat. 755, as amended) establishes a Federal prohibition, unless permitted by regulations, to "pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, at any time, or in any manner, any migratory bird (e.g. waterfowl, shorebirds, birds of prey, song birds, etc.) included in the terms of this Convention…for the protection of migratory birds…or any part, nest, or egg of any such bird."

The purpose of this FWCAR is to provide the Service's comments and recommendations regarding trust resources within the Study area while identifying planning constraints that may influence the Service's ability to fulfill our reporting responsibilities under Section 2(b) of the FWCA (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.). This report is prepared under the authority of the FWCA; and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

The Service will provide copies of this report to the Environmental Protection Agency (EPA), National Marine Fisheries Service (NMFS) and the Texas Parks and Wildlife Department

(TPWD); if any comments are received on this report they will be forwarded under a separate cover letter. Our comments in this FWCAR are focused on the alternatives under consideration by the Corps and the effects on the trust fish and wildlife resources within the overall project footprint.

The Service received no comments on the Planning Aid Letter (PAL) (2017) provided to NMFS and TPWD.

Project Background and Description

The Service is collaborating with the U.S. Army Corps of Engineers (Corps) on the evaluation of the "Matagorda Ship Channel Improvement Project (MSCIP) Calhoun and Matagorda Counties, Texas (**Figure 1**). The study area contains one major estuarine system (Matagorda Bay) and three rivers (Lavaca River, Colorado River, and Tres Palacios River). The Gulf Intercoastal Water Way (GIWW) flows through the study area creating a complex movement of water in the bay. The study area also encompasses a portion of the northern Gulf of Mexico. The Matagorda Ship Channel (MSC) extends about four miles into the Gulf and is confined to the inner continental shelf area. The entrance channel is a high-energy environment flanked by two man-made rock jetties. The barrier islands and peninsula help make the Matagorda Bay system a relatively low-energy environment.

The MSC was previously evaluated under U.S. Department of the Army permit 24071 for the Calhoun County Navigation District, for the Section 204(f) Assumption of Maintenance, and for the Matagorda Ship Channel Project Jetty Deficiency Study resulting in a 2009 Final Environmental Impact Statement (FEIS), a 2014 report, and a 2017 Environmental Assessment respectively. The Service has been extensively involved with prior coordination efforts with these and other projects in Matagorda Bay.

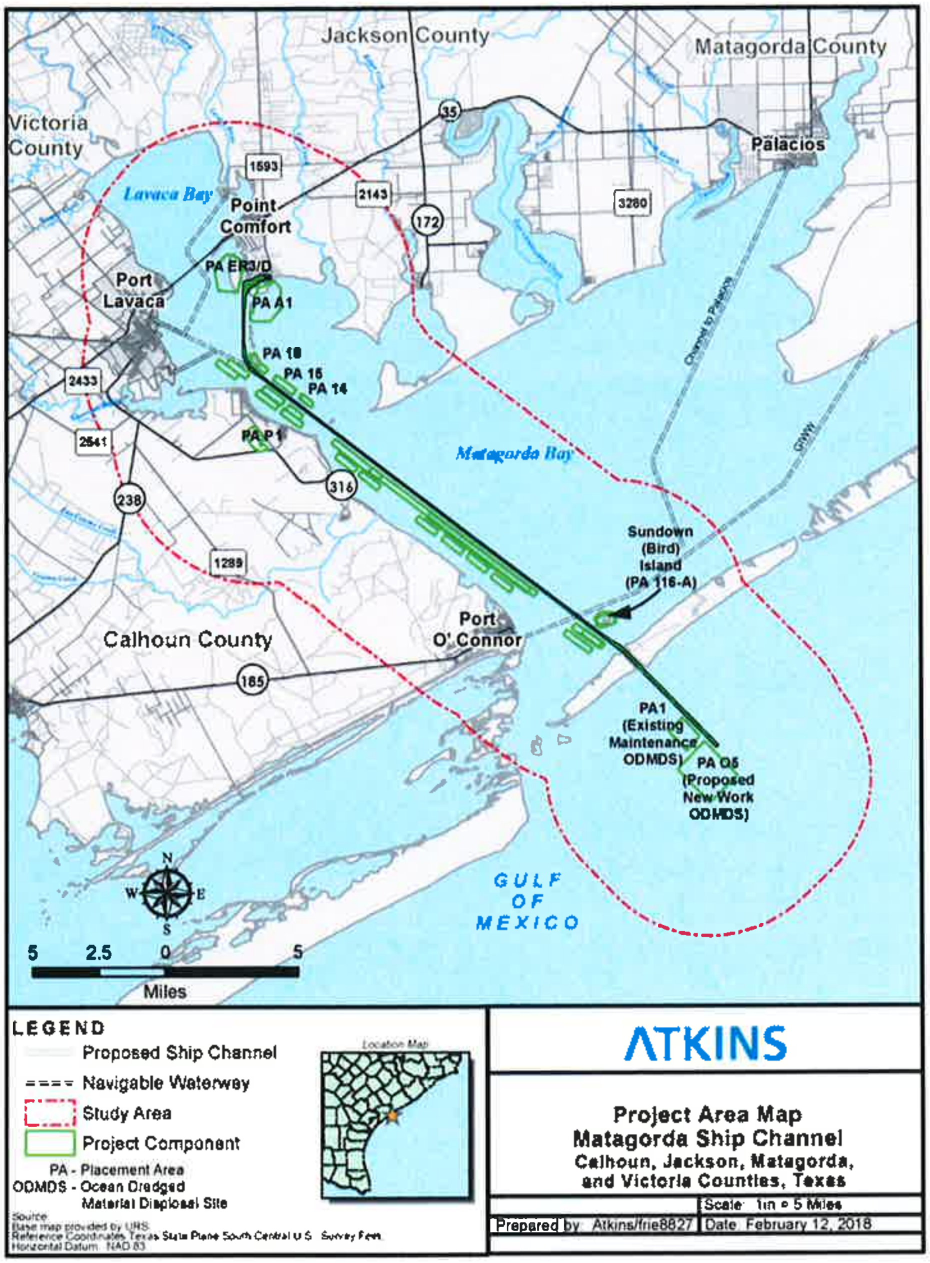

Figure 1 Matagorda Ship Channel Study Area
Source: Corps, (2018)

MSC ship pilots indicate transportation delays due in part to the strong jetty currents; daylight hour restrictions to vessels with a length of 639 feet; ocean going traffic travels one way; no passing of ocean-going vessels; no movement of any vessel drafting within 4 feet of the maximum allowable draft when currents are greater than 4 knots; and vessels within a four feet maximum allowable draft are restricted to daylight only. These restrictions are due to the current channel configurations (**Table 1**) and have proved to be economically burdensome for the CPA.

As a result, the CPA partnered with the Corps to evaluate alternatives that seek to alleviate these navigation issues.

Channel Section	Authorized Depth[1] (ft)	Width (ft)	Length (mi)
Offshore & Jetty Channel	40	300	3.2
Channel to Point Comfort	38	200	20.9
Approach Channel to Turning Basin	38	200	1.1
Point Comfort Channel to Turning Basin	38	1,000	1,000 ft
Point Comfort Turning Basin Extensions (North & South)	38	300	1,279 ft
[1] Authorized depth referenced as MLLW			

Table 1 Current dimensions of the MSC

During the initial phases of the Study and in consultation with the local sponsor, the Corps identified the following problems within the Study area:

- Create a channel to accept vessel whose drafts are greater than 38'
- Create a channel to accommodate fully loaded deep draft vessels
- Create a channel that accepts vessels moving in both directions simultaneously 24 hours a day
- Create a turning basin to accept large vessels

The Corps defined the following objectives for the Study area:

- Improve the navigational efficiency and safety of the deep-draft navigation system from 2024-2074
- Manage environmental quality effects in the project area beginning 2024 through 2074
- Establish environmentally suitable placement areas (PA) and utilize dredged material beneficially for beginning 2024 through 2074

The Study is authorized under Public Law 91-611; Title II- River and Harbor and Flood Control Act of 1970, Section 216, dates December 31, 1970, 33 U.S.C.§ 549a. The non-federal sponsor for this study is the Calhoun Port Authority (CPA) of Point Comfort, Texas. As a result, the local sponsor, CPA, signed a cost-share agreement with the Corps in August 2016. This resulting feasibility study is being conducted under the Corps 3x3x3 Rule limiting total project costs to $3 million, must be conducted within three years, and have three concurrent levels of review. The Study began in FY17 with completion expected in late FY19.

The Service has extensive involvement with the MSC as outlined in **Table 2**. In relation to the current study, the Service's PAL dated September 25, 2017 details the vast natural resources, previous deepening and widening efforts of the MSC, environmental challenges related to the Alcoa facility, and the economic significance of the MSC to the local ports and to the nation. The Service continues to stand by those and the additional comments made in the most recent letters dated June 6, 2019 and July 3, 2018. To streamline this report, the Service only discusses new information gathered and reported regarding the MSC project as of July 03, 2018. The Service previously submitted a FWCAR regarding the Matagorda Bay Jetty Deficiency Project on March 30, 2018. The Corps choose to assess the jetty deficiencies under a separate study; however, cumulative impacts from both studies should be evaluated on the Matagorda Bay system under the current Study.

Table 2 Previous Service involvement with the MSC

Document Name	Year
Recommendations for Dredge Material Maintenance for the MSC	2001
Department of Army Permit 24071 Scoping Comments (U.S. Fish and Wildlife Service, 2006)	2006
Department of Army Permit 24071 Response Letter (U.S. Fish and Wildlife Service, 2007)	2007
Draft Environmental Impact Statement Response Letter (U.S. Fish and Wildlife Service, 2007)	2007
Department of Army Permit 24071 Additional Comment Letter (U.S. Fish and Wildlife Service, 2007)	2007
Revised Biological Assessment Response Letter (U.S. Fish and Wildlife Service, 2008)	2008
Biological Assessment Response Letter (U.S. Fish and Wildlife Service, 2009)	2009
Permit Application SWG-2006-00092 Letter (U.S. Fish and Wildlife Service, 2009)	2009
Planning Aid Letter (U.S. Fish and Wildlife Service, 2017)	2017
Fish and Wildlife Coordination Act Report Matagorda Ship Channel Project Deficiency Study, Matagorda County, Texas (U. S. Fish and Wildlife Service, 2018)	2018
Draft Environmental Impact Statement Response Letter (U.S. Fish and Wildlife Service, 2018)	2018
In-bay Disposal Letter (U.S. Fish and Wildlife Service, 2019)	2019

Alternatives under Consideration

The Corps evaluated three alternatives including a no action alternative (**Table 3**). Alternatives A and B are similar in that both evaluate the channel at varying depths and widths; construct a new 1,200' diameter turning basin; however, only Alternative B includes passing lanes. Alternatives were evaluated based on economic and environmental considerations and are similar to the 2009 Study. The Corps' Tentatively Selected Plan (TSP) will widen the in-bay current channel to 350 feet, the outer channel to 600 feet, deepen the channel to -47 feet Mean Lower Low Water (MLLW), and construct a 1200-ft turning basin (**outlined in red in Table** 3). Passing lanes will not be constructed as part of the TSP. The CPA acknowledges and approves of the TSP and will not offer a locally preferred plan as an alternative to the TSP. Under the new Least Cost Plan Dredged Material Management Plan (March 2019) the proposed deepening and widening will generate approximately 21.0 million cubic yards (mcy) of new work and 154 mcy of maintenance material over the 50-year span of the project in the Lavaca Bay, Matagorda Bay, and Offshore reaches.

Table 3 Alternatives under consideration

Alternative	Depth Main / Entrance (MLLW)	Width Main / Entrance	Turning Basin	Passing Lane
No Action Plan	38' / 40'	200' / 300'	~1,000'	NO
A	41' / 43'	350' / 600'	1,200'	NO
	43' / 45'	350' / 600'	1,200'	NO
	45' / 47'	350' / 600'	1,200'	NO
	47' / 49'	350' / 600'	1,200'	NO
	49' / 51'	350' / 600'	1,200'	NO
	51' / 53'	350' / 600'	1,200'	NO
B	41' / 43'	350' / 600'	1,200'	YES
	43' / 45'	350' / 600'	1,200'	YES
	45' / 47'	350' / 600'	1,200'	YES
	47' / 49'	350' / 600'	1,200'	YES
	49' / 51'	350' / 600'	1,200'	YES
	51' / 53'	350' / 600'	1,200'	YES

If authorized, the Project would take 3 years to construct and could begin in fiscal year 2024.

Following construction, the Corps would thereafter maintain the Federal navigation channel and the turning basin. The CPA, with the exception of increased dredged material quantities and new placement areas, would maintain port access channels at the new channel design dimensions. The total estimated dredge quantities for project actions assume maintenance for a 50-year period.

The Corps anticipates using dredging equipment consistent with the amount of material, distance to disposal or PA, environment wave energy and the depth of access to disposal or PA. We expect the Corps will use hydraulic pipeline dredge methods in Lavaca and Matagorda Bay, hopper or clamshell dredge in portions of Matagorda Bay, and hopper or pipeline dredge for the offshore reaches.

The Corps held six formal coordination meetings (April 2017 through May 2018) with the natural resource agencies regarding the MSCIP. While we understand the Corps' accelerated timelines under the 3x3x3 rule, we believe this study could have used additional formal coordination meetings given the level of natural resources at risk from channel construction.

Fish and Wildlife Resource Concerns

Fish and wildlife resource concerns in the study area include ecosystem-wide hydrologic alterations associated with construction of major navigation channels within the study area, the continued loss of coastal fresh and brackish marsh, and loss of beach habitat. The Service remains concerned over water-quality degradation from agricultural and urban run-off, and industrial discharges into Matagorda and Lavaca Bays.

Sea level rise, shoreline retreat and the loss or transition of coastal wetlands remains the primary issues affecting Study area fish and wildlife resources. We expect future losses to be attributed to wave action, subsidence, saltwater intrusion, eustatic sea level rise, and insufficient sediment supply. Sediments supplies are notably deficient along the mid Texas coast, mainly due to ship channel dredging, damned upstream rivers, and the presence of jetties and this trend is expected to continue. Increasing acreages of open water and decreased wetland quality may lead to significant declines in coastal fish and shellfish production, limited carrying capacity for migratory waterfowl, wading birds, migratory birds, alligators, furbearers, and game mammals.

Deepening and widening efforts in deep-draft channels have been linked to increased salinity levels, water levels, and duration of high tides in some areas (U.S. Fish and Wildlife Service, 2010). The increased salinity stresses shoreline fresh and intermediate wetland vegetation, contributing to plant death and ultimately leads to conversion of wetlands to shallow open water. Those hydrologic changes result in the rapid conversion of interior low-salinity wetlands to open water and brackish wetlands. Once those changes have occurred, rates of loss decrease as the most vulnerable areas have become open water. Further, saltwater intrusion continues to impact sensitive low-salinity wetland areas during drought-induced high salinity periods. Changes to wetland habitats may stress fish and wildlife leading to decreased breeding productivity, limitations on sheltering and foraging, increased predation opportunities, contributing to potential habitat abandonment. Gradual saltwater intrusion caused by sea level rise, habitat quantity and quality for freshwater fishes, waterfowl, alligators, and more freshwater-tolerant estuarine species (i.e., Gulf menhaden, white shrimp) may continue to decrease throughout most of the project area. Habitat quantity will increase for species such as brown shrimp, spotted seatrout, and black drum, which prefer brackish and saline conditions. However, continued degradation of those brackish and saline marshes may reduce production of those fish and shellfish as lifecycles for many fish and shellfish are dependent upon shallow estuarine marsh complexes.

Fisheries Resources

Estuaries are among the most productive habitats in the world because they support high primary and fisheries production (Whittaker and Likens 1973; Walme 1972). We consider the project areas estuarine habitat. Most of the economically important saltwater fishes and crustaceans spawn offshore and then use estuarine areas for nursery habitat (Herke, 1995).

The project area supports estuarine and marine fishes including bay anchovies, scaled sardine, Gulf menhaden, striped mullet, red drum, spotted seatrout, sand seatrout, Atlantic croaker, and southern flounder. The area also supports shellfishes with the dominant crustaceans expected to occur in the area as white shrimp, brown shrimp, and blue crab.

Essential Fish Habitat

The project is located within an area identified as Essential Fish Habitat (EFH) by the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA, Magnuson-Stevens Act; P.L. 104-297). The updated and revised 2005 generic amendment of the Fishery Management Plans for the Gulf of Mexico, prepared by the Gulf of Mexico Fishery Management Council, identifies EFH in the project area to be estuarine emergent wetlands, mangrove wetlands, mud, sand, shell, and rock substrates, and estuarine water column. Under the MSFCMA, wetlands and associated estuarine waters in the project area are identified as EFH for federally managed species including various life stages of brown shrimp, white shrimp, red drum, gray snapper, lane snapper, red snapper, gray triggerfish, almaco jack, greater amberjack, king mackerel, and cobia. NMFS has also identified the project area as EFH for shark species including Atlantic sharpnose, bonnethead, bull, blacktip, finetooth, scalloped hammerhead, and spinner. The 2017 Amendment 10 to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan should be consulted for additional information on habitats identified as shark EFH (https://www.federalregister.gov/documents/2017/09/07/2017-18961/atlantic-highly-migratory-species-essential-fish-habitat).

Additionally, the water bodies and wetlands in the project area provide nursery and foraging habitats for a variety of economically important marine fishery species, such as striped mullet, Atlantic croaker, gulf menhaden, spotted seatrout, sand seatrout, southern flounder, black drum, and blue crab. Some of these species are prey for other fish species managed under the Magnuson-Stevens Act by the GMFMC (e.g., mackerels, snappers, and groupers) and highly migratory species managed by NMFS (e.g., billfishes and sharks).

Estuarine marsh throughout the area is the primary type of EFH impacted by continued wetland loss and deterioration. Although an increase in some types of EFH (i.e., mud bottom and estuarine water column) would occur, an inverse but equal adverse impact would occur to more productive types of EFH (i.e., estuarine emergent wetlands). The loss of estuarine emergent wetlands would result in negative impacts to these federally managed species. Both NMFS and the NOAA's Gulf of Mexico Fisheries Management Council (U.S. Army Corps of Engineers,

2009) evaluated and provided comments regarding impacts under the previous channel improvement project measures. We recommend the Corps reinitiate coordination with both offices for furtner guidance.

Threatened and Endangered Species and Species of Concern

Federally listed threatened and endangered species and/or their designated critical habitat potentially occurring in the study area include the threatened (T) West Indian manatee, the threatened (T) piping plover and its designated critical habitat, the red knot (T), and the Aplomado falcon (E). Several species of threatened/endangered sea turtles are also known to nest and/or forage in the coastal waters of the study area. Those species include the loggerhead sea turtle (T), Kemp's ridley sea turtle (E), green sea turtle (T), leatherback sea turtle (E), and hawksbill sea turtle (E). Additionally, the saltmarsh topminnow, diamond backed terrapin, and the black rail, all at risk species, may exist in the project area. For the purposes of a conservation strategy, the Service's Southwest Region has defined "at-risk species" as those that are; proposed for listing as threatened or endangered under the Act; a candidate for listing, or; it has been petitioned by a third party for listing. The Service's goal is to work with private and public entities on proactive conservation to conserve these species thereby precluding the need to federally list as many at-risk species as possible.

According to Section 7(a)(2) of the Act and the implementing regulations, it is the responsibility of each federal agency to ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of any federally listed species. Based upon an inventory of listed species and other current information, the federal action agency determines if any endangered or threatened species may be affected by the proposed action. The Service's Consultation Handbook (http://endangered.fws.gov/consultations/s7hndbk/s7hndbk.htm) is available online for further information on definitions and process.

The Service recommends the Corps conduct a review for threatened and endangered species two years prior to construction. In order to obtain information regarding fish and wildlife resources concerning a specific project or project area, we recommend the Corps first utilize the Service developed Information, Planning, and Conservation (IPaC) System. The IPaC system is designed for easy, public access to information about the natural resources for which the Service has trust or regulatory responsibility such as threatened and endangered species, migratory birds, National Refuge lands, and the National Wetland Index. One of the primary goals of the IPaC system is to provide this information in a manner that assists project proponents in planning their activities within the context of natural resource conservation. The IPaC system can assist users through the various regulatory consultation, permitting and approval processes administered by the Service, helping achieve more effective and efficient results for both the project proponents and natural resources. The IPaC system can be found at: https://ecos.fws.gov/ipac/

Whooping Crane

The whooping crane is the tallest North American bird with males approaching 1.5 meters in height, is snowy white with black primary feathers on the wings, and a bare red face and crown.

These birds form monogamous pairs for life and all whooping cranes return to the same breeding territory in Wood Buffalo National Park, Canada to nest in late April or May. Most birds re-enter the wintering grounds of Aransas National Wildlife Refuge (ANWR) by late October to mid-November where they migrate singly, in pairs, in family groups or in small flocks. The flock is closely monitored on the wintering grounds as climactic events, food resources, and human disturbance can interfere with spring migration. The broader landscape of and surrounding ANWR is comprised mainly of salt marshes dominated by salt grass, saltwort, smooth cordgrass, glasswort, and sea ox-eye daisy with whooping cranes utilizing similar marshes outside the historic wintering grounds.

Aplomado Falcon
Listed as endangered on February 25, 1986, the falcon is a medium sized falcon that is larger than a kestrel or merlin but smaller than the peregrine. Its total length is about 15 to 18 inches with a wingspan of about 32 to 36 inches. Adults are characterized by rust colored underparts, a gray back, a long-banded tail, and a distinctive facial pattern (Campbell, 1995). Males and females are similar in appearance but the males are generally smaller than the females (Keddy-Hector, 2000).

Habitat consists of open grasslands with scattered trees or shrubs for hunting, roosting, and nesting, and an understory of grasslands and shrubs. They are often seen perched in trees or on taller yuccas. Falcons found in Arizona, New Mexico, Trans-Pecos Texas, and central plateaus of Mexico inhabit semi-desert grasslands with scattered mesquite and yucca. In South Texas they inhabit coastal grasslands and in eastern Mexico, savannah grasslands. The falcons have also inhabited coastal dunes, tidal flats, margins of inland marshes and riparian woodlands (Campbell, 1995). Aplomado falcon encounters seem unlikely to occur within the project area.

Piping Plover
The piping plover, federally listed as a threatened species, is a small (7 inches long), pale, sand-colored shorebird that winters in coastal Texas and may be present for 8 to 10 months annually. Piping plovers arrive from their northern breeding grounds as early as late July and remain until late March or April. They feed on polychaete marine worms, various crustaceans, insects and their larvae, and bivalve mollusks that they peck from the top of or just beneath the sand. Piping plovers forage on intertidal beaches, mudflats, sand flats, algal flats, and wash-over passes with no or very sparse emergent vegetation. Piping plovers roost in unvegetated or sparsely vegetated areas, which may have debris, detritus, or micro-topographic relief offering refuge to plovers from high winds and cold weather. They also forage and roost in wrack (i.e., seaweed or other marine vegetation) deposited on beaches. In most areas, wintering piping plovers are dependent on a mosaic of sites distributed throughout the landscape, because the suitability of a particular site for foraging or roosting is dependent on local weather and tidal conditions. Plovers move among sites as environmental conditions change, and studies have indicated that they generally remain within a 2-mile area. Major threats to this species include the loss and degradation of habitat due to development, disturbance by humans and pets, and predation.

Red Knot

The red knot, federally listed as a threatened species, is a medium-sized shorebird about 9 to 11 inches in length with a proportionately small head, small eyes, short neck, and short legs. The black bill tapers steadily from a relatively thick base to a relatively fine tip; bill length is not much longer than head length. Legs are typically dark gray to black, but sometimes greenish in juveniles or older birds in non-breeding plumage. Non-breeding plumage is dusky gray above and whitish below. The red knot breeds in the central Canadian arctic but is found in Texas during spring and fall migrations and the winter months (generally September through May).

During migration and on their wintering grounds, red knots forage along sandy beaches, tidal mudflats, salt marshes, and peat banks. Observations along the Texas coast indicate that red knots forage on beaches, oyster reefs, and exposed bay bottoms, and they roost on high sand flats, reefs, and other sites protected from high tides. In wintering and migration habitats, red knots commonly forage on bivalves, gastropods, and crustaceans. Coquina clams, a frequent and often important food resource for red knots, are common along many gulf beaches. Major threats to this species along the Gulf of Mexico include the loss and degradation of habitat due to erosion, shoreline stabilization, and development; disturbance by humans and pets; and predation.

Gulf Coast Jaguarondi

The endangered jaguarondi has a long slender body, short legs, and sleek un-patterned fur, looks more like a large weasel or otter than a cat, and is primarily active during the day. The jaguarondi seek cover in thick, dense, thorny brushlands or chaparrals and is known to use mature forests and pasture-grasslands (Caso, 1994). The jaguarondi historically occurred in southeast Arizona, South Texas, Mexico and Central and South America as far south as northern Argentina. Today the jaguarondi has a similar distribution, but in reduces numbers, although it probably no longer occurs in Arizona (Tewes & Schmidly, 1987) and there has not been a confirmed sighting in South Texas since 1986. However historically, jaguarundis were reported from central Texas and the upper Gulf Coast, as well as from South Texas however, there is no tangible evidence to support this (Service, 2017). Therefore, Gulf Coast jaguarondi encounters seem unlikely to occur within the project area.

West Indian Manatee

Manatees occurring west of Florida and to the north of Mexico generally area considered to be strays originating from populations in either Florida or Mexico (Domning, 1986). Fertl et al., (2005) notes that traveling manatees use warm-water refuges along their migratory routes during both the early spring and late fall. The threatened West Indian manatee is known to occur in Matagorda Bay and its associated coastal waters streams, boat basins and power plant effluents. Infrequently reported because of their secretive nature, manatees migrate along the upper Texas coastal areas while the average water temperature is warm. Based on data maintained by the Texas Marine Mammal Stranding Network, over 80 percent of reported manatee sightings (1999-2011) in Texas have occurred from the months of June through November with the majority occurring in October and November. Most sightings are single individuals; however, rare sightings of calf/cow pairs have occurred between June and December. Reported manatee occurrences in Texas appear to be increasing as populations from Mexico and Florida make their way along coastal shorelines including canals and coastal marshes of Matagorda Bay. Cold weather and outbreaks of red tide may adversely affect these animals. However, human activity is the primary cause for declines in species numbers due to collisions with boats and barges, entrapment in flood control structures, poaching, habitat loss, and pollution.

Sea Turtles

There are five species of federally listed threatened or endangered sea turtles that nest and/or forage in the near shore waters, bays, and estuaries of Texas. The September 18, 2015 Memorandum of Understanding (U.S. Fish and Wildlife Service, 2015) between the Service and the National Marine Fisheries Service (NMFS) acknowledges the joint administration of marine sea turtles whereby NMFS has sole jurisdiction of sea turtles when in a marine environment and the Service shall have sole jurisdiction over sea turtles when on land. Please contact Kelly Shotts (727-824-5312) at the NMFS Regional Office in St. Petersburg, Florida, for information concerning those species in the marine environment.

When sea turtles leave the marine environment and come onshore to nest, the Service is responsible for those species. Three species, the loggerhead sea turtle (T), the green sea turtle (E), and the Kemp's ridley (E) nest in Texas during the summer months (i.e., May through November). Nesting records from the National Park Service Padre Island National Seashore in 2018 indicate 250 Kemps ridley, six loggerhead, and five green sea turtles nested along Texas beaches. Within the project area, seven Kemps ridley and one loggerhead nested on Matagorda Peninsula (D. Shaver 2018, pers. comm., 30 Aug); thus, nesting attempts could increase within the project area as each species populations increase. The primary threats to nesting beaches include coastal development and construction, placement of erosion control structures and other barriers to nesting, beachfront lighting, vehicular and pedestrian traffic, sand extraction, beach erosion, beach nourishment, beach pollution, removal of native vegetation, and planting of non-native vegetation (USFWS 2007).

Critical Habitat

Critical habitat is defined as the specific areas within the larger geographic area, occupied by the species at the time it was listed that contain the physical or biological features essential to the conservation of the endangered and threatened species. Critical habitat may also include areas not occupied by the species at the time of listing but are essential to its conservation. The Act requires Federal agencies to use their authorities to conserve endangered and threatened species and to consult with the Service about actions that they carry out, fund, or authorize to ensure that they will not destroy or adversely modify critical habitat. The prohibition against destruction and adverse modification of critical habitat protects such areas in the interest of conservation.

Critical habitat for the federally endangered piping plover lies within the study area boundaries. On July 10, 2001, the Service designated critical habitat for wintering piping plovers (Federal Register Volume 66, No. 132); a map of the critical habitat units in Texas can be found at http://criticalhabitat.fws.gov/crithab and are also located below (Figure 2). Their designated critical habitat identifies specific areas that are essential to the conservation of the species. The physical and biological features (PBFs) for piping plover wintering habitat are those habitat components that support foraging, roosting, and sheltering and the physical features necessary for maintaining the natural processes that support those habitat components. The PBFs are found in geologically dynamic coastal areas that contain intertidal beaches and flats (between annual low tide and annual high tide), and associated dune systems and flats above annual high tide.

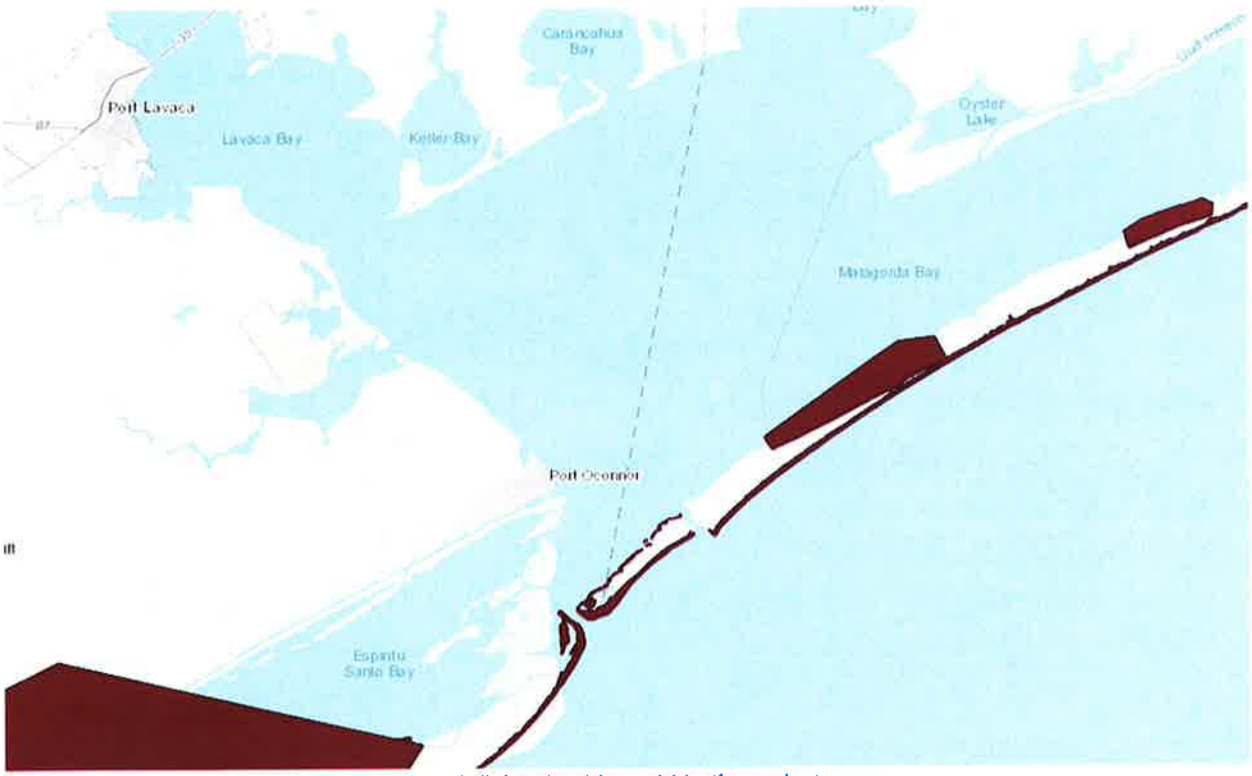

Figure 2 Critical habitat within the project area

Source: USFWS Critical Habitat Mapper

Important components of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting plovers. The Service strongly recommends the Corps evaluate the cumulative effects that all MSC modifications including the Jetty deficiency may have on critical habitat.

Migratory Bird Treaty Act

Colonial nesting waterbirds and/or seabirds commonly inhabit the habitats located in the project area. Colonies may be present that are not currently listed in the database maintained by the Texas Colonial Waterbird Society. That database is updated primarily by monitoring previously known colony sites and augmenting point-to-point surveys with flyovers of adjacent suitable habitat. Although several comprehensive coast-wide surveys have been recently conducted to determine the location of newly-established nesting colonies, we recommend that a qualified biologist inspect the proposed work site for the presence of undocumented nesting colonies during the nesting season because some waterbird colonies may change locations year-to-year.

In general, natural and dredge spoil islands host nesting colonies for most North American seabirds (Golder, Allen, Cameron, & Wilder, 2008). The Texas Colonial Waterbird Society recognizes five historic and three active colonies within the project area. Several of these sites are active, lie along the MSC (highlighted with an * below in **Table 4**), and direct and indirect impacts to these sites resulting from construction activities should be avoided during the breeding season. The Service defines the breeding season for colonial waterbirds as February 1 to September 1; however, this can vary from colony to colony therefore, site inspections to confirm that all nestlings have fledged should be conducted prior to work activity.

Approximately 21 species of colonial-nesting waterbirds (gulls, terns, herons, egrets, spoonbills, and skimmers) occur in the Matagorda Bay estuary, feeding in wetland and bay areas and nesting during the Feb – September period, primarily on two large offshore nesting islands, Chester and Lavaca Bay Spoil (Snake) Islands. The average number of breeding pairs for Lavaca Bay and western Matagorda Bay indicate a downward trend since 2001 (2001-2011 24,872 pairs and 2012-2017 20,781 pairs). Average number of species and total number of nesting pairs for these two important islands the previous five years (2013 – 2017) are as follows: Chester Island (TCWC 609-300) avg. 17,618 breeding pairs, 19 species; Lavaca Bay Spoil (63-770) (TCWC 609-121) avg. 4,172 breeding pairs, 20 species. These two nesting islands, lie along the MSC, and are the only two breeding sites for colonial waterbirds in Matagorda and Lavaca Bays, making them extremely important on the biological landscape.

On most islands, invasive predators such as rats, raccoons, and coyotes depredate nests posing a severe threat to nesting bird populations. Actions to eradicate predators have prevented extinction of vulnerable bird populations. Continued comprehensive restoration of priority islands for breeding birds is needed as many islands are still overrun by invasive species. The Service has identified eight historic colonial waterbird colonies within the project area. Six of these islands or sites are no longer suitable due to the presence of invasive predator species, overgrown vegetation, lack of open ground nesting habitat, erosion or subsidence, or the lack of available forage sites in close proximity to nesting habitat.

Table 4 Colonial waterbird colonies in or near the project area

Colony Name	TCWBS Code
Mouth of Lavaca River	609-122
Point Comfort-Alcoa	609-120
Mouth of Chocolate Bayou	609-221
Lavaca Bay Spoils 51-63	609-220
*Lavaca Bay Spoils 63-77	609-121
Matagorda Bay Spoil 39-51	609-240
*Chester Island	609-300
Olivia Shell Bars	609-143

The construction of bird islands using new work dredged matieral is well documented, but it was not until the 1970s that the importance of this dredged material to nesting waterbirds was realized (Golder, Allen, Cameron, & Wilder, 2008). Dredge spoil islands created out of local sand and clays provide immediate nesting opportunties for bare ground nesters such as terns and skimmers. Successional vegetation including mangroves, baccharis, and other shrub spieces provide suitable nesting habitat for three species of egrets, five species of herons, white ibis and rosette spoonbills. This and subsequent projects could positively contribute to the colonial waterbird populations across the Gulf of Mexico if materials were beneficially used to create bird islands.

At Risk Species

Restored saline marsh and nourished barrier shoreline are proactive conservation strategies that may benefit habitat used by several at risk species including reddish egret, snowy plover, saltmarsh topminnow, diamond backed terrapin, and black rail.

Reddish Egret

The reddish egret nests in mixed species colonies amidst shrubby vegetation and is generally restricted to sandy beaches or shallow ponds near the coast or on barrier islands when feeding. During nesting season, the greatest concentration of reddish egrets lies on islands in mid to south Texas; however, fewer pairs are scattered across the coastal Texas landscape. The reddish egret is threatened by coastal land loss, decreases in the quantity of suitable habitat, human disturbance resulting in nest abandonment, beach development (especially in Florida), and entanglement in fishing nets and lines.

Snowy Plover

The snowy plover nests in loose colonies on open beaches. Winter habitat consists of mostly dry sandy or shell beaches, above the high tide mark and along the coast or on barrier islands. They eat a variety of invertebrates including crustaceans, worms and insects. In Texas, the species is a relatively rare migrant and winter resident along the coast. Threats include trampling of eggs and nests by humans, vehicles, entanglement in discarded fishing line, habitat degradation or abandonment as a result of the expansion of beachfront development and recreation, habitat loss due to coastal land loss and erosion.

Saltmarsh Topminnow

The saltmarsh topminnow is a small (approx. 1-2 inches), coastal fish, considered a resident species of coastal marsh, and closely related to other killifish species such as the Gulf killifish. It occurs sporadically in low-salinity smooth cordgrass or black rush marshes from Galveston Bay, Texas to Escambia Bay, Florida (Lopez et al. 2011); however, historic occurrences expand the range to Aransas Bay. For Texas, the species is most likely to occur in the coastal counties of Jefferson, Galveston, Brazoria, Matagorda, Calhoun, and Aransas.

This species is typically found in coastal salt marsh habitats characterized by smooth cordgrass. Numerous studies indicate that the species is most abundant in low-salinity salt marsh ecosystems that range from 0 ppt to 31.4 ppt. Small rivulets are important for access to interior marsh areas. Threats include loss of coastal salt marsh habitat from natural causes (e.g., storms) and human activities (e.g., development).

Diamond backed terrapin

The diamond backed terrapin is restricted to saline or brackish habitats. They favor seagrass beds, marshes and estuaries (especially those bordered by mangroves) and more open channels to the "grassy" flats. One of seven subspecies, the Texas diamondback terrapin occurs in marshes, tidal creeks, and embayments from western Louisiana throughout much of Texas. In Texas, barrier island marshes and seagrass beds on the bayside of the islands are important areas for the species. Like all turtles, terrapins nest on land and in most states, terrapins seem to prefer sandy, non-vegetated areas for nesting although they are limited by the available habitat and substrate type. Nesting occurs above the normal high tide line, although above normal rainfall or tides may result in the inundation of normally exposed nesting sites. Shell hash is the principal nesting substrate documented across most of the Texas' coast for this species.

Threats to the species include poor water quality (pollution), human disturbance on nesting areas, loss of population in derelict crab traps, habitat altered or lost by dredging and siltation, coastal land loss of nesting beaches and saline marsh.

Black rail

On October 9, 2018, the Service proposed to list the eastern black rail be listed as "threatened" under the Act (83 FR 50610 50630). The Service is also proposing a special rule under Section 4(d) of the ESA that would tailor protections for the bird. If finalized, this 4(d) rule would exempt certain activities from the take prohibitions of the ESA. The eastern black rail is a wetland dependent species that favors coastal settings. It is found in a variety of salt, brackish, and freshwater marsh habitats that can be tidally or non-tidally influenced. Within these habitats, the birds occupy relatively high elevations along heavily vegetated wetland gradients, with soils that are moist or flooded to a shallow depth. The eastern black rail requires dense vegetation cover that allows movement underneath the canopy. Plant structure is considered more important than plant species composition in predicting habitat suitability. Occupied habitat tends to be primarily composed of fine-stemmed emergent plants (rushes, grasses, and sedges) with high stem densities and dense canopy cover. However, when shrub densities become too high, the habitat becomes less suitable for the eastern black rail. The black rail is not found in areas with woody vegetation. Soils are moist to saturated (occasionally dry) and interspersed with or adjacent to very shallow water (1 to 6 centimeters). (83 Federal Register 50610).

Impact Analysis

The President's Council on Environmental Quality defined the term mitigation in the National Environmental Policy Act regulations to include:

a) avoiding the impacts altogether by not taking a certain action or parts of an action;

b) minimizing impacts by limiting the degree or magnitude of the action and its implementation;

c) rectifying the impacts by repairing, rehabilitating, or restoring the affected environment;

d) reducing or eliminating the impacts over time by preservation and maintenance operations during the life of the action; and,

e) compensation for the impacts by replacing or providing substitute resources or environments.

The Service supports and adopts this definition of mitigation and considers its specific elements to represent the desirable sequence of steps in the mitigation planning process. Based on current and expected future without-project conditions, the planning goal of the Service is to develop a balanced project, i.e., one that is responsive to MSCIP needs while addressing the need for fish and wildlife resource conservation.

The Service's mitigation policy (FR, Volume 46, Number 15, pages 7656-7663, January 23, 1981) provides guidance to help ensure that the level of compensatory mitigation recommended by the Service is consistent with the value and scarcity of the fish and wildlife resources involved. In keeping with that policy, the Service usually recommends that losses of high-value habitats, which are becoming scarce be avoided or minimized to the greatest extent possible. Unavoidable losses of such habitats should be fully compensated by replacement of the same kind of habitat value; this is called in-kind mitigation. The mitigation planning goals and associated Service recommendations should be based on the four categories, as shown in **Table 5.**

Table 5 Service resource categories

Resource Category 1 - Habitat to be impacted is of high value for evaluation species and is unique and irreplaceable on a national basis or in the ecoregion section. The mitigation goal for this Resource Category is that there should be no loss of existing habitat value. Resource Category 2 - Habitat to be impacted is of high value for evaluation species and is relatively scarce or becoming scarce on a national basis or in the ecoregion section. The mitigation goal for habitat placed in this category is that there should be no net loss of in-kind habitat value. Resource Category 3 - Habitat to be impacted is of high to medium value for evaluation species and is relatively abundant on a national basis. FWS's mitigation goal here is that there be no net loss of habitat value while minimizing loss of in-kind habitat value. Resource Category 4 - Habitat to be impacted is of medium to low value for evaluation species. The mitigation goal is to minimize loss of habitat value.

Additionally the Service works to support the following goals specific to coastal habitats:

- Creating coastal ecosystems that are resilient and adaptive to climate change impacts
- Using science based conservation design at a landscape scale that supports habitat connectivity and ecological integrity.
- Benefiting the conservation and recovery of federal trust species and other priority species
- Building conservation partnerships that leverage resources and promote community stewardship of fish and wildlife resources.

Texas coastal habitats include bottomland hardwood forests, bald cypress swamps, oyster reef, sea grass beds, and coastal marshes. The Service considers oyster reef, sea grass beds, and coastal marsh habitats to be aquatic resources with a high value for fish and wildlife within Federal trusteeship (i.e., migratory waterfowl, wading birds, other migratory birds, threatened and endangered species, and inter-jurisdictional fisheries). The increasing scarcity of oyster, sea grass, and marsh habitats in Matagorda Bay clearly places these habitats within Resource Category 2. Therefore, the Service recommends avoiding losses of those habitats found within the project footprint. If unavoidable impacts are necessary, we recommend in-kind mitigation within the greater Study area and additional coordination with our office and the other resource agencies.

The Service has reviewed all Corps supplied documents and Service files relevant to the MSCIP. We understand the majority of impacts will occur over bay bottom habitat but have concerns regarding the impacts to sea grasses, adjacent wetlands, and oyster habitat as well. Because the project footprint will be finalized during the PED and construction phases of the project, staging and construction areas have not been identified. We recommend all construction and staging areas be limited to right-of-ways or previously impacted areas to avoid and minimize impacts to terrestrial wildlife species.

Fish

Review of Service and other federal and state natural resource agency publicly available data indicates the aquatic environment within the immediate project area supports fish species of both commercial and recreation importance. Dredging and dredge material placement activities may result in exposure of fish to various stimuli that may result in positive, negative, or neutral behavioral response (ECORP, 2009). Germano and Cary (2005) beleive the majority of fish behavioral effects from dredging activities are associated with the re-suspension of sediments and the resulting physical and chemical alterations within the water column. Migrating behaviors of fish can be disrupted when encountering dredging acitivity or localized dredge plumes; however, most migration patterns return to normal after the dredging is completed.

While the majority of the construction will occur within shallow to deeper open water areas, we believe migratory or resident fish species will quickly move away from any dredging activites. However dredging and open-bay disposal of dredge material can release toxicants promoting low mobility and will affect all eggs and lavae in the area. A suspended sediment plume can encourage visual predators, affect demersal eggs, produce sticky boyant eggs, and affect gills particulary larvae with open mouths. Settlement of sediments potentially affect benthic spawners, herbivores, and demersal eggs. Noise caused by dregding can produce variable flight responses and affect swim bladders causing buoyancy control issues (Wenger, 2017).

Wetlands

Coastal marsh habitat armors shorelines from erosion, filters pollutants, enhances water quality and promotes primary production (Mitsch & Gosselink, 1993). In general, coastal marshes serve as nurseries for fish and shellfish and serve as buffer zones helping to slow and absorb storm surges that might otherwise do greater damage farther inland. Coastal marsh and wetland habitats within the project area are well documented by the Service in the reports and letters listed in **Table 1.** Maintaining the economic values, fish and wildlife resources, and aesthetic qualities of the Texas Coast depends on re-establishing and restoring its wetlands. The Service continues to support creation and restoration efforts by the CPA, other natural resource agencies, non-governmental organizations, and the public. Should the Corps not be able to avoid direct and indirect impacts to coastal marsh habitat as a result of the TSP, we recommend the Corps engage the interagency coordination team (ICT) to determine appropriate habitat impact modeling and restoration or mitigation site selection.

Fringe or estuarine wetlands are tidal in nature, are extremely productive, occur along the edges of Matagorda Bay and some of the land features found within the bay. Prevalent flora of the estuarine and marine wetlands include smooth cordgrass, saltwort, saltgrass, and glasswort spp. Estuarine wetlands are valuable for commercial and recreational fishery species with most species completing all or part of all of its life cycle in this habitat. We encourage the Corps to avoid this habitat during construction activities to the greatest extent practicable. However, if the Corps determines avoidance is not possible, the Service recommends appropriate modeling and analysis with complete in-kind compensation to fully offset impacts to the existing functions and values of wetland habitat.

Freshwater wetlands are found in areas where rainfall runoff accumulates in relic depressions and stream channels. Closer to the coast, this wetland type can be found inland of salt or estuarine wetlands and intertidal swales (Dick & Hunt, 2012). These wetlands tend to have reduced salinties and are suitable for plants such as sedges, rushes, and coastal arrowhead. While many freshwater wetlands are found on the mainland within the project area, some of the dredge placement and disposal areas (filled placement areas not currently being used or upgraded) provide excellent freshwater emergent wetlands. Wetlands in general can provide valuable stop-over habitat for migrating species such as waterfowl, raptors, shorebirds, and should be avoided during construction activities. However, if the Corps deems that avoidance is not possible, the Service recommends mitigation with full in-kind compensation for any impacts.

The Service is concerned regarding the direct impacts to low and high marsh and to farmed wetlands laid out in the DEIS (2018) as well as our inability to review and validate those findings within the scope of this report. Additionally, the Corps conducted Habitat Suitability

Index models (HSI) (without Service input or involvement) requiring 26 acres of marsh as mitigation for wetland impacts. Given the recent changes to the DMMP and the Least Cost Plan, the Service is not entirely sure what the proposed wetland impacts are. The Service is not aware of any natural resource agency coordination efforts with respect to wetland impacts and modeling. Therefore, we request further details as to the Corps HSI findings.

Bay Bottom

The open bay bottom habitat of Matagorda Bay is the second largest habitat type in the bay and is made up of mostly soft rippling mud and silt that is not covered by oysters and vegetation. Over the years, the area of open bay bottom has increased mainly due to oyster removal and dredging activities. Biological decomposition, a major function for the breakdown of plant material, occurs in this habitat, where eventually it is re-suspended in the water column to provide food for fish and other wildlife species. Wildlife usage of and negative impacts by deepening and widening construction of Matagorda's Bay's open bay bottom were recognized in Service's letters noted in **Table 1** (USFWS 2001, 2007, 2009). Direct physical impacts to bay bottom will almost always result from the disposal of dredged material. The deposition of millions of cubic yards of new work and maintenance materials may have the potential to change circulation or erosion patterns; alter the water depth and bathymetry; chemical and biological characterizations of the site; salinity; temperature; substrate; benthic recolonization of the site; decline in species richness; and reduce habitat complexity (loss of erect and sessile epifauna, smoothing of sedimentary bedforms and reduction of bottom roughness, and removal of taxa that produce structure). Further, benthic and demersal organisms at the disposal site may become more vulnerable to scavengers and other predators, buried and not able to migrate through the disposal material, or change species composition based on the newly deposited material.

Some Service trust fish and wildlife resources (including threatened and endangered species) feed extensively on fishery resources within Matagorda Bay. Activities that would degrade water quality, increase turbidity, increase sedimentation, or alter flows, temperature, or water depths could affect the biological productivity of this area. All species would be adversely affected by water pollution, such as chemical contamination (including food chain effects resulting from bioaccumulation), oil spills, excessive turbidity or sediment loading, non-point source run-off, waste disposal (including vessel wastes), and stormwater runoff. It is essential that high water quality be maintained in the bay to protect the shellfishery.

Submerged Aquatic Vegetation

Seagrasses are marine angiosperms found in many shallow coastal and oceanic waters around the world. Although seagrasses have a large geographic extent, they have low species biodiversity with approximately 60 seagrass species and roughly 10% of the total number of species present within the northern Gulf of Mexico (Goodin, et al., 2018). Light stress is attributed to natural and anthropogenic stressors; however, temperature and salinity are important abiotic factors influencing seagrass productivity. Seagrasses are important indicators of ecosystem health, where changes in abundance and distribution may signify upset within the environment.

Globally, seagrasses are experiencing unprecedented declines (Waycott, et al., 2009) however, these systems have exhibited recovery when stressors are controlled and disturbances are minimized (Macreadie, et al., 2015). Natural (hurricanes, droughts, and precipitation) and human (coastal development, sediment loading, eutrophication, and propeller scarring) disturbances can lead to seagrass ecosystem degradation, fragmentation, patchiness, and loss reducing biodiversity and leading to bed collapse (Fonesca, 1998).

Seagrass meadows can form monospecific stands or mixed assemblages and provide excellent nursery and maturation habitat for brown and white shrimp and important finfish species. Shoalgrass, widgeongrass, and turtlegrass, are documented in Matagorda Bay (White, Tremblay, Waldinger, & Calnan, 2002). Shoalgrass and wideongrass are mapped in Keller Bay and Carancahua Bay to the east of Matagorda Bay and north of Port O'Connor in Boggy Bayou. Additionally, the Seagrass Conservation Plan of Texas (Texas Parks and Widlife Department, 1999) documents the presence of shoalgrass, widgeongrass, and clovergrass in the Matagorda Bay system. TPWD (2000) estimated the Matagorda Bay system contains about 2,700 ac of seagrasses, or about 1% of its total (250,500-ac) area. This follows the general trend that the northernmost Gulf of Mexico bays contain the least seagrass coverage and the southernmost have the greatest coverage. Matagorda Bay seagrasses have an intermediate range between Galveston Bay (approximately .002% seagrass coverage) and Lower Laguna Madre (approximately 70% seagrass coverage). Thus verifying the importance of restoring and creating sea grass beds in Matagorda Bay.

Small, often rather sparse seagrass meadows, comprised primarily of shoalgrass but mixed with the more seasonal and ephemeral widgeongrass, lie on the 2 or 3 parallel subsurface sand ridges out to approximately the +2 ft. MLLW contours (TPWD 2018) in the Study area. Strong seasonal winds and waves along the western Matagorda Bay shoreline prevent dense seagrass meadows or marsh formation. Strongly influenced by human alterations such as land use changes, coastal development, and dredging (Short, 1996), nutrient additions and activities affect the concentration of suspended sediments and impact light availability to the ecosystem thus degrading seagrass beds.

TPWD's online viewer (TPWD, 2019) suggests that seagrasses are present along the west side of the shoreline from just south of Powderhorn Lake to Port O'Connor, in Powderhorn Lake near the confluence with Matagorda Bay, eastern most shoreline of Epsiritu Santo Bay, the southern shoreline in Keller Bay, along the shoreline between Caracahua Bay and Turtle Bay, adjacent to the City of Palacious shoreline, and the bay shorelines of Matagorda Peninsula (east and west sides of the jetties) (**Figure 3**). Currently proposed TSP features include creation of in-bay placement areas accomodating new work and maintenace materials located on the west side of channel potentially impacting seagrasses along the Matagorda Bay shoreline. Final design and location of the placement areas will occur during the PED phase of the project however the Service has concerns regarding the proximity to seagrasses and the implicaiton of increased turbidity, decreased water quality, and potential to bury the beds.

As described in the Service's PAL (2017), submerged aquatic vegetation provides essentail aquatic function for fish and wildlife species. Found along all Matagorda Bay shorleines, seagrass beds are more extensive and typically have greater biomass along south shorelines when compared to northern shorelines (Adair, Moore, & Onuf, 1994). The variety of structure that grass beds offer, compared to unvegetated bottom, provides estuarine-spawning fishes, and their offspring with protection from predators. Shelter provided by the submerged aquatic vegetation (SAVs) are also important to blue crabs that are vulnerable during the molting period where they have soft shells and are sluggish.

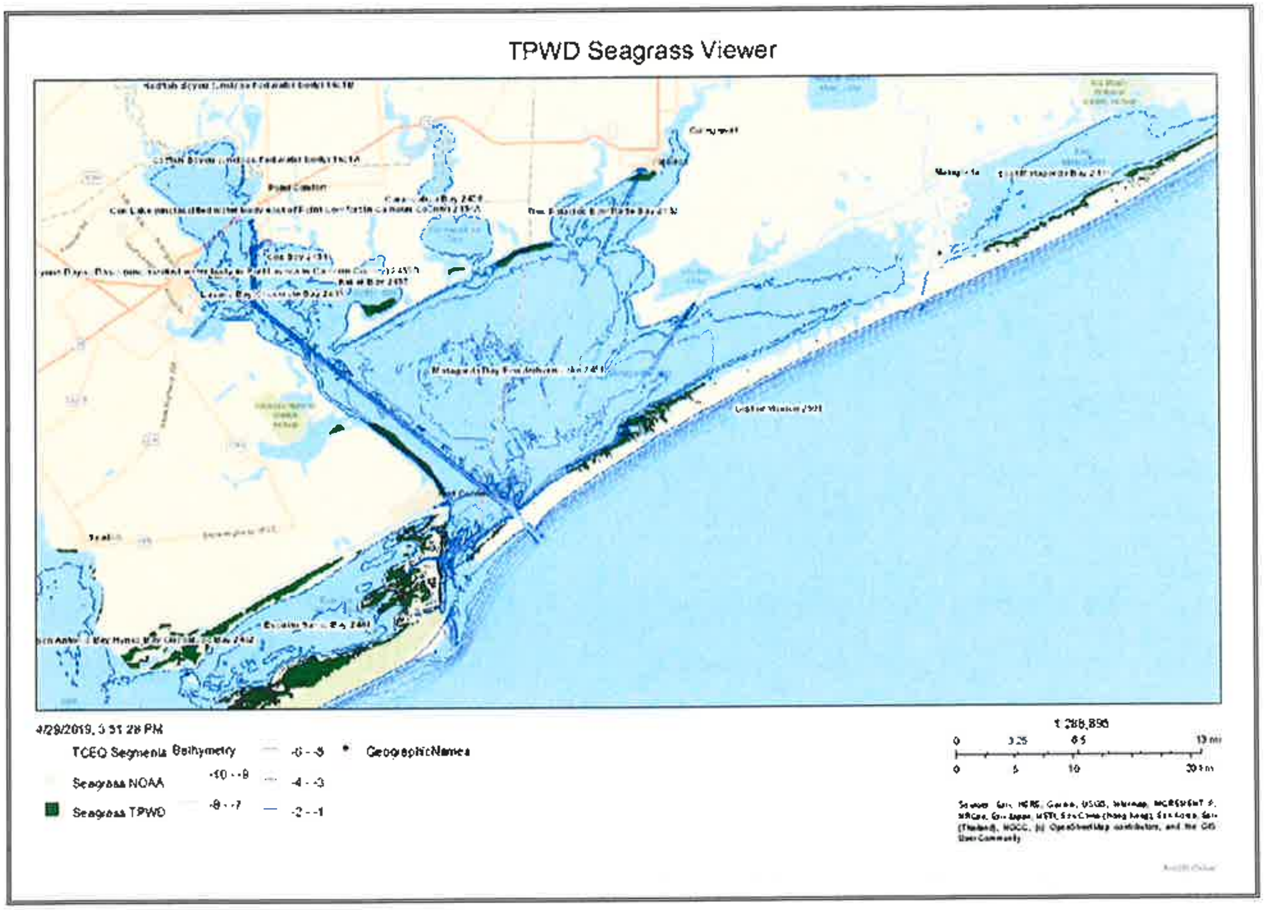

Figure 3 TPWD seagrass viewer

Channel dredging can have permanent negative direct and indirect impacts to SAVs. Indirect imapcts such as increased wave action, turbidity, herbicides, petrochemicals, nonpoint and point pollution, warming trends, natural disease, hurricanes, and over grazing by animals pose threats to little remaining SAVs of Matagorda Bay. The Corps fails to identify potential impacts to sea grass beds lining the western most shoreline of Matagorda Bay given sediment transport from the proposed in-bay unconsolidated placement areas. Seagrasses in this area may be at risk due to increased wave action from larger nagivation vessles, turbidity, shoreline erosion, wind and wave fetch, and sediment transports towards the shore.

Newly formed sand platforms resulting from the Colorado River re-route in Matagorda Bay may recruit sea grasses (Corps 2018). While this may perhaps happen, the Corps assumes that no significant cumulative impacts nor a net loss of SAVs in Matagorda or Lavaca bays is expected because of the TSP and the DMMP. As a Resource Category 2 habitat, the Service does not draw the same conclusion as the Corps with respect to the fate of seagrasses in Matagorda Bay. We do not anticipate the creation or addition of suitable sand platforms by the Colorado River reroute nor will we expect created habitat as a result of the hurricane storm events. We do anticipate impacts from sea level rise to be detrimental to seagrass beds as the extra depths may prohibit the necessary amount of light for continued growth. We instead will continue to work with partners to create and restore seagrass habitat in the Matagorda Area. Periodic (and strategically timed) shots of dredge material may benefit and expand existing seagrass beds in Matagorda Bay. Funding a coast-wide comprehensive seagrass monitoring program will ultimately benefit bay systems by reducing coastal risks and building resilience such as coastal erosion and wavy energy reduction (Larkum, 2006). We are happy to work with the Corps to develop a suitable seagrass strategy that compliments existing plans.

Oysters

Eastern oysters are natural components of estuaries along the Gulf of Mexico and mostly tend toward forming reefs. These reef structures accrete shell material via recruitment and growth, which is in turn degraded at varying rates (Powell, 2006 and Powell and Klinck, 2007). Because larvae produced from nearshore oysters settle and grow in subtidal areas, the permanent loss of nearshore oysters and the reefs they form can disrupt the regional larvae pool and contribute to the lack of recovery via oyster recruitment ((National Oceanic and Atmospheric Administration, 2019). Additionally, extended periods of failure of any part of the reproductive cycle can lead to sedimentation of existing reefs, causing the removal of substrate for settlement further reducing oyster cover over time. Oysters also provide habitat for commercial fisheries species (Grabowski et al., 2007). The loss of oyster reefs means more than just the loss of an important commodity. It can also cause decline in habitat for sustaining other commercially important species and species important to ecosystem stability (Beck et al., 2011).

The Matagorda Bay system was last comprehensively surveyed in 1976 where it was estimated to support 6,505 acres of oysters (Benefield, 1976 and Deepwater Horizon Natural Resource Damage Assessment Trustees, 2017). The TxGLO identifies oyster reefs in **Figure 4** though the data is outdated. The Nature Conservancy completed one of the largest oyster restoration projects in Matagorda Bay in 2014. Half Moon Oyster Reef, a 54 acre restored reef, was designed to maximize structural complexity creating niches to attract fish, shellfish, invertebrates, and sea turtles ensuring a thriving ecosystem (The Nature Consevancy, 2019). After four years of monitoring, the restoration project demonstrated a thriving oyster reef community with average oyster sizes increasing by more than 550 percent between January 2014 and May 2018. Additionally, biodiversity on the reef tends to be 1014% higher than on adjacent bay bottom (The Nature Conservancy, 2019.). The reef's diversity attracts larger prey species to the reef making Half Moon Reef a well-known fishing destination in Matagorda Bay.

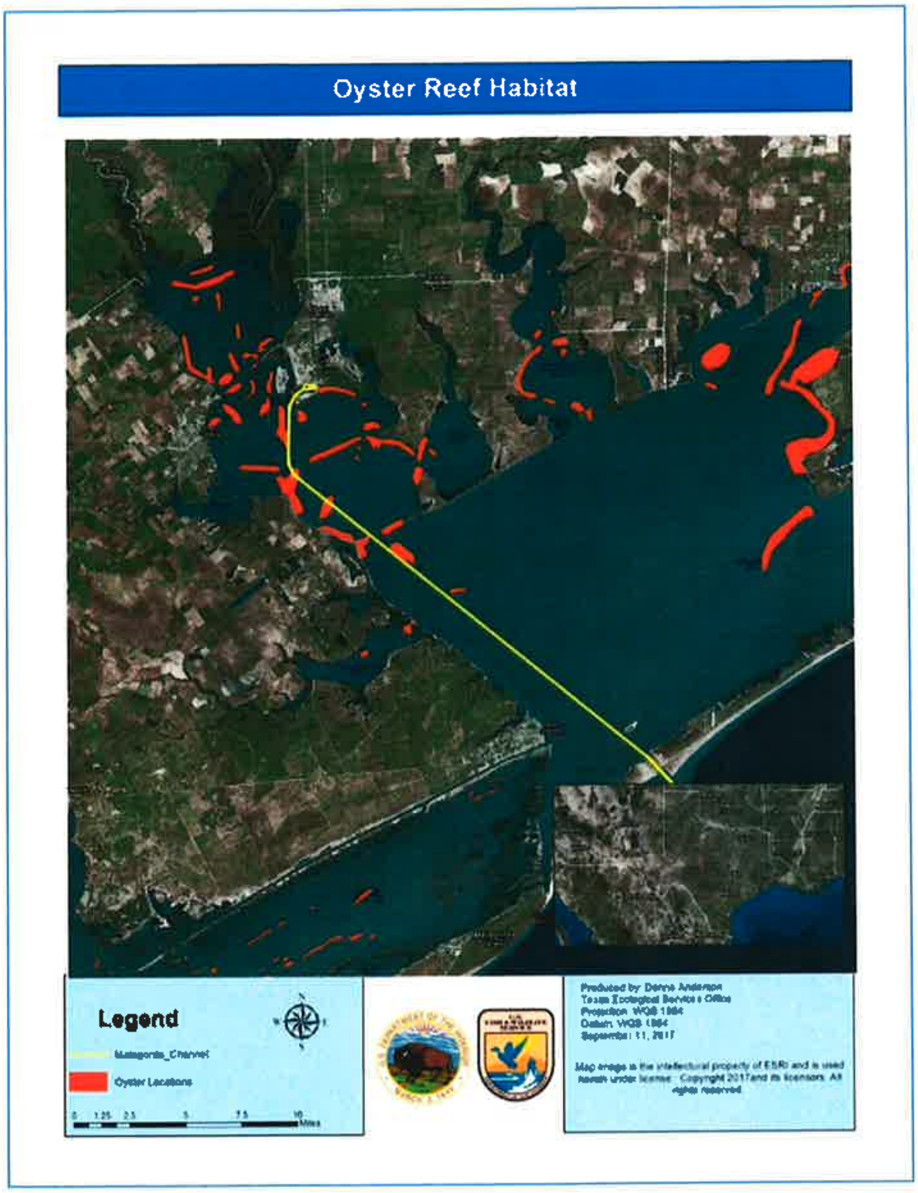

Figure 4 Oyster habitat within MSCIP Study Area

Documents provided by the Corps indicate the west side of the MSC is covered by oyster reef, scattered oysters, and shell on mud habitat. The reef off Gallinipper Point is a public reef harvested by recreational and commercial oyster fisherman when conditions are suitable. In addition to having harvest value, oyster reefs provides a number of ecosystems services including stabilization of sediments and horizontal and vertical stratification of bare bay bottom. The complexity offered by reef structure provides refuge for a number of invertebrates and finfish species, as well as settling habitat for sessile species. Oysters filter and clarify bay waters, removing bacteria, phytoplankton, and fine sediments. Oyster reefs provide foraging grounds for numerous aquatic and avian species and are, therefore, attractive fishing grounds for recreational anglers. Wading birds rely on benthic invertebrates in intertidal areas, and terrOyster reef habitat Due to the high productivity and diversity of organisms supported by the reef complex, this area is listed as a Priority Protection Area under the Oil Spill Planning and Response Atlas (The Texas General Land Office, 2019). Further, oyster reefs are considered critical areas under the Texas Coastal Management Plan (CMP) (31 TAC §501.3) and the General Provisions state that adverse effects on critical areas are to be avoided to the greatest extent possible and it should be demonstrated that no practicable alternative with fewer adverse effects is available (31 TAC §501.23).

The Service remains concerned that the Corps has underestimated impacts to oyster reef, oyster reef habiats, and the salinity regime of the estuary resulting from TSP implementation as depicted in the DEIS. The 2007 Hydrodynamic and salinity models prepared for the Calhoun County Navigation District (CCND) predicted that deepening of the MSC would allow deep density currents in the bottom of the channel to transport an increased volume of higher salinity Gulf of Mexico (GOM) water into the upper bay. While the salinity differences between existing and proposed conditions were predicted to be < 1 Practical Salinity Unit during low flow periods, this is not the case for median and high flow events, where the differences between bottom and surface salinities are predicted to be greater. Following freshwater inflow events, the deeper channel is expected to reduce the time required for the density current to move higher salinity water into Lavaca Bay, bringing higher salinities back to upper reaches of the bay more quickly. Thus, the overall average salinity in the upper Matagorda and Lavaca Bays would be expected to increase, since freshets would be of shorter duration. Based on the models, page 4-82 of the 2009 FEIS states *with the improved channel, an overall rise in salinity of about 2 to 4 ppt could be expected.* Since increases in salinity are a factor in the incidence of Dermo in oysters and predation by oyster drills, it was estimated that the changes in the salinity regime would negatively impact a net 30.1 acres of oyster reef (U.S. Army Corps of Engineers, 2009). Current documentation provided by the Corps does not utilize salinity models or the previous Oyster Reef Impact Assessment (URS, 2007) to consider indirect loss of oyster habitat. Additionally, the Corps has not provided information that considers temporal loss of functions and services provided by oysters, or the temporal loss of commercial value of impacted oyster reefs over the life of the project.

Contaminants

The Service outlined concerns regarding suspension and resuspension of contaminated sediments from the Alcoa facility in the 2017 PAL. Mercury, a byproduct of the work conducted at the plant, was discharged into Matagorda Bay leading to fishing restrictions, site remediation, and restoration work as part of the Natural Resource Damage Assessment (NRDA) processes. We are aware of the ongoing monitoring by the NRDA team and the EPA and recommend strict adherence to guidance from both entities to protect the aquatic resources of Matagorda Bay.

The Service urges the Corps to continue coordination with the EPA, Alcoa, and the NRDA Trustees to assess the ongoing mercury contamination issues associated with the Alcoa/Point Comfort facility. Current restoration associated with this project may be negatively impacted because of the ongoing contamination. According to the Corps (2019), it was determined that upland confined PA P1 was deemed to be unnecessary unless contaminated material is found within the dredge template. Additionally, the Corps removed ER3/D from the DMMP due to concerns regarding the resuspension of contaminated materials during construction of a new containment perimeter. During a June 26, 2019 meeting with the Corps, it was confirmed that PA P1 would be modified and used should contaminated material be detected during sediment testing of the dredge profile. Given the continued presence of mercury within the bay bottom of the superfund site and the surrounding areas as reported by the EPA on April 25, 2017, the Service remains concerned that any disturbance may re-suspend contaminants in the water column injuring fish and wildlife.

Given the significance of Chester Island to the local and regional colonial waterbird populations, we encourage the Corps to "beef up" their capability to quickly deploy boom around this island and other critical areas in the bay in the event of a hydrocarbon spill. Response time is critical during the nesting season of February through September where 20,000+ nesting pairs call Chester Island home. Discussions with Texas Audubon, the local warden managing the island, and the Natural Resource Damage Assessment Trustees would be prudent in determining a best course of action for spill response.

The Service understands the Corps will test sediments throughout the channel template to locate any pockets of mercury because of the Alcoa superfund site. In the event mercury is confirmed within the dredging template, it is our understanding that the contaminated material will be disposed of in an offsite terrestrial placement area (PA 1A) to be constructed in accordance with EPA guidelines by the Corps.

Climate Change and Sea Level Rise

The terms "climate" and "climate change" are defined by the Intergovernmental Panel on Climate Change (IPCC). "Climate" refers to the mean and variability of different types of weather conditions over time, with 30 years being a typical period for such measurements, although shorter or longer periods also may be used (Solomon, et al., 2007). The term "climate change" thus refers to a change in the mean or variability of one or more measures of climate (e.g., temperature or precipitation) that persists for an extended period, typically decades or longer, whether the change is due to natural variability, human activity, or both (IPCC 2007 p. 78). Various types of changes in climate can have direct or indirect effects on species. These effects may be positive, neutral, or negative and they may change over time, along with other relevant considerations, such as the effects of interactions of climate with other variables (e.g., habitat fragmentation) (Solomon, et al., 2007 p.8-14, 18-19). Changes in temperature and/or precipitation patterns will influence the status of the Matagorda Bay ecosystem. These changes may contribute to threats that have already been identified and discussed for the Aplomado falcon, Gulf Coast jaguarundi, piping plover, red knot, whooping crane, West Indian manatee, and nesting sea turtles.

Sea Level Rise

The melting of glaciers and continental ice masses, which are linked to atmospheric temerapture, can contribute signficant amounts of freshwater to the Earth's oceans. Additionally, a steady increase in global atmospheric temperature creates an expansion of saline sea water contributing to increases in ocean volume. Short (daily) and long term (30 years) variations such as seasonal weather patterns, changes in coastal and ocean circulation, anthropogenic influences (such as dredging), vertical land motial are just a few of the many factors influencing changes in sea levels over time.

Generally speaking, salt marshes along the upper Texas coast are currently experiencing submergence and erosion in most locations (White W. A., 1997). Feagin and Yeager (2019) showed that accretion rates along portions of East Matagorda Bay appear to be keeping up with relative sea level rise in *Spartina alternaflora* low marsh. While this is positive, nearby salt flats will likely be converted into low marsh in the same areas. Both habitats provide important lifecycle characteristics for fish and wildlife and thus should be protected, restored or created whenver possible. As sea levels rises, we would expect Matagorda Bay shorelines to advance inland with current adjacent wetlands and beaches becoming inundated.

Dredged Material Management Plan

The Service assisted the Corps in developing a DMMP under the 2009 MSC deepening and widening effort. Based on the location and type of new work and maintenance dredged material generated by the proposed project, material would be used to create or protect habitats, would cap mercury impacted sediments, be placed in in-bay upland placement areas, placed in onshore placement areas, or placed in unconfined placement areas in Matagorda Bay or the Gulf of Mexico. Dredged material would be used to create marshes in Lavaca Bay and south of Sand Point in Matagorda Bay. Stiff clay would be used to create oyster reefs in Lavaca Bay between the MSC and TX Hwy 35; or used to create levees to construct in-bay uplands in Lavaca Bay and a habitat area in Matagorda Bay. Sand would be used to nourish beaches along the Magnolia Beach and Indianola shorelines and be used to create a habitat area in Matagorda Bay. Soft clay and silt would be placed in in-bay uplands in Lavaca Bay (located on existing placement areas or mercury-impacted sediments where possible); in an onshore placement area south of Alamo Beach; or placed in unconfined placement areas in Matagorda Bay and the Gulf of Mexico. The DMMP also featured an earthen levee constructed using materials mechanically excavated from along the Matagorda Bay shoreline south of Keller Bay to prevent a breach of the peninsula separating Keller Bay from Matagorda Bay. The environmental measures identified under the 2009 effort sought to minimize and mitigate negative impacts from the proposed deepening and widening efforts.

As part of the TSP for the current study effort, the Corps identified the Applicant's Preferred Alternative for the DMMP (2018) outlined below in **Table 6.** The 2018 DMMP removed all but one of the environmental features mentioned in the 2009 plan and developed 17 new in-bay and offshore unconfined placement areas covering nearly 3,000 acres of bay bottom habitat.

Table 6 CPA preferred alternative for the DEIS DMMP (2018)

Feature Identity	Feature Description	New Work (mcy)	Maintenance (mcy)
ER3/D	Clay Cap on Mercury-Impacted Sediment	2.5	39.5
P1	Onshore Upland	1.1	21.1
PA 14 to PA 16	Potential Placement Areas as Existing Sites		
NP 4 to NP 6	Potential Placement Areas as only for New Work		
NP 2 and NP 3	New Unconfined Area only for New Work	15.7	0.0
Sundown Island	Existing Unconfined Area along GIWW	3.3	4.4
NP 7	Potential Placement Areas only for New Work		
O5	Offshore Dispersive Site	7.6	0.0
A1	In-Bay Upland only for Maintenance	0.0	70.0
OP 8 to OP 10	Potential Placement Areas as only for Maintenance		
OP 2 to OP 7	New Unconfined Area only for Maintenance	0.0	108.9
OP 11	Potential Placement Areas only for Maintenance		
PA 1	Existing Offshore Dispersive Site	0.0	13.6
TOTAL	New Work and Maintenance Material	30.2	257.5

Source: Corps (2018)

Least Cost Plan

On April 16, 2019, the Service received the Least Lost Plan (Plan) replacing the DMMP from the DEIS. Subsequent conversations with Corps indicated that recent ship simulations permitted a channel width reduction of 50 feet resulting in reduced amounts of dredged material. **Table 7** indicates the TSP's new Plan, placement areas, and anticipated dredge material quantities over the 50-year life span of the project.

Table 7 Least Cost DMMP (2019)

Feature Identity	**Feature Description**	**New Work (mcy)**	**Maintenance (mcy)**
O5	Offshore Dispersive Site	3.2	0.0
Sand Engine	New Unconfined Area for Work and Maintenance Material	1.4	9.0
Sundown Island	Existing Unconfined Area along GIWW	2.3	12.9
NP1 to NP7	New Unconfined Area only for New Work Material	14.0	0.0
OP 1 to OP 10	New Unconfined Area only for Maintenance Material	0.0	114.2
PA 1	Existing Offshore Dispersive Site	0.0	17.9
TOTAL	New Work and Maintenance Material	21.0	154.0

Source: Corps (2019)

The Plan uses only three placement areas (05, Chester Island, and PA 1) and will create 17 new unconfined bay and off shore placement areas. Of note, ER3/D was determined to be unnecessary to construct due to potential contaminant issues at that site. Additionally, PA P1 was determined to be unnecessary unless contaminated materials are found within the dredging templates. The Plan outlines the new construction of six new work material unconfined placement areas (NP1-N7) totaling 2,425 acres, with berms constructed to a height of two feet below the water, and will be located southwest of the ship channel in Matagorda Bay. Fifty percent of the available new work material will be used to construct the berms with the remainder of the material left unconfined to flow towards the western bay shoreline. If contaminated sediment is discovered within the dredging template, the Corps plans to construct PA P1 (248 acres) south of Alamo Beach on existing agricultural land to house the material. Levee construction for PA P1 will consist of using existing material from the site impacting fresh wetlands. It is our understanding that the Corps will mitigate for wetland impacts should PA P1 be constructed.

The Corps' Operations and Maintenance division historically dredges the MSC placing material on the east side of the channel in unconfined PAs with some of the material returning to the channel. Under the Plan, all unconfined PAs on the east side of the channel will be relocated to the west side (OP1-10) of the channel and westward of the NP PAs. Although the Corps anticipates unlimited capacity within each of the Open water placements (OP), the Corps anticipates disposal quantities of 114.2 mcy over the 50-year period. The OPs will span across 579 acres of bay bottom.

Ocean Dumping Management Disposal (ODMDS) Site PA1 (457 acres) located 2-miles off shore will be used to dispose of maintenance material from the entrance channel. The Corps proposes to construct a new ODMDS site, 2,663 acres is size, located 3 miles offshore to handle 3.2 mcy of new work material.

Chester Island

Identified in both the 2018 and the 2019 plans as Sundown Island, the island was renamed Chester Island in honor of the late Texas Audubon Warden, Chester Smith in 2011. Accordingly, both documents incorrectly identify the current size of Chester Island as 442-acres when in reality it is closer to 80 acres. Imagery indicates the original size of the island to be between 50 and 60 acres and in 2000 the Corps completed an expansion creating almost 20 acres of land to the northeast end of the island. Chester Island suffers from severe erosion, most likely due to high velocity currents entering Matagorda Bay from the MSC entrance and vessels existing Matagorda Bay passing within 1,000 feet of the island (Buzan et. al., 2017) and fluxuates between 60 and 80 acres in size. The Corps has intermittently provided material and protection measures to the island with the most recent placement of nearly 975,000 cy in 2016 and 2017 growing the island to nearly 87 acres. However, Buzan 2017 notes that earlier placements resulted in less than half the material still present within three years after placement.

The Plan identifies a total of 2.3 mcy of new work material and 12.9 mcy of material will be placed here. Texas Audubon continues to lease and actively manage the island for 21 species of nesting colonial waterbirds and early coordination **is necessary** to avoid impacts. While we commend the Corps for incorporating Chester Island as part of the DMMP, we remind the Corps of the need for additional armoring measures at this site. As part of the Plan, we would expect the Corps to be financially responsible for all engineering, design, and construction costs of shoreline protection at Chester Island. Further, the Plan only refers to "local coordination, if necessary, will be done prior to placement on the island." Additional coordination is necessary prior to any material placement at Chester Island due to the significant natural resources found here. Buzan et al., 2017 conducted a comprehensive analysis to identify appropriate design templates for material placement at Chester Island that may be helpful during the planning phases of future placements.

Sand Engine (SE)
Not originally identified in the 2018 DEIS DMMP nor during previous coordination efforts with the Service under the MSC Jetty Deficiency Study and subsequent FWCAR (2018), the Corps now deems the SE necessary to reduce erosion at the southwest jetty. Assessment by the Corps' Hydraulics and Hydrology Branch concluded that erosion of the land surrounding the jetty would fail likely causing the entrance channel to close if not supported by a SE. The Service questions the validity of this statement and wonders why this issue was not clearly identified nor modeled earlier in the planning process of the Matagorda Jetty Deficiency and the MSCIP studies. The proposed SE will accept both new work (1.4 mcy) and maintenance (9.0 mcy) materials during the life span of the project. The Service has not been provided nor reviewed any plans specific to the SE and remains skeptical of its use and the effects on fish and wildlife species.

General comments regarding the Plan
Historically, the Corps mitigated for incidental and unavoidable impacts to resources other than oyster reefs in large-scale navigation projects. These impacts include short-term impacts caused by increased turbidity levels during the construction period and were considered to be offset by construction of "beneficial use" dredged material intertidal marshes and offshore colonial waterbird nesting islands, with monitoring and maintenance plans spanning the 50-yr. project life. One example of a coordinated and appropriate mitigation effort occurred with the Houston Ship Channel where 4,250 acres of estuarine marsh and a 12-acre waterbird-nesting island were created as a result of a 1995 deepening and widening effort. The Corps and Port of Houston avoided adverse impacts to bay bottom (this was the historical approach to dredged material disposal by the Corps and the Port of Houston) that would have occurred with the open-bay unconfined disposal of the new work and subsequent maintenance materials. Although not as productive on a per-acre basis as marsh or oyster reef, open bay bottom is an essential habitat for juvenile and adult sport and commercially important fishery species. The beneficial use features developed for the deepening and widening of the Houston Ship Channel (U.S. Fish and Wildlife Service, 1995) allowed for the discontinuance of unconfined open-bay disposal of dredge material associated with ship channel construction and project maintenance. The Service remains an integral member of that effort and continues to object to open bay disposal.

The Corps own Engineering with Nature (EWN) initiative provides for sustainable delivery of economic, social, and environmental benefits associated with water resource infrastructure

(Bridges, et al., 2014; Gerhardt-Smith & Banks, 2014; EWN, 2016). Environmental restoration elements are an integral element of any project as the method of disposing of the dredged material can consist of beaches, dunes, seagrass beds, coral and oyster reefs, barrier islands, salt marshes, freshwater wetlands and fluvial flood plain, and maritime forests. These landscape features provide habitat for fish and wildlife, recreational opportunities, reduce coastal erosion and land loss due to natural and anthropogenic influences. Continuing the practice of open in-bay disposal in Matagorda Bay given the Corps emphasis to create nature based landscape features is a contradiction in principles and should be reevaluated and revised in the Least Cost Plan (Corps 2019).

To be consistent with other Texas channel expansion projects, the Service urges the Corps to develop a suitable DMMP commensurate with the proposed impacts on the natural resources of the MSCIP. The DMMP should focus on using the dredged material beneficially while providing ecosystem benefits on a landscape scale in Matagorda Bay.

Experience in other large-scale estuarine channel enlargement projects involving placement of large volumes of dredged material has revealed that methods and construction techniques often require significant adjustments, interagency coordination, planning, monitoring, and on-site inspections. Success of BU features depends on sound planning, timely inspections, and the ability to modify construction techniques on-site. Therefore, the Service recommends that an interagency coordination team be formed to include all State and Federal natural resource agencies to meet regularly and provide inspection oversight and recommendations during post-authorization planning and construction. The Service will request yearly Fish and Wildlife Coordination Act transfer funds during the construction phase to provide inspection and design recommendations for habitat creation features.

In-Bay unconfined sediment placement

The Service participated in discussions with the Corps and other natural resource agencies as part of the DEIS and DMMP planning processes since 2001. We understand the historic use of in-bay unconfined disposal to be limited to the east side of the MSC; however, the Corps determined material would quickly return to the channel thereby increasing dredge frequency. Under the current project, to alleviate frequent dredging of the MSC, ICT group discussions explored in-bay unconfined disposal on the west side of the MSC at the Corps request. The Corps proposed creating a levee from new work material (**Figure 5**) and pumping past the levee allowing maitenance material (**Figure 6**) to flow freely and unconfined towards the shoreline creating a "platform". By creating a "platform" from the new work and maitenance material, the Corps asserts this process may provide the elevation needed to support seagrass bed growth. Additionally, the natural resource agencies looked at a combination of marsh and bird island creation on the west side of the channel since both of these techniques would provide shoreline protection and produce ecological benefits for fish and wildlife.

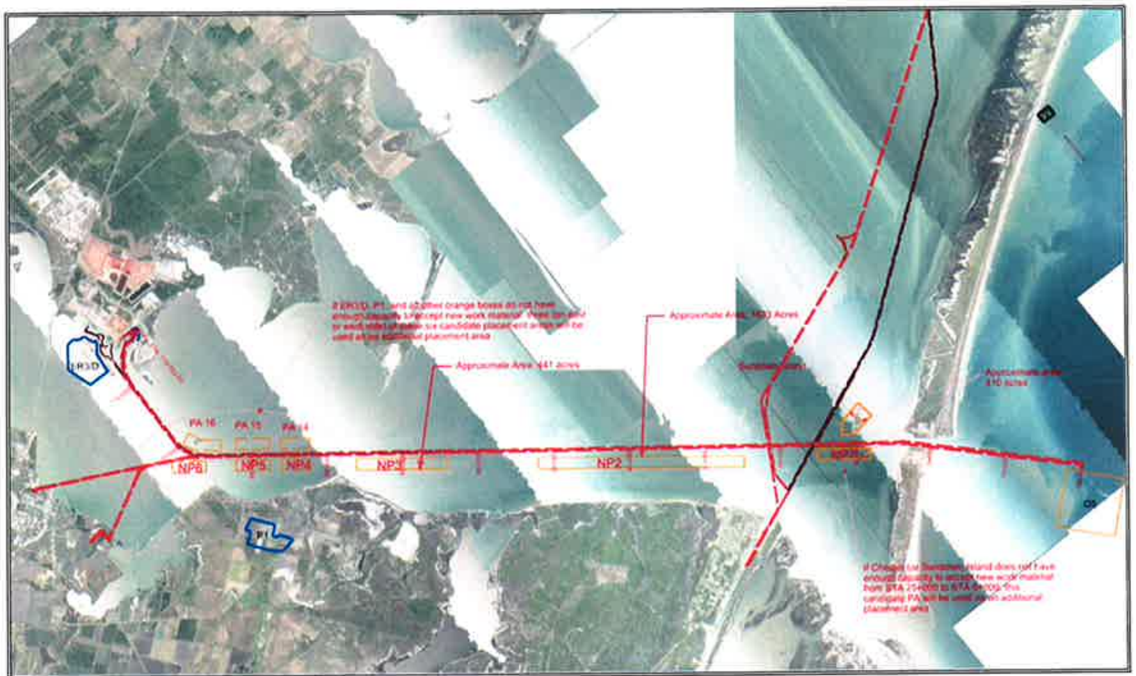

Figure 5 Proposed new work placement areas

Source: Corps, (2018)

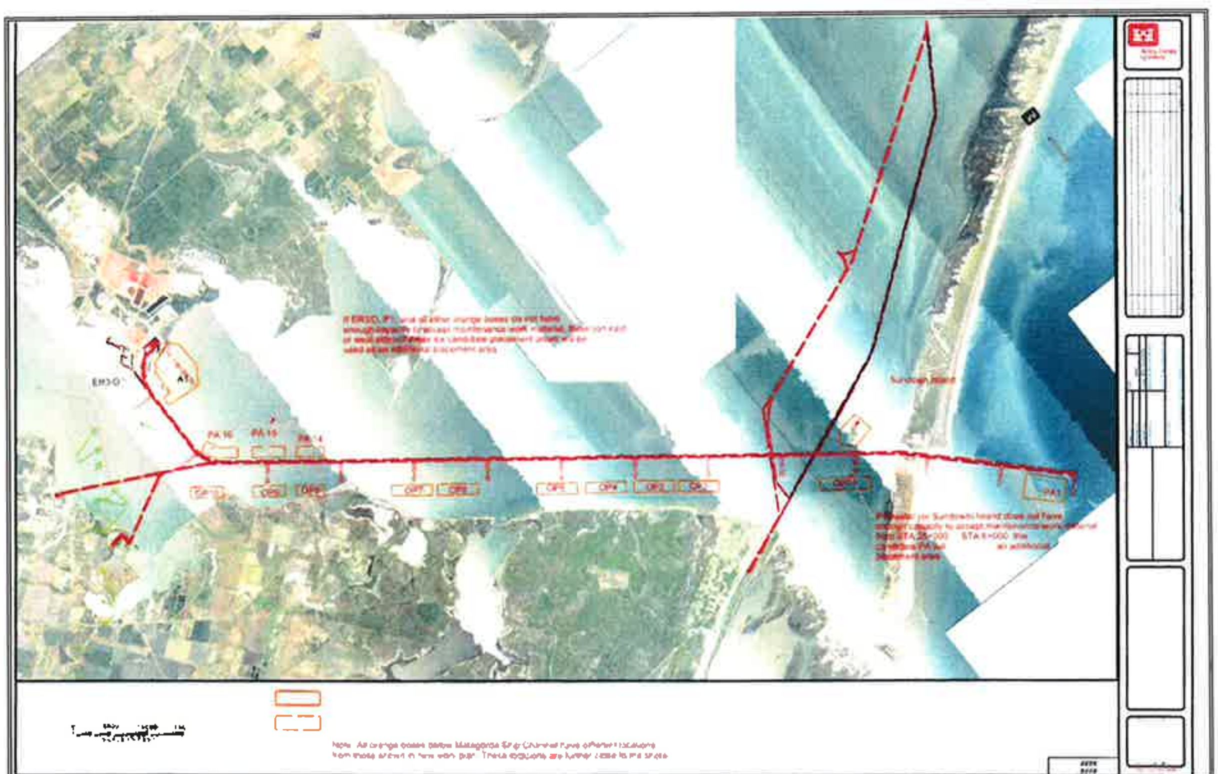

Figure 6 Proposed unconfined open bay disposal

Source: Corps, (2018)

The Service opposes the Corps' continued development and usage of unconfined placement areas within bay systems. Under the proposed TSP, the Corps plans to dispose of 124.9 mcy of maintenance material and an undisclosed amount of new work material into newly constructed unconfined PAs with no proposed monitoring for seagrasses. We believe that under the current Study, the Corps has ignored the Service's previously documented concerns regarding open in-bay disposal in Matagorda Bay. We believe these concerns lead to the creation of a reasonable DMMP and beneficial use plan during the 2009 study effort. However, under the current study, the Corps removed most BU and opted for in-bay unconfined dredge material placement as identified in the Plan. While the Corps is obligated to identify a least cost plan, the Service generally does not support unconfined in-bay disposal of dredge material due to the temporary and long-term effects to bay bottom and adjacent habitats. Instead, the development of a plan which balances confined and unconfined dredge material placement with environmental features will provide the greatest benefits for Matagorda Bay.

The Service remains concerned about the proposed in-bay unconfined PAs given the close proximity to Gallinipper Reef and other oyster estuarine habitat. The placement of the proposed unconfined PAs for new work material are described in section 5.7 of Appendix F (Dredged Material Management Plan) as *being at least greater than 1500 feet from the channel toe* and having widths of *approximately 2400 feet.* Based on current Google Earth aerial imagery, the MSC is approximately 3,500 feet from Gallinipper Point. The PA dimensions given in Appendix F of the DEIS would suggest the placement would be on, or very close to, reef habitat. Further, placement areas for the maintenance dredge material, depicted in Plate D-05 of Appendix F, are even closer to shore and are unquestionably in oyster reef habitat.

The Service, TPWD (TPWD, 2018, U.S. Army Corps of Engineers, 2009), and the Gulf of Mexico Fisheries Council (U.S. Army Corps of Engineers, 2009) have recommended against the practice of open bay disposal for reasons such as the detrimental effects on benthic communities, continuous suspension of sediments in the water column, direct and indirect impacts to oyster reef habitat, temporal loss of breeding and feeding habitats for fish, and overall detrimental impacts to impact to fish and wildlife species. We continue to recommend beneficial uses of dredge material, primarily restoration of former areas of aquatic and wetland habitat, as highly preferable to open water disposal in all areas of the Texas coast (U.S. Fish and Wildlife Service, 1995). The Service and the Gulf of Mexico Fisheries Council (U.S. Army Corps of Engineers, 2009) consider dredged material a valuable resource that should not be wasted and open bay disposal of dredged material (because of the impacts) should be avoided even if it is the least expensive disposal option. When evaluating dredge material disposal alternatives, the Corps' own benefit/cost analysis ought to account for potential future environmental benefits when dredged material is used beneficially. By incorporating future environmental benefits into project costs, it is our hope eco-friendly or conservation based alternatives will be more frequently selected for implementation. With that said, the Service remains concerned over the Corps' current cost/benefit analysis and will continue to advocate for the inclusion of potential environmental benefits in Corps' cost/benefit calculations for all federal project.

Mitigation

The Corps proposes mitigation for identified direct impacts to oyster (133 acres) habitat resulting from the TSP. The Service reminds the Corps that appropriate mitigation for **direct and indirect** impacts to natural resources (oysters, wetlands, seagrasses, bay bottom, etc.) are necessary and should be discussed as part of the EIS and DMMP and consist of a well thought out and developed mitigation plan available for public review.

The Service is not aware of any recent survey efforts mapping the current extent of oyster habitat in Matagorda Bay. The resource agencies identified the same deficiency during the 2009 and 2014 Study efforts leaving this significant resource under surveyed within the Study area and thus possibly under mitigated. We strongly recommend the Corps conduct side scan sonar surveys (with appropriate classification of oyster habitats) to identify the extent of oyster habitats within the entire MSC and adjacent channels. Consultation with the Service, TPWD, and NMFS is highly recommended to identify specific parameters when surveying for oysters and when identifying and designing oyster creation and restoration sites in Matagorda Bay. Additionally, the DEIS (2018) only discloses direct oyster impacts of 129.2 acres but does not address any indirect impacts. As mitigation, the Corps proposes to create 133 acres of oyster habitat but the Service is not aware of an oyster mitigation plan other than what was proposed as part of the 2009 DEIS. That plan accounts for 253.9 acres of direct and indirect impacts to oysters and oyster reef habitat as follows:

- 75.0 acres of loss from mortality in the fall;
- 27.6 acres of loss from sublethal impacts on growth in the summer;
- 3.1 acres of losses from sublethal impacts on mitigation reefs; and
- 148.2 acres of loss from direct impacts to oyster reefs from the project (not described in this document, see URS 2006).

We appreciate the Corps continued refinement of the TSP and efforts to reduce and minimize impacts. We believe impacts resulting from the TSP will likely be similar to those evaluated under the 2009 DEIS effort and fully expect the Corps to propose additional oyster mitigation for direct and indirect impacts in the final EIS or during the PED phase. The Service is available to assist with impact evaluation and identification of suitable mitigation sites.

The DEIS identifies over 5,000 acres of permanent direct impacts to bay bottom (in-bay and offshore) from the TSP and the jetty stabilization projects that "could result" in SAV impacts. The Corps asserts that potential sand formations constructed from other projects will likely grow SAVs almost alleviating the Corps from any responsibility from the direct and indirect TSP impacts to wetlands, bay bottom, seagrasses, and oysters. SAVs and bay bottom habitats provide significant ecological functions for fish and wildlife that rely on aquatic environments for part or all of their life requisites (National Oceanic and Atmospheric Administration, 2019). Time lags between TSP construction impacts to the creation of future sand platforms will result in lost ecological function for over 5,000 acres of bay bottom for an unknown period. The Service reminds the Corps of their responsibility to fully mitigate for the loss of bay bottom habitat because of the TSP.

The Service understands that if the TSP is constructed, the MSC will act as a conduit for higher salinity waters to travel to upper Matagorda and Lavaca Bays placing shoreline wetlands and other natural resources at risk. The Corps acknowledges possible impacts to wetlands resulting from an increase in salinity and tidal amplitude; however, no mitigation is proposed. We believe the Corps assertion to be incomplete and recommend continued coordination with federal and state natural resource agencies to fully model, identify impacts, and mitigate for these natural resources.

Additionally, the Service believes seagrass beds may be directly and indirectly impacted as a result of the TSP. The Corps assumes that sand platforms created by the Colorado River reroute will offset any potential seagrass impacts of the TSP (Corps 2018). The Service reminds the Corps of their responsibility to first avoid and then minimize adverse impacts to wetlands, streams, and other aquatic resources. Review of Corps supplied documents did not yield avoidance measures for the aquatic resources of Matagorda Bay. Compensatory mitigation can be used to offset unavoidable impacts creating a no net loss of aquatic functions. The development of well thought out and comprehensive mitigation plan should be provided to the state and federal resource agencies for review and comment. Any mitigation plan should include objective and verifiable ecological performance standards to assess whether the compensatory mitigation project achieves its objective. These standards should be based on the best available science.

Ecosystem Benefits of Created or Restored Habitats

Creation of saline marsh (converted from open water), bird islands, and nourishment of barrier shoreline habitats improve habitat conditions for shorebirds, neotropical migratory birds including threatened and endangered species, fish, mammals, reptiles and amphibians. If designed correctly, these created and nourished habitats develop complex food web systems, provide desirable nesting, foraging, and roosting habitats, increase local populations, while combatting wetland and island fragmentation and deterioration.

Restored and nourished habitats provide greater food supplies resulting in increased intertidal marsh, marsh edge, mudflats, and shallow water habitats; benthos; detritus; and a general increase in abundance and diversity of habitats for food sources. Several avian species feed on micro-invertebrates and crustaceans found on mudflats which are exposed at low tide and in shallow-water areas of the appropriate depth. Small fishes and crustaceans are often found in greater densities along vegetated marsh edge (Castellanos & Rozas, 2001 and Rozas and Minello 2001), and many of those species are important prey items for shorebirds, neotropical migrants, and other wildlife species. Increased saline marsh and barrier shorelines may also improve more desirable nesting habitat for some species, such as the diamond backed terrapin.

Matagorda Bay has limited availability for nesting colonial waterbirds. Current islands suffer wind and wave erosive forces or lie close to bay shorelines promoting predation. Successful islands design should meet a target range of needs for specific guilds. Using material from the construction of the TSP, a combination of shell islands for ground nesters (terns, gulls, black skimmers) and islands with larger shrubs and trees for the larger wading birds (egrets, herons, spoonbills, white ibis, neotropic cormorants, and brown pelicans) will provide relief for Chester Island. With the design and construction of additional bird islands as part of the TSP and the Least Cost Plan, we would expect increasing population trends for local nesting species that contributing to coast-wide colonial waterbird management goals.

Monitoring

A draft monitoring plan was not available as part of the DEIS for Service review and comment. However, the future monitoring plan should recommend the implementation of an Adaptive Monitoring Team (AMT) during the PED phase of the Study. Focusing the team on reviewing, interpreting, and recommending actions reflecting the mitigation goals of the Study that are consistent with species and habitat needs in the area is vital. We recommend the team be comprised of Corps, TPWD, local sponsors, federal resource agency staff, and NGOs (as necessary). Monitoring efforts should focus on evaluating the success of creation or restoration features and species usages of these features as well as providing recommendations for additional nourishment and levee stabilization opportunities.

Evaluation of Alternatives

The Service has reviewed the Corps provided documents concerning the TSP and does not object to the navigation improvement measures outlined in the TSP, specifically deepening and widening of the MSC and the construction of a 1,200-foot turning basin. The Service does however; have concerns regarding the lack of mitigation for direct and indirect aquatic resource impacts sustained because of the TSP. The Service does not support in-bay unconfined dredge material disposal as described in the DEIS and believes the dredge material can used beneficially in beach nourishment, oyster reef, bird island, marsh creation, or other eco-friendly features aimed at benefiting trust resources. The Service does commend the Corps for including the beneficial use of dredged material at Chester Island and recommends close coordination with resource agency staff and Texas Audubon well in advance of a planned placement to discuss design and implementation.

Matagorda Bay estuary remains a testament to the resiliency of the many estuarine organisms, which are physiologically adapted to a wide range of salinities and conditions. Overall, the Corps asserts that the increases in salinity caused by the TSP are not expected to cause significant deleterious effects to motile species. However, more subtle and cumulative impacts should not be overlooked, particularly in concert with possible future changes in freshwater inflows into the Matagorda Bay estuary. The biotic health of Matagorda Bay depends on the maintenance of adequate freshwater inflow more than any other single factor. Should these be diminished or altered, then incremental increases in salinity caused by the TSP could impact bay habitats and the Service's trust resources.

Overall, we anticipate negative net benefits to the natural resources (wetlands, sea grasses, oysters, including piping plover critical habitat) in Matagorda Bay due the TSP and the "Least Cost Dredge Material Management Plan." This is in stark contrast to previously coordinated efforts during the 2009 MSCIP where the Corps agreed to a suite of restoration and creation features including in-bay marshes, beach nourishment, shoreline protection, oyster reef creation, and bird island nourishment aimed to offset negative project impacts. The MSCIP should employ similar mitigation that occurred during the Houston Ship Channel navigation expansion project. This project mitigated for direct and indirect impacts to oyster and bay bottom habitats, avoided in-bay unconfined dredge material disposal, created over 4,000 acres of intertidal marsh habitat, restored and created oyster reef habitat, and constructed a nine acre bird island that supports 12 species of colonial waterbirds.

The Service typically performs spatial analysis (using geographic information systems) while evaluating impacts to the natural resources within the project area. Due to the lack of specific geographic information system files required from the Corps, our spatial analysis evaluations were thus limited. Instead, the Corps provided engineering designs and approximations of project features for our assessment. We presume the Corps will provide the appropriate files during the PED phase of the study and the Service anticipates a more rigorous evaluation with additional recommendations (if necessary) at that time.

Recommendations

Matagorda Bay is among the most dynamic coastal environments in Texas, protected from tides and storms of the Gulf of Mexico by the Matagorda Peninsula, and is divided almost equally between Calhoun and Matagorda counties. The MSC, a 26-mile long channel has an outer channel four miles long, divides Matagorda Peninsula and continues through Matagorda and Lavaca Bays terminating at Point Comfort. The Study evaluated a series of alternatives culminating in the TSP selection of a 47-foot deep and 300'/600' wide (entrance and Gulf) channel and the construction of a new 1,200-ft turning basin, which are endorsed by the CPA. The Study identified 122 acres of permanent impacts to oyster habitat, almost 3,000 acres of direct impacts to bay bottom and off shore habitat, with no direct or indirect impacts to wetlands. The Corps proposes to mitigate for only oyster impacts. The 50-year life span of the project begins in 2024 and end in 2074.

Overall, the Corps asserts that implementation of the TSP will provide safer vessel transport; increased economic opportunity for the local ports of Matagorda Bay; and have minimal impacts to the coastal environment. The DEIS in general used outdated or incomplete datasets and failed to fully evaluate impacts to the environment therefore, the Service is not able to fully analyze the effects of the project on the aquatic ecosystem. Based on these concerns, the Services makes the following recommendations:

<u>Recommended studies</u>

1. Model changes and evaluate mercury contamination through sediment disturbance in the MSC.

2. Evaluate changes in velocities in Matagorda Bay due to TSP implementation.
3. Evaluate the effects of a tidal prism on the upper portions of Matagorda Bay as a result of the TSP.
4. Perform a comprehensive analysis of available studies on the predicted increases in the salinity regime (concentration and duration) and potential impacts of those increases on oysters and other estuarine-dependent species.
5. Perform an analysis of the propensity of the deeper, wider channel to alter the residence time of freshwater in the estuary.
6. Evaluate the TSP for effects on tidal amplitude with respect to fish and wildlife in Matagorda and Lavaca Bays.
7. Evaluate the temporal impacts to functions and services provided by affected oyster reef.
8. Evaluate the transport and fate of unconfined dredged material as a result of wind-driven waves, ship wakes, and anticipated water circulation patterns and currents.
9. Evaluate the potential impacts of the alternation of water circulation and currents and the transport and settlement of sediments on reefs, other oyster habitat, and seagrass beds in close proximity to the proposed unconfined in-bay PAs.
10. Perform a comprehensive analysis of the potential impacts of dredging, open bay sediment disposal, and potential sediment migration on all life stages of fish and invertebrates.
11. Perform a comprehensive analysis of the potential impacts of the alteration of water circulation and currents on transport and migration of larval or juvenile stages of fish and invertebrate species.
12. Perform a comprehensive hydrologic analysis (short and long term affects) of impacts from the proposed west side unconfined in-bay PAs on water circulation and current patterns.
13. Complete comprehensive habitat surveys for any area being considered as a new or proposed PA.
14. There is a clear lack of updated information regarding the ecological resources within the study area. We recommend a thorough analysis of the resources (oyster, seagrass, sea turtle, manatee etc.) and how the TSP will affect those resources by conducting comprehensive habitat surveys for the entire study area.
15. Model the direct and indirect effects of increased salinity, turbidity, dispersion, and sediments from the proposed unconfined placement areas on oyster and other aquatic resources found in the project area. This analysis should include temporal (immediate and long-term) effects. Once determined, propose adequate compensatory mitigation if impacts cannot be avoided. These modeling efforts should be conducted as a coordinated effort with the ICT.
16. Restoration projects within the study area should be identified and the affects from the TSP on projects should be evaluated.
17. The Corps should perform a bay-wide sediment transport model that could influence placement area locations
18. Fund seagrass research in concert with the Seagrass Conservation Plan for Texas (Onuf, et al., 2012) to achieve effective management and conservation of seagrasses in Matagorda Bay.

19. The 2018 FR/EIS does not clearly describe the potential impacts to ecological resources, nor does it clearly present the compensatory mitigation. Corps should fully describe all ecological resources, specifically those directly or indirectly impacted by the project. All compensatory mitigation should be clearly presented and easily accessed in future documents.
20. Develop a robust monitoring program for the open bay disposal sites to evaluate seagrass growth in coordination with the natural resource agencies.

Administrative

21. The Corps should fund the Service through the PED phase to continue coordination efforts aimed at further refining the TSP and minimizing impacts during construction.
22. The Service does not support open-water disposal of dredge material identified as the "low cost base plan" and we continue to urge the Corps to discontinue this practice. As an alternative, we believe the Corps should aim to beneficially use all dredge material. Strategically engineered confined placement used to create marsh cells or bird islands should be considered high priority for dredge material disposal in Matagorda Bay.
23. Complete mitigation and monitoring plans should be disclosed in the DEIS with refinement to occur during the PED phase. The Corps does consider costs associated with mitigation and it is a driving factor when analyzing TSP alternatives. We recommend the Corps develop a comprehensive mitigation and monitoring plan commensurate with the impacts associated with the TSP.
24. When mitigation features are identified, they should complement existing agency restoration plans and management objectives and aim to enhance aquatic habitats for wetland dependent species.
25. The Corps should initiate coordination with NMFS regarding EFH, sea turtle impacts, and mitigation issues within the project area.
26. Should this project move to the design and construction phases, the Corps should evaluate the project's effects on threatened and endangered species and other natural resources. The Corps should utilize the IPaC system at http://ecos.fws.gov/ipac/and initiate any necessary consultation procedures pursuant to Section 7 of the Act.
27. The Corps should develop a spill response plan for the relocation of 22 pipelines within the study area. A plan is necessary prior to construction given the vast amount of natural resources in Matagorda Bay.
28. Cumulative effects from this and the storm surge reduction or restoration measures from the Texas Coastal Study projects must be considered when developing project features and mitigation plans. We recommend the sponsor along with the Corps work in coordination with counterparts from the Texas Coastal Study to develop complimentary project features and mitigation plans if necessary.
29. The Corps should evaluate the project pursuant to the Coastal Barrier Resource Act of 1982.
30. Provide the Service with reports and plans specific to the SE for review and comment.

Restoration

31. Engineer and design a new bird island(s) using new work and maintenance dredge materials. Locate the island sufficiently away from the MSC to avoid wave fetch from the MSC and at least one mile from any shoreline to avoid predator issues. The Texas Audubon Society evaluated such criteria and identified suitable areas in Matagorda Bay for bird island creation and restoration.
32. Coordinate with Audubon Texas regarding the placement of new work or maintenance dredge material at Chester Island during the PED phase. Timing restrictions and placement location of dredge material deposition will require early coordination.
33. Dredged material can combat changes in water levels, erosion, and subsidence in most marsh habitats found in Matagorda and Calhoun Counties through thin layer, open pipe placement, terraces features, and training berms. Pumping distance should not be a limitation and we urge the Corps to evaluate transporting material (new work and maintenance material) to areas outside of the typical 6-mile pump distance to areas along the shoreline and along the GIWW if necessary. All new work (should it become available for use) and maintenance material should be thoroughly tested for contaminants using the standards outlined in the EPA's Inland Testing and Ocean Dumping Manuals prior to being used in any beneficial use projects. Should data suggest the presence of toxic levels of contaminants that can harm wildlife or humans, the Service recommends disposal of the material in accordance with EPA guidelines and within an approved landfill site.
34. Invasive native and non-native terrestrial and aquatic plants continues to spread across the Study Area. To combat this growing issue, any alternative moving forward should include treatment/removal and monitoring of invasive species.
35. We recommend the Corps coordinate with the Service, TPWD, and other interested natural resource agencies when developing detailed plans regarding restoration or BU measures, especially during PED and construction phases.
36. Reduce siltation and sedimentation; protecting and conserving coastal dune, shrub, and shell rake habitats in Matagorda Bay to improve breeding strategies for the diamondback terrapin.

Mitigation

37. Develop a plan for compensatory mitigation for any proposed direct and indirect impacts to oyster habitat due to excavation and the altered salinity regime cause by the TSP.
38. Direct and indirect wetland impacts (along shoreline and PAs) should be compensated All wetlands impacted from direct or indirect
39. Mitigation for indirect impacts to the bay bottom from channel dredging and construction of placement areas is not fully realized and addressed in the DEIS requiring revision. Additionally, marsh creation to offset any impacts to bay bottom once realized in the 2014 plan are not included in the 2018 base plan. We request additional clarification as to the Corps' intent to use marsh creation as mitigation.
40. Coordinate with the ICT to develop and incorporate success criteria, monitoring, and adaptive management into all selected features to ensure project success.
41. Evaluate new or incorporate previously identified beneficial use opportunities into the DMMP.

42. The Service is concerned with the Corps intent to drop portions of the mitigation and beneficial use options from the current DEIS previously agreed upon under earlier MSC coordination efforts. The Service was part of an ICT during the 2014 DEIS effort where beneficial use features (beach nourishment, oyster reef creation and protection, shoreline protections, and marsh), were incorporated into the final base plan. The Corps removed the beneficial use features from the current plan with no explanation. We request clarification as to why these options have been removed and/or replaced from the 2018 DEIS.

Wildlife and Fisheries

43. Whooping cranes frequent marsh habitat in Matagorda and Calhoun Counties. In regards to whooping cranes: project equipment that may be a collision hazard (guy wires that support dredging equipment, telecommunication towers on dredges, antenna or similar items located on dredges) will be marked using red plastic balls or other suitable marking devices sized and spaced, and lighted during inclement weather conditions when low light and/or fog is present and implemented from October 1 through April 30. Prepare a spill response plan specific to the whooping crane for ICT review and comment and implemented prior to the onset of construction activities. These actions do not alleviate the Corps responsibility of evaluating project actions and initiating formal Section 7 consultation and should not be construed as such.
44. The Service encourages the Corps to initiate coordination during the design phases of the project and prior to the commencement of any construction activities so the site-specific best management practices (BMPs) can be developed. Measures should be implemented to avoid or minimize the adverse effects of pollution, sedimentation, and erosion by limiting soil disturbances, scheduling work when the fewest number of fish are likely to be present, managing likely pollutants, and limiting the harm that may be caused by accidental discharges of pollutants and sediments. BMPs attempt to minimize impacts to fish and wildlife species within the immediate construction and nearby areas and may consist of floating turbidity curtains, limiting certain construction activities to daylight hours, limiting the use of or shielding lights at night, no vegetation removal or soil disturbance should be allowed outside of the project area, removal of mature trees providing soil or bank stabilization should be coordinated with the ICT, erosive banks should be stabilized using bioengineering solutions and minimize the use of riprap, and using monitors in open water areas to identify sensitive species.
45. Construction of any study features shall occur at least 1,000 feet away from a colonial waterbird rookery site during the breeding season of February 1 through September 1.
46. Avoid affecting oysters, oyster reef, and scattered shell habitats in Matagorda and Lavaca Bays.
47. The following conditions should be implemented to avoid impacts to manatee. All contract personnel associated with the project shall be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all

construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within 100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels shall operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service (281/286-8282) and the Texas Marine Mammal Stranding Network (800/9-MAMMAL).

48. To minimize disturbance to colonial nesting birds, the following conservation measures should be considered:

   A. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Texas's brown pelican colonies; however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. Brown pelicans are known to nest on barrier islands and other coastal islands in Matagorda and Lavaca Bays. In spring and summer, nests are built in mangrove trees or other shrubby vegetation, although ground nesting may also occur. Brown pelicans feed along the Texas coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance.

   B. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present).

   C. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present).

   D. In addition, we recommend that on-site contract personnel be trained to identify colonial nesting birds and their nests, and avoid affecting them during the breeding season (i.e., the time period outside the activity window).

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Appendix A

Reptiles	
Diamond back terrapin	*Malaclemys terrapin littoralis*
Kemps Ridley	*Lepidochelys kempii*
Green sea turtle	*Chelonia mydas*
Loggerhead sea turtle	*Caretta caretta*
Leatherback sea turtle	*Dermochelys coriacea*
Hawksbill sea turtle	*Eretmochelys imbricata*
Avian	
Black rail	*Laterallus jamaicensis*
Snowy plover	*Charadrius nivosus*
Piping plover	*Charadrius melodus*
Brown pelican	*Pelecanus occidentalis*
Black skimmer	*Rynchops niger*
Rosette spoonbill	*Platalea ajaja*
Reddish egret	*Egretta rufescens*
White ibis	*Eudocimus albus*
Whooping crane	*Grus americana*
Reddish egret	*Egretta rufescens*
Mammals	
West Indian manatee	*Trichechus manatus*
Fish and Invertebrates	
Eastern oyster	*Crassostrea virginica*
Brown shrimp	*Crangon crangon*
White shrimp	*Litopenaeus setiferus*
Red drum	*Sciaenops ocellatus*
Gray snapper	*Lutjanus griseus*
Saltmarsh topminnow	*Fundulus jenkinsi*
Lane snapper	*Lutjanus synagris*
Red snapper	*Lutjanus campechanus*
Gray triggerfish	*Balistes capriscus*
Almaco jack	*Seriola rivoliana*
Greater amberjack	*Seriola dumerili*
King mackerel	*Scomberomorus cavalla*
Cobia	*Rachycentron canadum*
Atlantic sharpnose	*Rhizoprionodon terraenovae*
Bonnethead	*Sphyrna tiburo*
Bull	*Carcharhinus leucas*
Blacktip	*Carcharhinus limbatus*
Finetooth	*Carcharhinus isodon*
Scalloped hammerhead	*Sphyrna lewini*

Spinner	*Carcharhinus brevipinna*
Striped mullet	*Mugil cephalus*
Atlantic croaker	*Micropogonias undulatus*
Gulf menhaden	*Brevoortia patronus*
Spotted trout	*Cynoscion nebulosus*
Sand trout	*Cynoscion arenarius*
Southern flounder	*Paralichthys lethostigma*
Black drum	*Pogonias cromis*
Blue crab	*Callinectes sapidus*

Plants	
Smooth cordgrass	*Spartina alterniflora*
Saltwort	*Batis maritime*,
Saltgrass	*Distichlis spicata*
Glasswort	*Salicornia* spp.
Yucca	*Yucca* spp.
Coastal arrowhead	*Sagittaria lancifolia*
Shoalgrass	*Halodule wrightii*,
Widgeongrass	*Ruppia maritima*,
Turtlegrass	*Thalassia testudinum*
Clovergrass	*Halophila engelmannii*

USACE Responses to USFWS Coordination Act Report Recommendations

Recommended Studies
1. Model changes and evaluate mercury contamination through sediment disturbance in the MSC.
Non-concur. *Testing of sediment has been ongoing in Matagorda Bay as a result of the Alcoa Point Comfort CERCLA investigation. Prior to dredging the sediment will be tested in coordination with EPA. If mercury contaminated material is discovered, that material will be removed and handled by the Non-Federal Sponsor and Alcoa.*
2. Evaluate changes in velocities in Matagorda Bay due to TSP implementation.
Concur. *Modeling of the changes of circulation within the Matagorda Bay resulting from the project has been conducted by USACE engineers. The only significant changes in velocity were a decrease in currents in the entrance channel.*
3. Evaluate the effects of a tidal prism on the upper portions of Matagorda Bay as a result of the TSP.
Concur. *Modeling of the changes of tidal prism within the Matagorda Bay resulting from the project has been conducted by USACE engineers.*
4. Perform a comprehensive analysis of available studies on the predicted increases in the salinity regime (concentration and duration) and potential impacts of those increases on oysters and other estuarine-dependent species.
Concur. *USACE can conduct this comprehensive analysis as part of the pre-construction, engineering and design phase of the study. The analysis would likely achieve better results if done after the oyster surveys are conducted. The results of the analysis can then be included with the oyster surveys to determine overall impacts to oysters.*
5. Perform an analysis of the propensity of the deeper, wider channel to alter the residence time of freshwater in the estuary.
Concur. *The data for this analysis can be retrieved from the circulation modeling performed by USACE.*
6. Evaluate the TSP for effects on tidal amplitude with respect to fish and wildlife in Matagorda and Lavaca Bays.
Concur. *The tidal amplitude estimation is expected to minimal as a result of the project, less than 1%. The effects to fish and wildlife are expected to be of an insignificant or discountable nature.*
7. Evaluate the temporal impacts to functions and services provided by affected oyster reef.
Concur. *In order to estimate impacts to oyster reefs, the Swannack et al. (2013) oyster HSI model was used to determine AAHUs at both the impact site and a proposed mitigation site. The model was run over a 50-year time period which accounts for impacts to functions and services over the life of the project.*
8. Evaluate the transport and fate of unconfined dredged material as a result of wind-driven waves, ship wakes, and anticipated water circulation patterns and currents.
Concur. *The effects on circulation patterns and currents as a result of this project were evaluated by USACE during the course of the study to estimate shoaling patterns. The effects of wind-driven waves and ship wakes were factored in to that estimation.*
9. Evaluate the potential impacts of the alternation of water circulation and currents and the transport and settlement of sediments on reefs, other oyster habitat, and seagrass beds in close proximity to the proposed unconfined in-bay P As.
Concur. *The effects on circulation patterns and currents as a result of this project were evaluated by USACE during the course of the study to estimate shoaling patterns. The new underwater placement areas are the same dimensions as the existing PAs. Placement of*

material on the western side of the channel is expected to reduce ship wakes and wave activity which would improve aquatic habitats.
10. Perform a comprehensive analysis of the potential impacts of dredging, open bay sediment disposal, and potential sediment migration on all life stages of fish and invertebrates.
Non-concur. *There is a long history of dredging and open-water placement along the Matagorda Ship Channel. There is currently no ongoing controversy or documented findings to warrant a comprehensive analysis of all life stages of fish and invertebrates.*
11. Perform a comprehensive analysis of the potential impacts of the alteration of water circulation and currents on transport and migration of larval or juvenile stages of fish and invertebrate species.
Non-concur. *There is currently no ongoing controversy or documented findings to warrant a comprehensive analysis. Placement of material on the western side of the channel is expected to reduce ship wakes and wave activity which would improve aquatic habitats.*
12. Perform a comprehensive hydrologic analysis (short and long term affects) of impacts from the proposed west side unconfined in-bay P As on water circulation and current patterns.
Concur. *The effects on circulation patterns and currents as a result of this project were modeled by USACE during the course of the study to estimate shoaling patterns. The results of this model was used to look at potential placement locations.*
13. Complete comprehensive habitat surveys for any area being considered as a new or proposed PA.
Partially concur. *The Corps concurs with the recommendation to conduct oyster surveys prior to construction to get an accurate measure of acreage impacted by placement of material. However, USACE does not concur to with performing other "comprehensive" habitat surveys. NMFS has not required mitigation for bay bottom impacts where material will be placed, so surveys of benthic habitats are not necessary for placement areas.*
14. There is a clear lack of updated information regarding the ecological resources within the study area. We recommend a thorough analysis of the resources (oyster, seagrass, sea turtle, manatee etc.) and how the TSP will affect those resources by conducting comprehensive habitat surveys for the entire study area.
Partially concur. *USACE concurs that some of the ecological resource data may not have been up-to-date. SMART planning requires that the PDT utilizes the best available data when making decisions. The PDT utilized habitat survey data that was available at the time to make decisions regarding impacts to ecological resources. The Corps has committed to performing oyster surveys prior to construction to get an accurate measure of acreage impacted by placement of material and can work with USWFWS and TPWD to conduct surveys for seagrass along the west bay shorelines prior to construction. USACE does not concur with performing other comprehensive habitat surveys of the entire study area, as the project is not expected to have a significant impact to those resources.*
15. Model the direct and indirect effects of increased salinity, turbidity, dispersion, and sediments from the proposed unconfined placement areas on oyster and other aquatic resources found in the project area. This analysis should include temporal (immediate and long-term) effects. Once determined, propose adequate compensatory mitigation if impacts cannot be avoided. These modeling efforts should be conducted as a coordinated effort with the ICT.
Non-concur. *USACE is limited in the used of models available for use in civil works projects to those certified by the Ecosystem Restoration Planning Center of Expertise. In order to estimate impacts to oyster reefs, the Swannack et al. (2013) oyster HSI model was used to determine AAHUs at both the impact site and a proposed mitigation site. This model utilizes salinity as one of the variables within the model.*

16. Restoration projects within the study area should be identified and the affects from the TSP on projects should be evaluated.
Non-concur. *No restoration projects were identified by the resource agencies or any non-governmental agency within the study area during the study process which would require further investigation of the projects effects.*
17. The Corps should perform a bay-wide sediment transport model that could influence placement area locations
Non-concur. *Sediment transport models are notoriously unreliable, since the physics are unknown.*
18. Fund seagrass research in concert with the Seagrass Conservation Plan for Texas (Onuf, et al., 2012) to achieve effective management and conservation of seagrasses in Matagorda Bay.
Non-concur. *The USACE generally does not fund general research efforts not tied directly to Corps projects*
19. The 2018 FR/EIS does not clearly describe the potential impacts to ecological resources, nor does it clearly present the compensatory mitigation. Corps should fully describe all ecological resources, specifically those directly or indirectly impacted by the project. All compensatory mitigation should be clearly presented and easily accessed in future documents.
Partially-concur. *USACE does not concur that the impacts were not presented. The impacts to ecological resources are more thoroughly presented in Appendix B of the FR/EIS than the main portion of report. Appendix B also thoroughly discusses the compensatory mitigation required due to unavoidable impacts resulting from the recommended plan. Enclosure 1 of Appendix B presents the alternative methods of mitigation construction considered for this project. The Corps does concur that it may have done the best job presenting the information and will strive to do a better job of presenting the material in a clearer manner in future reports.*
20. Develop a robust monitoring program for the open bay disposal sites to evaluate seagrass growth in coordination with the natural resource agencies.
Non-concur. *Seagrass planting is not part of the mitigation plan for the project and therefore no funding would be available for a monitoring program.*
Administrative
21. The Corps should fund the Service through the PED phase to continue coordination efforts aimed at further refining the TSP and minimizing impacts during construction.
Concur. *The Corps will include the Service's coordination efforts in the funding request for the PED phase.*
22. The Service does not support open-water disposal of dredge material identified as the "low cost base plan" and we continue to urge the Corps to discontinue this practice. As an alternative, we believe the Corps should aim to beneficially use all dredge material. Strategically engineered confined placement used to create marsh cells or bird islands should be considered high priority for dredge material disposal in Matagorda Bay.
Partially concur. *The Corps does concur that using material beneficially whenever possible is a priority. Beneficial use was considered when creating the DMMP. The placement of material at Chester Island is a beneficial use of both new work and maintenance material. However, the Corps does not concur that all material can be used beneficially. The cost of placement of material above the Least Cost Plan is the responsibility of Non-Federal Sponsor and to completely utilize beneficial use placement would be cost prohibitive to this project.*
23. Complete mitigation and monitoring plans should be disclosed in the DEIS with refinement to occur during the PED phase. The Corps does consider costs associated with mitigation and it is a driving factor when analyzing TSP alternatives. We recommend the Corps develop a

comprehensive mitigation and monitoring plan commensurate with the impacts associated with the TSP.
Concur. *A mitigation plan is included in the EIS (Appendix B, Enclosure 1) as well as a Monitoring and Adaptive Management Plan (Appendix B, Enclosure 10). The costs were included in the benefit to cost ratio calculation. The estimated costs for construction of the mitigation sites are included in the mitigation plan.*
24. When mitigation features are identified, they should complement existing agency restoration plans and management objectives and aim to enhance aquatic habitats for wetland dependent species.
Concur. *The Corps will work with the resource agencies, to include the Service and TPWD, to properly site and develop the mitigation features during the PED and construction phases.*
25. The Corps should initiate coordination with NMFS regarding EFH, sea turtle impacts, and mitigation issues within the project area.
Concur. *The Corps has coordinated with NMFS in the Galveston, TX office regarding EFH and mitigation. Our coordination is complete with regards to these per NMFS. The Corps has also completed coordination with NMFS in the St. Petersburg, FL office regarding sea turtle impacts.*
26. Should this project move to the design and construction phases, the Corps should evaluate the project's effects on threatened and endangered species and other natural resources. The Corps should utilize the IPaC system at http://ecos.fws.gov/ipac/and initiate any necessary consultation procedures pursuant to Section 7 of the Act.
Concur. *Upon reaching the PED phase, the Corps will utilize the IPaC system for any necessary updates to the ESA coordination and reinitiate consultation, if necessary.*
27. The Corps should develop a spill response plan for the relocation of 22 pipelines within the study area. A plan is necessary prior to construction given the vast amount of natural resources in Matagorda Bay.
Non-concur. *The spill response plans for relocation of pipelines will be the responsibility of the Calhoun Port Authority and the contractor relocating the pipelines.*
28. Cumulative effects from this and the storm surge reduction or restoration measures from the Texas Coastal Study projects must be considered when developing project features and mitigation plans. We recommend the sponsor along with the Corps work in coordination with counterparts from the Texas Coastal Study to develop complimentary project features and mitigation plans if necessary.
Partially-concur. *USACE does not concur, at this time, with coordinating the mitigation features with the Texas Coastal Study as the Texas Coastal Study is not finalized. If the Texas Coastal Study is finalized, and authorized, when this project goes to construction USACE would concur with working with the PDT from the Coastal Study and the resource agencies to ensure the mitigation plans are complimentary features of both studies, to the maximum extent possible.*
29. The Corps should evaluate the project pursuant to the Coastal Barrier Resource Act of 1982.
Concur. *The project has been reviewed by USFWS for compliance with CBRA and the letter documenting this process has been added to the Final Report-Environmental Impact Statement (Appendix B, Enclosure 9).*
30. Provide the Service with reports and plans specific to the SE for review and comment.
Concur. *The Corps will provide these reports and plans to the Service.*
Restoration

31. Engineer and design a new bird island(s) using new work and maintenance dredge materials. Locate the island sufficiently away from the MSC to avoid wave fetch from the MSC and at least one mile from any shoreline to avoid predator issues. The Texas Audubon Society evaluated such criteria and identified suitable areas in Matagorda Bay for bird island creation and restoration.
Non-concur. *This would be a new feature that was not investigated within the study. A new EIS would need to be conducted for such a feature to be constructed.*
32. Coordinate with Audubon Texas regarding the placement of new work or maintenance dredge material at Chester Island during the PED phase. Timing restrictions and placement location of dredge material deposition will require early coordination.
Concur. *The Corps has been working, and will continue to work, with Audubon Texas regarding placement of new work and maintenance material on Chester Island.*
33. Dredged material can combat changes in water levels, erosion, and subsidence in most marsh habitats found in Matagorda and Calhoun Counties through thin layer, open pipe placement, terraces features, and training berms. Pumping distance should not be a limitation and we urge the Corps to evaluate transporting material (new work and maintenance material) to areas outside of the typical 6-mile pump distance to areas along the shoreline and along the GIWW if necessary. All new work (should it become available for use) and maintenance material should be thoroughly tested for contaminants using the standards outlined in the EPA's Inland Testing and Ocean Dumping Manuals prior to being used in any beneficial use projects. Should data suggest the presence of toxic levels of contaminants that can harm wildlife or humans, the Service recommends disposal of the material in accordance with EPA guidelines and within an approved landfill site.
Concur. *Prior to dredging sediment testing for contaminants will be conducted in coordination with the EPA. The Non-Federal Sponsor has an agreement with Alcoa for the removal and the disposal of contaminated material associated with the CERCLA site at Point Comfort. Material will be handled in accordance with EPA regulations.*
34. Invasive native and non-native terrestrial and aquatic plants continues to spread across the Study Area. To combat this growing issue, any alternative moving forward should include treatment/removal and monitoring of invasive species.
Non-concur. *This project will not be the exacerbating cause of invasive and/or non-native aquatic plant species proliferation throughout the bay. As such, funding would not be available for a program to treat/remove and monitor invasive species in the bay.*
35. We recommend the Corps coordinate with the Service, TPWD, and other interested natural resource agencies when developing detailed plans regarding restoration or BU measures, especially during PED and construction phases.
Concur. *The Corps will coordinate with the resource agencies, to include the Service and TPWD, at the earliest possible point in the PED process regarding the design of BU measures.*
36. Reduce siltation and sedimentation; protecting and conserving coastal dune, shrub, and shell rake habitats in Matagorda Bay to improve breeding strategies for the diamondback terrapin.
Concur. *The Corps will work with the ICT to formulate BMPs for siltation and sedimentation reduction.*
Mitigation
37. Develop a plan for compensatory mitigation for any proposed direct and indirect impacts to oyster habitat due to excavation and the altered salinity regime cause by the TSP.
Concur. *A compensatory mitigation plan is included in the Final Report in Appendix B, Enclosure 1. In order to estimate impacts the Swannack et al. (2013) oyster HSI model was used to determine AAHUs at both the impact site and a proposed mitigation site. The model*

uses salinity as a variable to calculate the HSI. Therefore, the use of this model takes into account the altered salinity regime when calculating the number of acres required for oyster mitigation.
38. Direct and indirect wetland impacts (along shoreline and P As) should be compensated All wetlands impacted from direct or indirect
Non-concur. *The placement area PA P1 was removed from the DMMP, so no direct marsh impacts are included as part of the project. Therefore, no compensation is required for direct wetland impacts are required. We do not believe that the small temporary increases in salinity (1-2) will lead to changes in wetland that will impact the overall landscape or modify the habitat. Indirect impacts to wetlands are likely to result from relative sea level rise, which will occur without this project. Therefore, no compensation is required for indirect wetland impacts.*
39. Mitigation for indirect impacts to the bay bottom from channel dredging and construction of placement areas is not fully realized and addressed in the DEIS requiring revision. Additionally, marsh creation to offset any impacts to bay bottom once realized in the 2014 plan are not included in the 2018 base plan. We request additional clarification as to the Corps' intent to use marsh creation as mitigation.
Partially-concur. *The Corps does not concur with creating marsh as mitigation. Discussions with National Marine Fisheries Service regarding bay bottom impacts and essential fish habitat have resulted in a conclusion by NMFS that mitigation for dredging and placement is not necessary or required. The placement plan will provide some beneficial opportunities for both submerged aquatic vegetation habitat, as well as other algal species which are important to finfish and invertebrates in Matagorda Bay.* *The Corps concurs with providing clarification on marsh creation as mitigation. The Corps has no plans to use marsh creation as mitigation as no impacts to wetlands were identified in the EIS.*
40. Coordinate with the ICT to develop and incorporate success criteria, monitoring, and adaptive management into all selected features to ensure project success.
Concur. *An adaptive management plan is included in the FR-EIS (Appendix B, Enclosure 10) which include success criteria and monitoring plans for oyster mitigation. However, as part of adaptive management plans the Corps needs to be nimble enough to modify its criteria and plans as needed. The Corps will work with the ICT to ensure that the oyster reefs created as part of the project's mitigation are done with the best available success criteria, monitoring, and management plans.*
41. Evaluate new or incorporate previously identified beneficial use opportunities into the DMMP.
Non-concur. *The DMMP is the Least Cost Plan which is environmentally acceptable. The PDT looked at ways to use the material beneficially, however the cost of that beneficial use would be the sole responsibility of the non-federal sponsor if it was above the Least Cost Plan. The previously identified beneficial use opportunities were proposed under a regulatory permit by a private applicant. The cost of those features were prohibitive to this project.*
42. The Service is concerned with the Corps intent to drop portions of the mitigation and beneficial use options from the current DEIS previously agreed upon under earlier MSC coordination efforts. The Service was part of an ICT during the 2014 DEIS effort where beneficial use features (beach nourishment, oyster reef creation and protection, shoreline protections, and marsh), were incorporated into the final base plan. The Corps removed the beneficial use features from the current plan with no explanation. We request clarification as to why these options have been removed and/or replaced from the 2018 DEIS.

Non-concur. *See the response to comment 41.*

Wildlife and Fisheries

43. Whooping cranes frequent marsh habitat in Matagorda and Calhoun Counties. In regards to whooping cranes: project equipment that may be a collision hazard (guy wires that support dredging equipment, telecommunication towers on dredges, antenna or similar items located on dredges) will be marked using red plastic balls or other suitable marking devices sized and spaced, and lighted during inclement weather conditions when low light and/or fog is present and implemented from October 1 through April 30. Prepare a spill response plan specific to the whooping crane for ICT review and comment and implemented prior to the onset of construction activities. These actions do not alleviate the Corps responsibility of evaluating project actions and initiating formal Section 7 consultation and should not be construed as such.

Non-concur. *The project will not be conducting work within the marsh areas. Any spill response plans would be the responsibility of the contractor performing dredging and placement operations.*

44. The Service encourages the Corps to initiate coordination during the design phases of the project and prior to the commencement of any construction activities so the site-specific best management practices (BMPs) can be developed. Measures should be implemented to avoid or minimize the adverse effects of pollution, sedimentation, and erosion by limiting soil disturbances, scheduling work when the fewest number of fish are likely to be present, managing likely pollutants, and limiting the harm that may be caused by accidental discharges of pollutants and sediments. BMPs attempt to minimize impacts to fish and wildlife species within the immediate construction and nearby areas and may consist of floating turbidity curtains, limiting certain construction activities to daylight hours, limiting the use of or shielding lights at night, no vegetation removal or soil disturbance should be allowed outside of the project area, removal of mature trees providing soil or bank stabilization should be coordinated with the ICT, erosive banks should be stabilized using bioengineering solutions and minimize the use of riprap, and using monitors in open water areas to identify sensitive species.

Concur. *The Corps will engage the ICT at the earliest point possible during PED to develop BMPs to minimize, or avoid, impacts to sensitive species.*

45. Construction of any study features shall occur at least 1,000 feet away from a colonial waterbird rookery site during the breeding season of February 1 through September 1.

Concur. *Placement of material at Chester Island will be coordinated with Audubon Texas in order to ensure that rookery sites are not disturbed.*

46. Avoid affecting oysters, oyster reef, and scattered shell habitats in Matagorda and Lavaca Bays.

Non-concur. *There are unavoidable impacts to oyster reefs as part of this project. Those impacts are detailed in the FR/EIS. The impacts are to be compensated through mitigation, which has been, and will continue to be, coordinated with the resource agencies.*

47. The following conditions should be implemented to avoid impacts to manatee. All contract personnel associated with the project shall be informed of the potential presence of manatees and the need to avoid collisions with manatees, which are protected under the Marine Mammal Protection Act of 1972 and the Endangered Species Act of 1973. All construction personnel are responsible for observing water-related activities for the presence of manatee(s). Temporary signs should be posted prior to and during all construction/dredging activities to remind personnel to be observant for manatees during active construction/dredging operations or within vessel movement zones (i.e., work area), and at least one sign should be placed where it is visible to the vessel operator. Siltation barriers, if used, should be made of material in which manatees could not become entangled, and should be properly secured and monitored. If a manatee is sighted within

100 yards of the active work zone, special operating conditions should be implemented, including: no operation of moving equipment within 50 feet of a manatee; all vessels shall operate at no wake/idle speeds within 100 yards of the work area; and siltation barriers, if used, should be re-secured and monitored. Once the manatee has left the 100-yard buffer zone around the work area on its own accord, special operating conditions are no longer necessary, but careful observations would be resumed. Any manatee sighting should be immediately reported to the U.S. Fish and Wildlife Service (281/286-8282) and the Texas Marine Mammal Stranding Network (800/9-MAMMAL).
Concur. *These conditions will be added to the specifications for the contracts should the project go to construction.*
48. To minimize disturbance to colonial nesting birds, the following conservation measures should be considered: A. For colonies containing nesting brown pelicans, all activity occurring within 2,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 15 through March 31). Nesting periods vary considerably among Texas's brown pelican colonies; however, so it is possible that this activity window could be altered based upon the dynamics of the individual colony. Brown pelicans are known to nest on barrier islands and other coastal islands in Matagorda and Lavaca Bays. In spring and summer, nests are built in mangrove trees or other shrubby vegetation, although ground nesting may also occur. Brown pelicans feed along the Texas coast in shallow estuarine waters, using sand spits and offshore sand bars as rest and roost areas. Major threats to this species include chemical pollutants, colony site erosion, disease, and human disturbance. B. For colonies containing nesting wading birds (i.e., herons, egrets, night-herons, ibis, and roseate spoonbills), anhingas, and/or cormorants, all activity occurring within 1,000 feet of a rookery should be restricted to the non-nesting period (i.e., September 1 through February 15, exact dates may vary within this window depending on species present). C. For colonies containing nesting gulls, terns, and/or black skimmers, all activity occurring within 650 feet of a rookery should be restricted to the non-nesting period (i.e., September 16 through April 1, exact dates may vary within this window depending on species present). D. In addition, we recommend that on-site contract personnel be trained to identify colonial nesting birds and their nests, and avoid affecting them during the breeding season (i.e., the time period outside the activity window).
Concur. *Placement of material at Chester Island will be coordinated with Audubon Texas in order to ensure that nestin sites are not disturbed.*

Enclosure 6 – Section 404(b)(1) Short Form

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

February 2019

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DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

February 15, 2019

Mr. David Galindo
Director, Water Quality Division
Texas Commission on Environmental Quality
P.O. Box 13087, Mail Code 145
Austin, TX 78711-3087

Dear Mr. Galindo,

Enclosed please find a Section 404(b)(1) Evaluation for the Matagorda Ship Channel Improvement Project (MSC), Port Lavaca, Texas, concluding that the Proposed Action would comply with Section 404(b)(1) guidelines (Enclosure). A copy of the Draft Integrated Feasibility Report and Environmental Impact Statement (DIFR-EIS) was provided in May 2018, which included an unsigned version of the Section 404(b)(1) Evaluation. The DEIS was issued as a joint public notice with your agency during the public comment period. We are currently finalizing the DIFR-EIS.

The U.S. Army Corps of Engineers, Galveston District is requesting a Section 401 State Water Quality Certification from Texas Commission on Environment Quality for this action. If you have any questions or concerns, please contact Dr. Harmon Brown, Biologist, Environmental Branch, Regional Planning and Environmental Center at: U.S. Army Corps of Engineers, Regional Planning and Environmental Center, Attn: Dr. Harmon Brown, P.O. Box 1229, Galveston, Texas, 77553-1229. Dr. Brown may also be contacted at 409-766-3837 or harmon.brown@usace.army.mil.

Sincerely,

Douglas C. Sims, PMP, RPA
Chief, Environmental Branch
Regional Planning and Environmental Center

Enclosures

MATAGORDA SHIP CHANNEL IMPROVEMENT PROJECT, PORT LAVACA, TEXAS

EVALUATION OF SECTION 404(b)(1) GUIDELINES (SHORT FORM)

PROPOSED PROJECT: Matagorda Ship Channel Improvement Project Draft Integrated Feasibility Report and Environmental Impact Statement

	Yes	No*
1. Review of Compliance (230.10(a)-(d))		
A review of the proposed project indicates that:		
a. The placement represents the least environmentally damaging practicable alternative and, if in a special aquatic site, the activity associated with the placement must have direct access or proximity to, or be located in the aquatic ecosystem, to fulfill its basic purpose (if no, see section 2 and information gathered for EA alternative). (See Appendix F)	X	
b. The activity does not appear to:		
1) Violate applicable state water quality standards or effluent standards prohibited under Section 307 of the Clean Water Act; (See Appendix B, Section 4.9.3)	X	
2) Jeopardize the existence of Federally-listed endangered or threatened species or their habitat; and (See Appendix B, Section 4.13)	X	
3) Violate requirements of any Federally-designated marine sanctuary (if no, see section 2b and check responses from resource and water quality certifying agencies). (See Appendix B, Enclosure 2)	X	
c. The activity will not cause or contribute to significant degradation of waters of the U.S. including adverse effects on human health, life stages of organisms dependent on the aquatic ecosystem, ecosystem diversity, productivity and stability, and recreational, aesthetic, an economic values (if no, see values, Section 2) (See Appendix B, Section 4.9.3)	X	
d. Appropriate and practicable steps have been taken to minimize potential adverse impacts of the discharge on the aquatic ecosystem (if no, see Section 5) (See Appendix B, Section 4.9.3)	X	

	Not Applicable	Not Significant	Significant*
2. Technical Evaluation Factors (Subparts C-F) (where a 'Significant' category is checked, add explanation below.)			
a. Physical and Chemical Characteristics of the Aquatic Ecosystem (Subpart C) (See Appendix B, Section 4.9.3)			
1) Substrate impacts		X	
2) Suspended particulates/turbidity impacts		X	

3) Water column impacts		X	
4) Alteration of current patterns and water circulation		X	
5) Alteration of normal water fluctuation/hydroperiod		X	
6) Alteration of salinity gradients		X	
b. Biological Characteristics of the Aquatic Ecosystem (Subpart D)			
1) Effect on threatened/endangered species and their habitat		X	
2) Effect on the aquatic food web		X	
3) Effect on other wildlife (mammals, birds, reptiles and amphibians)		X	
c. Special Aquatic Sites (Subpart E)			
1) Sanctuaries and refuges	X		
2) Wetlands Approximately 1.1 acre of low marsh will be impacted by placement in an area previously used for agricultural purposes. Approximately 17.9 acres of high marsh will be impacted by placement at a confined bay placement area. (See Appendix B, Section 4.10 and Enclosure 1)			X
3) Mud flats	X		
4) Vegetated shallows	X		
5) Coral reefs	X		
6) Riffle and pool complexes	X		
d. Human Use Characteristics (Subpart F) (See Appendix B, Section 4.12)			
1) Effects on municipal and private water supplies	X		
2) Recreational and Commercial fisheries impacts		X	
3) Effects on water-related recreation	X		
4) Aesthetic impacts		X	
5) Effects on parks, national and historical monuments, national seashores, wilderness areas, research sites, and similar preserves	X		

	Yes
3. Evaluation of Dredged or Fill Material (Subpart G)	
a. The following information has been considered in evaluating the biological availability of possible contaminants in dredged or fill material (check only those appropriate) (See Appendix F)	
1) Physical characteristics	X
2) Hydrography in relation to known or anticipated sources of contaminants	X
3) Results from previous testing of the material or similar material in the vicinity of the project	X
4) Known, significant sources of persistent pesticides from land runoff or percolation	
5) Spill records for petroleum products or designated (Section 311 of Clean Water Act) hazardous substances	X

6) Other public records of significant introduction of contaminants from industries, municipalities or other sources	X
7) Known existence of substantial material deposits of substances which could be released in harmful quantities to the aquatic environment by man-induced discharge activities	

List appropriate references:

1) Moffatt and Nichol. 2006. Sedimentation Study, Matagorda Ship Channel Improvement Project. Prepared by Mofatt and Nichol. 11011 Richmond Avenue, Suite 200, Houston, TX 77042. October, 2006.
2) PBS&J. 2009. Final Environmental Impact Statement (FEIS) for USACE regarding The Proposed Matagorda Ship Channel Improvement Project, Austin, TX
3) URS. 2014. Section 204(f) Feasibility Report for Calhoun Port Authority, Matagorda Ship Channel Improvement, Houston, TX
4) URS. 2006. Matagorda Sedimentary Analysis. Prepared by: URS Corporation, 10550 Richmond Avenue, Suite 155, Houston, TX 77042. October, 2006.

	Yes	No
b. An evaluation of the appropriate information in 3a above indicates that there is reason to believe the proposed dredged or fill material is not a carrier of contaminants, or that levels of contaminants are substantively similar at extraction and placement sites and not likely to degrade the placement sites, or the material meets the testing exclusion criteria.	X	

	Yes
4. Placement Site Delineation (230.11(f)) (See Appendix F)	
a. The following factors as appropriate, have been considered in evaluating the placement site:	
1) Depth of water at placement site	X
2) Current velocity, direction, and variability at placement site	X
3) Degree of turbulence	X
4) Water column stratification	X
5) Discharge vessel speed and direction	X
6) Rate of discharge	X
7) Fill material characteristics (constituents, amount, and type of material, settling velocities)	X
8) Number of discharges per unit of time	X
9) Other factors affecting rates and patterns of mixing (specify)	X

List appropriate references:

	Yes	No
b. An evaluation of the appropriate factors in 4a above indicates that the placement site and/or size of mixing zone are acceptable.	X	

	Yes	No
5. Actions to Minimize Adverse Effects (Subpart H)		
All appropriate and practicable steps have been taken, through application of recommendations of 230.70-230.77 to ensure minimal adverse effects of the proposed discharge.	**X**	

List actions taken:

1) Silt curtains will be utilized to prevent inadvertent discharge of fill material into adjacent wetland or waterbodies. Forestry BMPs will be utilized to prevent disturbance of forest floors.

	Yes	No*
6. Factual Determination (230.11)		
A review of appropriate information as identified in items 2-5 above indicates that there is minimal potential for short- or long-term environmental effects of the proposed discharge as related to:		
a. Physical substrate at the placement site (review Sections 2a. 3, 4, and 5 above)	**X**	
b. Water circulation, fluctuation and salinity (review Sections 2a. 3, 4, and 5)	**X**	
c. Suspended particulates/turbidity (review Sections 2a. 3, 4, and 5)	**X**	
d. Contaminant availability (review Sections 2a. 3, and 4)	**X**	
e. Aquatic ecosystem structure and function (review Sections 2b and c, 3, and 5)	**X**	
f. Placement site (review Sections 2, 4, and 5)	**X**	
g. Cumulative impacts on the aquatic ecosystem	**X**	
h. Secondary impacts on the aquatic ecosystem	**X**	

7. Evaluation Responsibility	
a. This evaluation was prepared by:	**Harmon Brown**
Position:	**Biologist, Environmental Branch, RPEC**

8. **Findings**	Yes
a. The proposed placement site for discharge of or fill material complies with the Section 404(b)(1) Guidelines.	X
b. The proposed placement site for discharge of dredged or fill material complies with the Section 404(b)(1) Guidelines with the inclusion of the following conditions:	

List of conditions:

c. The proposed placement site for discharge of dredged or fill material does not comply with the Section 404(b)(1) Guidelines for the following reason(s):	
1) There is a less damaging practicable alternative	
2) The proposed discharge will result in significant degradation of the aquatic ecosystem	
3) The proposed discharge does not include all practicable and appropriate measures to minimize potential harm to the aquatic ecosystem	

2/15/19 Date	DOUGLAS C. SIMS Chief, Environmental Branch, RPEC

NOTES:

* A negative, significant, or unknown response indicates that the permit application may not be in compliance with the Section 404(b)(1) Guidelines.

Negative responses to three or more of the compliance criteria at the preliminary stage indicate that the proposed projects may not be evaluated using this "short form" procedure. Care should be used in assessing pertinent portions of the technical information of items 2a-e before completing the final review of compliance.

Negative response to one of the compliance criteria at the final stage indicates that the proposed project does not comply with the Guidelines. If the economics of navigation and anchorage of Section 404(b)(2) are to be evaluated in the decision-making process, the "short form" evaluation process is inappropriate.

Jon Niermann, *Chairman*
Emily Lindley, *Commissioner*
Toby Baker, *Executive Director*

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Protecting Texas by Reducing and Preventing Pollution

May 8, 2019

Dr. Harmon Brown, Biologist
Environmental Compliance Branch
Regional Planning & Environmental Center
Galveston District CESWG-PE-RE
U.S. Army Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Integrated Feasibility Report and Environmental Impact Statement for the Proposed U.S. Army Corps of Engineers Matagorda Ship Channel Project

Dear Dr. Brown:

This letter is in response to the U.S. Army Corps of Engineers (USACE) draft Record of Decision (ROD) received April 16, 2019, for the final Integrated Feasibility Report and Environmental Impact Statement (IFR/EIS) for the proposed USACE Matagorda Ship Channel (MSC) Project. The project is located in Calhoun and Matagorda Counties, Texas.

The TCEQ has reviewed the final IFR/EIS and draft ROD. Based on our evaluation of the information contained in these documents, the TCEQ certifies that there is reasonable assurance that the project will be conducted in a way that will not violate water quality standards.

The MSC extends from the Port of Port Lavaca-Point Comfort Turning Basin in Lavaca Bay, through Matagorda Bay and into the Gulf of Mexico through Matagorda Peninsula via the MSC jetties. The current length of the ship channel is approximately 26 miles. The in-bay channel is authorized to a current depth of -38 feet Mean Low Low Water (MLLW) with a bottom width of 200 feet. The Entrance Channel is maintained at -40 feet MLLW. The MSC Project would widen the in-bay channel to 350 feet and deepen the channel to -47 feet MLLW. The Entrance Channel would be widened to 600 feet and deepened to -47 feet MLLW. Impacts to oyster reef, and high and low marsh are expected due to widening of the channel and placement of dredged material.

The USACE performed sediment elutriate tests in accordance with the Inland Testing Manual (ITM EPA/USACE, 1998) and the Regional Implementation Agreement (RIA EPA/USACE, 2003) protocols and utilized previously conducted sediment tests. The results of these tests indicate that water quality standards will be maintained following dredging and placement. However, because there is a potential risk of increasing the surface sediment mercury concentration through the disturbance of mercury-impaired sediment, placement of material at PA ER3/D has been excluded from the placement plan. Addition of sediment to this placement area could result in a "mud wave" as existing sediment in the placement area is displaced by new sediment, which creates the potential to release mercury-impaired sediment. Furthermore, the material from the MSC in Lavaca Bay will all be confined.

Sediment testing will be undertaken during the Pre-Construction, Engineering and Design (PED) phase to determine the concentrations of any contaminants present under the requirements of Section 103 of the Marine Protection Research and Sanctuaries Act. This includes testing of the sediment and elutriates. Bioassays of the sediment and elutriates are required under the testing regiment to allow for placement in an Off-site Dredge Material Disposal Site (ODMDS). The sampling regimen will be detailed in the Sampling Analysis Plan to be written during PED. The IFR/EIS states that the USACE will perform routine tests on all maintenance material prior to dredging and placement.

The IFR/EIS states "The hydrodynamic modeling predicts an increase of less than 1 PSU in average annual salinity throughout the project area over most of the growing season under low flow conditions. This would not be expected to have a measurable impact on any wetland communities, including special aquatic vegetation (SAV). Although high flow conditions show greater differences in salinities for the recommended plan, the absolute values would be relatively low, and so would not stress the estuaries SAV beds." Regarding fisheries, the IFR/EIS states "A slight increase in salinity is likely to be observed as a result of the proposed channel improvement. However, adverse effects are not expected to occur to community structure or productivity as a result of salinity changes with the recommended plan. Therefore, impacts to recreational and commercial fish populations are not expected to be significant."

"Non-vascular vegetation, such as freshwater algae and free-floating marine seaweed (Sargassum spp.) that occur more commonly near outlets to the Gulf should not be impacted. The freshwater algaes are remote from the proposed activities, and sargassum that drifts into the bay from the Gulf would be carried by currents and/or drift away from turbulent areas."

The IFR/EIS states that loss of tidal flats would be no greater with implementation of the recommended than under the No-Action Alternative. The recommended plan is predicted to have little effect on both tides and waves. It is unlikely tidal flats would be impacted.

Regarding cumulative impacts in relation to salinity changes, the IFR/EIS states "Potential changes in salinity and tidal amplitude due to the recommended plan and the USACE jetty stability project combined, could result in a transition of marshes from freshwater to saline/brackish marshes".

Regarding impacts to oysters, the IFR/EIS states "During the construction phase of the recommended plan, approximately 129.2 acres of oyster reef habitat will be dredged during the construction of the channel." This equals 79.3 average annual habitat units (AAHUs) net loss using the American Oyster Habitat Suitability Index Model (Swannack et al, 2014). To compensate for impacts to oyster reef habitat, 130 acres of new oyster reef will be created which is estimated to equal 79.8 AAHUs.

No review of property rights, location of property lines, nor the distinction between public and private ownership has been made, and this certification may not be used in any way with regard to questions of ownership.

If you require additional information or further assistance, please contact Mr. Peter Schaefer of the Water Quality Division MC-150, P.O. Box 13087, Austin, Texas 78711-3087. Mr. Schaefer may also be contacted by e-mail at *peter.schaefer@tceq.texas.gov*, or by telephone at (512) 239-4372.

Sincerely,

David W. Galindo, Director
Water Quality Division
Texas Commission on Environmental Quality

DWG/PS/fc

Enclosure 7 – Clean Air Act Modeling

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

April 2018

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Matagorda Ship Channel Improvement Project

Updated Air Quality Impacts

Section 4.1

Notice

This document and its contents have been prepared and are intended solely for Calhoun Port Authority and U.S. Army Corps of Engineers' information and use in relation to the update of the Matagorda Ship Channel Improvement Project Environmental Impact Statement.

Atkins North America assumes no responsibility to any other party in respect of or arising out of or in connection with this document and/or its contents.

This document has 24 pages including the cover.

Document history

Job number: 100057551, 2.2			Document ref: Air Quality Baseline Condition			
Revision	**Purpose description**	**Originated**	**Checked**	**Reviewed**	**Authorized**	**Date**
Rev 1.0	Draft For Client Review	RIV	CE/RH	RH	JB/LAZ	May 2018

Client signoff

Client	Calhoun Port Authority
Project	Hazardous, Toxic, and Radioactive Waste and Air Quality Resource Update for the July 2009 Final EIS for the Matagorda Ship Channel Improvement Project
Document title	Draft Air Quality Impacts Section
Job no.	100057551
Copy no.	Electronic
Document reference	Task 2.2

Acronyms and Abbreviations

CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
cy	cubic yards
cy/day	cubic yards per day
EF	emission factor
EPA	U.S. Environmental Protection Agency
g/hp-hr	grams per horsepower-hour
g/kW-hr	grams per kilowatt-hour
GHG	greenhouse gas
GWP	Global Warming Potentials
hp	horsepower
Hr	hour
LF	load factor
MOVES	Motor Vehicle Emissions Simulator
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NO_x	nitrogen oxide
PA	Placement Area
PM	particulate matter
PM_{10}	particulate matter with particle diameters of 10 micrometers or less
$PM_{2.5}$	particulate matter with particle diameters of 2.5 micrometers or less
SO_2	sulfur dioxide
TCEQ	Texas Commission on Environmental Quality
tpy	tons per year
USACE	U.S. Army Corps of Engineers
VMT	vehicle miles traveled
VOC	volatile organic compound

4.1 Tentatively Selected Plan Alternative

4.1.1 Construction Dredging Equipment

Diesel-fired engines would be used to remove the dredged material; transport it to a designated location by pipeline, scow, or hopper; and support any associated dredging equipment. Dredge and support equipment in service during the dredging operations will primarily include dredges, booster pumps and associated barges, dredge tender barges, tug boats, work-related transport and supply boats, survey boats, and crew boats. Emission sources that may be associated with project construction dredging are listed in **Table 4.1-1**.

Table 4.1-1 Proposed Project Construction Emission Sources

Construction Emission Sources*	Quantity	Horsepower Rating
Dredging Equipment		
30-inch Hydraulic Dredge	2	13,200
Hopper Dredge	2	18,000
Clamshell Dredge	1	2,340
Dredging Support Equipment		
Booster Pump Barge	2	5,400
Dredge Tender Barge	4	150
Tug for Supply Barge	2	1,000
Tug Boat	2	850
Tug Boat for Dump Scow	1	3,500
Work Boat	2	350
Survey Boat	2	350
Crew Boat	2	350
Generator	2	7
Welding Machine	2	10
Air Compressor	2	55
Placement Area Construction Equipment		
Cat D6 LPG Dozers	3	225
Hydraulic Excavator	3	250
200-ton Crane – Dragline	2	550
Spill Barge/Crane	2	416
Cat 325 Marsh Buggy	2	250
Generator	2	7
Mules	2	50
Air Compressor	2	55
Dump Truck – 20 yard	4	430
Light Plant	4	300
Commuter Vehicles		
Vans	5	n/a
Cars	8	n/a
Trucks	17	n/a

* All equipment information provided in the previous Environmental Impact Statement.

4.1.1.1 Construction Volumes and Timeline

For this alternative, the total volume of new work material to be dredged has been calculated to be approximately 30.2 million cubic yards. The emission rate calculations used in support of this report conservatively assumed maximum operations for an estimated construction duration of a little less than 3 years with construction beginning in January 2020 and ending in November 2022. The total volume of dredged material, production rate, and total days of operation for each dredge type are shown in **Table 4.1-2**.

Table 4.1-2 Volume of Material, Dredge Production Rate, and Total Days of Operation

Dredge	Total Volume Dredged (cy)	Production Rate (cy/day)	Total Days of Operation
Clamshell	5,696,672	8,088	704
Hoppers (2)	2,081,914	9,951	209
Hydraulic #1	11,857,940	13,518	877
Hydraulic #2	10,578,512	13,518	783
Total	**30,215,038**		

cy = cubic yards
cy/day = cubic yards per day

4.1.1.2 Construction Dredging Emissions

The rate of emissions from the dredging and support equipment is directly related to the horsepower (hp) rating of each engine, load factor, duration of use, and the projected amount of dredged material. The rate of emissions from employee commuter vehicles is directly related to the total miles traveled for each vehicle. The combustion of diesel fuel in internal combustion engines during the dredging operations will result in air emissions of carbon monoxide (CO), nitrogen oxide (NO_x), particulate matter (PM), sulfur dioxide (SO_2), and volatile organic compounds (VOC).

Air contaminant emissions from marine vessels were estimated using emission factors from the U.S. Environmental Protection Agency (EPA) published study, *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). Air contaminant emissions from generators, welding machines, and air compressors were estimated based on emission factors from the EPA's Motor Vehicle Emissions Simulator model, version 2014a (hereafter, MOVES2014a), using the NONROAD modeling function through MOVES. These emission factors, in combination with the equipment lists, engine load rate levels, and scheduling information prepared in support of the project, served as the basis for calculating annual and total emissions over the site preparation phase.

It was assumed that the proposed construction dredging may proceed up to 20 hours per day, 7 days per week (with some scheduled down time). The dredges would operate in continuous 10-hour shifts, during which supporting equipment would be utilized to transport the crew to and from the dredges for each shift. It is expected that the same boat that brings one work crew to the dredge would return to shore with the exiting crew. Light plants would be used in the late afternoon and evening timeframes to provide additional lighting for the crew and to serve as safety beacons to surrounding waterborne traffic.

Onshore construction equipment related to the dredged material Placement Areas (PAs) would include cranes, trucks, dozers, front-end loaders, backhoes, compactors, graders, and dump trucks. Air contaminant emission factors for this diesel-fired equipment were derived from MOVES2014a, using the NONROAD modeling function.

Commuter vehicles will be used to transport the crew and staff from the shore to land-side locations and back to the shore. Employee commuter vehicles would include a mix of light-duty gas vehicles and light-duty gas trucks. Vans were assumed to transport the dredge crew inland twice per day, passenger cars were assumed to transport management staff and support crew 30 days per month, and trucks were assumed to transport management staff 15 days per month. An average commute of 25 miles each way per day of work was assumed for each vehicle. Mobile on-road emissions associated with these commuter vehicles were calculated using EPA's MOVES2014a. The total number of miles traveled was estimated from the number of miles per trip multiplied by the total number of days of travel to and from the worksite times the number of vehicles.

Fugitive dust that may be generated by the physical disturbance of soils caused by earth-moving and equipment/vehicle traffic at the land-based PA construction sites would be minimal as the dredged material (sand, silt, and clay) is assumed to be moist; therefore, quantitative estimates are not necessary. However, dust-reduction measures, such as the use of a water truck at the site, would be employed, if required.

The annual, projected construction dredging emissions for operations in 2020, 2021, and 2022 are summarized in **Tables 4.1-3, 4.1-4,** and **4.1-5**. Summary tables showing the basis and methodology used to estimate these air contaminant emission rates are found in the appendix to this document.

Table 4.1-3 2020 Annual Construction Dredging Emissions – Tentatively Selected Plan Alternative

Emission Sources	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
	(tpy)						
30-inch Hydraulic Dredge	349.79	685.59	18.05	17.51	0.45	18.89	44,312
Hopper Dredge	0.00	0.00	0.00	0.00	0.00	0.00	7617
Clamshell Dredge	29.58	57.98	3.66	3.55	0.04	2.96	3334
Support Equipment	216.76	376.63	22.78	22.13	0.26	19.24	25,067
Placement Area Construction	14.67	20.71	0.89	0.86	0.05	3.29	8253
Commuter Vehicles*	2.85	0.27	0.0034	0.0030	0.0039	0.06	187
2020 Total	613.65	1,141.18	45.3834	44.053	0.8039	44.44	88,770

*Annual commuter vehicle emissions were assumed to be the same for 2020, 2021, and 2022.
CO_2e = carbon dioxide equivalent
PM_{10} = particulate matter with particle diameters of 10 micrometers or less
$PM_{2.5}$ = particulate matter with particle diameters of 2.5 micrometers or less
tpy = tons per year

Table 4.1-4 2021 Annual Construction Dredging Emissions – Tentatively Selected Plan Alternative

Emission Sources	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
	(tpy)						
30-inch Hydraulic Dredge	398.98	782.00	20.59	19.97	0.52	21.54	50,543
Hopper Dredge	72.53	142.17	8.98	8.71	0.09	7.25	8688
Clamshell Dredge	29.58	57.98	3.66	3.55	0.04	2.96	3803
Support Equipment	242.77	420.99	25.54	24.82	0.29	21.51	28,593
Placement Area Construction	14.67	20.71	0.89	0.86	0.05	3.29	8253
Commuter Vehicles*	2.85	0.27	0.0034	0.0030	0.0039	0.06	187
2021 Total	761.38	1,424.12	59.66	57.91	0.99	56.61	100,067

*Annual commuter vehicle emissions were assumed to be the same for 2020, 2021, and 2022.

Table 4.1-5 2022 Annual Construction Dredging Emissions – Tentatively Selected Plan Alternative

Emission Sources	CO	NO_x	PM_{10}	$PM_{2.5}$	SO_2	VOC	CO_2e
	(tpy)						
30-inch Hydraulic Dredge	331.75	650.24	17.12	16.60	0.43	17.91	42,027
Hopper Dredge	113.21	221.89	14.02	13.60	0.15	11.32	7224
Clamshell Dredge	22.13	43.37	2.74	2.66	0.03	2.21	3162
Support Equipment	199.63	345.50	20.94	20.35	0.24	17.65	23,775
Placement Area Construction	13.42	18.95	0.81	0.79	0.04	3.01	7552
Commuter Vehicles*	2.85	0.27	0.0034	0.0030	0.0039	0.06	187
2022 Total	682.99	1,280.22	55.63	54.00	0.89	52.16	83,927

*Annual commuter vehicle emissions were assumed to be the same for 2020, 2021, and 2022.

4.1.1.3 Estimated Air Quality Impacts

It is expected that air contaminant emissions from construction dredging activities would result in short-term impacts on air quality in the immediate vicinity of the dredging site. These activities are considered one-time activities (i.e., the construction dredging activities would not continue past the date of completion). Due to the phased, one-time construction dredging, it is expected there would be no long-term impacts (i.e., beyond the project duration) to air quality in the area.

Atmospheric dispersion modeling of emissions was not performed for this analysis. Although dispersion modeling tools may be available to estimate localized air quality impacts, this discussion is based on a comparison of the air emissions associated with the construction dredging activities to the current inventory of emissions for Calhoun, Jackson, Matagorda, and Victoria Counties.

Airshed pollutant loading determined by the magnitude of emissions expected to result from this alternative compared to area emissions was used to estimate air quality impacts of the criteria pollutants. **Table 4.1-6** provides a summary of estimated air contaminant emissions for this alternative compared to air emissions inventory information for the Calhoun, Jackson, Matagorda, and Victoria Counties area provided on EPA's AIRData website (EPA 2006c). Air contaminant emissions data in EPA's database are available for area, mobile, and point-source emissions based on emissions inventory information for 2014. This emissions inventory provides a basis from which to compare the proposed project emissions to existing sources of air emissions in the affected counties.

As shown in **Table 4.1-6**, construction dredging for this alternative would result in an increase in emissions above those reported for existing sources in the Calhoun, Jackson, Matagorda, and Victoria Counties area. Emissions of NO_x may result in a temporary increase of about 5.3 to 6.6 percent of reported area emissions. Emissions of CO, PM_{10}, $PM_{2.5}$, SO_2, and VOC are anticipated to result in an increase of 1 percent or less over reported area emissions. Emissions of CO_2e are not compared to the emissions inventory for this area as CO_2e would be more appropriately evaluated in a global context rather than at the project level.

Table 4.1-6 Summary of Air Emissions from Dredging Activities Compared with Calhoun, Jackson, Matagorda, and Victoria Counties Emissions for 2014

Air Pollutant	County Area, Mobile, and Point Sources (tpy)	2020 Annual Construction Dredging Emissions (tpy)	Construction Dredging Percentage of County Emissions (%)	2021 Annual Construction Dredging Emissions (tpy)	Construction Dredging Percentage of County Emissions (%)	2022 Annual Construction Dredging Emissions (tpy)	Construction Dredging Percentage of County Emissions (%)
CO	72,676	613.65	0.8	761.38	1.0	682.99	0.9
NO_x	21,706	1141.18	5.3	1424.12	6.6	1280.22	5.9
PM_{10}	35,659	45.38	0.1	59.66	0.2	55.63	0.2
$PM_{2.5}$	7,886	44.05	0.6	57.91	0.7	54.00	0.7
SO_2	928	0.80	0.1	0.99	0.1	0.89	0.1
VOC	90,277	44.44	0.05	56.61	0.1	52.16	0.06

*2014 year is the most recent and complete year.

The Texas Commission on Environmental Quality (TCEQ) and EPA's Air Quality New Source Review permitting program applies to stationary sources of air emissions, and would therefore not apply to emissions from the dredging activities. However, emissions are expected to be within the National Ambient Air Quality Standards (NAAQS) and the rules and regulations of the EPA and the TCEQ.

5.0 Cumulative Impacts

5.4.6 Air Quality

The study area is currently considered an attainment area in terms of compliance with the NAAQS. Air emissions associated with construction of the Tentatively Selected Plan Alternative may temporarily impact the air quality of the study area. It is expected that air contaminant emissions from construction dredging activities would result in short-term impacts on air quality in the immediate vicinity of the dredging site. These activities are considered one-time activities (i.e., the construction dredging activities would not continue past the date of completion). Due to the phased, one-time construction dredging, it is expected there would be no long-term impacts due to construction activities (i.e., beyond the project duration) to air quality in the area. Temporary impacts from dredging activities have occurred and will continue to occur for maintenance dredging of channels in the bay. Routine dredging would be required to maintain the channel at the depth authorized to accommodate larger vessels and tankers. Maintenance dredging would occur along different segments of the Matagorda Bay and Lavaca Bay channels approximately every 2 years, and in offshore portions of the channel would occur approximately every 4 years. It is expected that air contaminant emissions from maintenance dredging activities would also result in minor short-term impacts on air quality in the immediate vicinity of the dredging site. As previously noted, VOC and NO_x emissions from these activities can combine under the right conditions to form ozone, possibly increasing the concentration of ozone in the region. However, these reactions take place over a period of several hours, with maximum concentrations of ozone often far downwind of the precursor sources. These maintenance activities would be intermittent and of relatively short-term duration for each segment during maintenance. Therefore, emissions from the maintenance dredging are not expected to result in a serious impact to the regional air quality, nor differ significantly from present maintenance dredging activities.

Appendix A.
Air Emissions Summary

Appendix A
Air Emissions Summary

The combustion of diesel fuel in internal combustion engines during the construction of the proposed project would result in air emissions of carbon monoxide (CO), nitrous oxide (NO_x), particulate matter (PM), sulfur dioxide (SO_2), and volatile organic compounds (VOC). Sources of these air pollutants will be from dredging vessels and supporting vessels and equipment, onshore construction equipment (cranes, trucks, bulldozers, backhoes, etc.), and employee commuter vehicles. Emissions from construction of the proposed project were estimated using U.S. Environmental Protection Agency (EPA)-approved software and modeling tools.

A.1 Construction Dredging Equipment

Diesel-fired engines would be used to remove the dredged material; transport it to a designated location by pipeline, scow, or hopper; and support any associated dredging equipment. Dredge and support equipment in service during the dredging operations will primarily include dredges, booster pumps and associated barges, dredge tender barges, tug boats, work-related transport and supply boats, survey boats, and crew boats.

A.2 Construction Dredging Emissions

The rate of emissions from the dredging and support equipment is directly related to the horsepower (hp) rating of each engine, load factor, duration of use, and the amount of material to be dredged. The rate of emissions from employee commuter vehicles is directly related to the total miles traveled for each vehicle. The combustion of diesel fuel in these internal combustion engines during the dredging operations will result in air emissions of CO, NO_x, PM, SO_2, and VOC.

A.3 Project Construction Emissions Inventory

Temporary increases in air pollution would result from the equipment associated with construction of the Tentatively Selected Plan Alternative. These air contaminant emissions would result from the use of marine vessels and land-based mobile sources during the construction activities, including:

- Dredge and Support Equipment—dredging vessels and supporting equipment and vessels such as tugboats;
- Non-Road Construction Equipment—land-based equipment such as bulldozers and graders;
- On-Road and Employee Vehicles—land-based equipment such as cars and trucks; and
- Maintenance Dredging—dredging vessels for maintenance such as tugboats.

Air contaminant emissions associated with these construction activities would primarily be combustion products from fuel burned in equipment used for project dredging, support vessels, and dredged material placement equipment. Equipment, such as excavators, backhoes, and front-end loaders, would also be required. The marine vessel emission sources would be primarily diesel-powered engines. The off-road and on-road equipment may be assumed to be a mix of gasoline and diesel-powered vehicles. These construction activities would be considered one-time activities, i.e., the construction activities would not continue past the date of completion. For purposes of estimating emissions, the construction activities were projected to occur from the year 2020 to the year 2022. It was assumed that the proposed construction dredging may continue up to 20 hours per day, 7 days per week (with some scheduled down time). The dredges would operate in continuous 10-hour shifts, during which supporting equipment would be used to transport the crew to and from the dredges for each shift. It is expected that the same boat that brings one work crew to the dredge would return to shore with the exiting crew. Light plants would be used in the late afternoon and evening timeframes to provide additional lighting for the crew and to serve as safety beacons to surrounding waterborne traffic.

Onshore construction equipment related to the dredged material placement areas would include cranes, trucks, dozers, front-end loaders, backhoes, compactors, graders, and dump trucks. SO_2 emissions from onshore construction equipment were estimated based on the use of ultra-low sulfur off-road diesel fuel, in accordance with EPA reduced fuel sulfur standards.

Commuter vehicles will be used to transport the crew and staff from the shore to land-side locations and back to the shore. Employee commuter vehicles would include a mix of light-duty gas vehicles and light-duty gas trucks. It is assumed that vans will transport the dredge crew inland twice per day, passenger cars were assumed to transport management staff and support crew 30 days per month, and trucks were assumed to transport management staff 15 days per month. An average commute of 25 miles each way per day of work was assumed for each vehicle.

Fugitive dust that may be generated by the physical disturbance of soils caused by earth-moving and equipment/vehicle traffic at the land-based project construction sites would be minimal as the dredged material (sand, silt, and clay) is assumed to be moist; therefore, quantitative estimates are not necessary. However, dust-reduction measures, such as the use of a water truck at the site, would be employed, if required.

In general, air contaminant emission rates for the non-road/off-road emission sources were estimated using the following equation:

Emission Rate = (engine horsepower) x (load factor) x (hours per year of operation) x (emission factor, grams per horsepower-hour)

Air contaminant emission rates for the on-road emission sources were estimated using the following equation:

Emission Rate = (number of vehicles) x (vehicle miles traveled per vehicle per year) x (emission factor, grams per vehicle mile traveled)

The calculated emissions were converted to tons per year (tpy) using the appropriate conversion factors.

Dredge and Support Equipment

Dredge and support equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tpy = HP x LF x Hr x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

HP = Horsepower (hp)
LF = Load Factor (unitless)
Hr = Annual Operating Hours (hr)
EF = Emission Factor (grams per horsepower-hour [g/hp-hr])

Dredge and support equipment list, monthly operating hours per equipment type and activity, hp, and engine tier were provided by the U.S. Army Corps of Engineers (USACE) for the Tentatively Selected Plan Alternative. Load factors were taken from Table 3-3 in *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). Emission factors for the dredging and support vessels were taken from Table 3-8 in *Current Methodologies for Preparing Mobile Source Port-Related Emission Inventories* (EPA 2009). The emission factors in the table were presented in units of grams per kilowatt-hour (g/kW-hr). These were converted to units of g/hp-hr using a conversion factor of 1.341022 kW-hr/g/hp-hr.

Greenhouse gas (GHG) emissions were estimated for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) and converted to carbon dioxide equivalents (CO_2e) using Global Warming Potentials (GWP).

Non-Road Construction Equipment

Non-road construction equipment emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tpy = HP x LF x Hr x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

HP = Horsepower (hp)
LF = Load Factor (unitless)
Hr = Annual Operating Hours (hr)
EF = Emission Factor (g/hp-hr)

A non-road construction equipment list, monthly operating hours per equipment type and activity, and hp were provided by the USACE for the Tentatively Selected Plan Alternative. Load factors were taken from EPA's *Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling* (EPA 2004). Emission factors were developed using the EPA Motor Vehicle Emissions Simulator (MOVES) model, version 2014a (MOVES2014a), using the NONROAD modeling function through MOVES.

The MOVES model was used to produce emission factors in units of g/hp-hr for peak winter (January) and peak summer (July), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2020 through 2022, 2020 emission factors were used. A single year was used to calculate construction emission factors assuming the same construction fleet tends to be used throughout the full construction schedule.

GHG emissions were estimated for CO_2, CH_4, and N_2O and converted to CO_2e using GWP.

On-Road and Employee Vehicles

On-road and employee vehicle emissions were estimated for each equipment type for each year using the following equation:

Annual Emissions, tpy = VMT x EF / (453.59 g/lb) / (2000 lb/ton)

Where:

VMT = Annual Vehicle Miles Traveled (miles)
EF = Emission Factor (g/VMT)

Annual VMT were calculated by multiplying the number of vehicles per day, the daily travel distance per vehicle, and the number of travel days per year. The daily travel distance was assumed to be 25 miles each way per day of work, on average. Emission factors were developed using the MOVES2014a.

The MOVES model was used to produce emission factors in units of g/VMT for peak winter (January, 7:00 a.m. to 8:00 a.m.) and peak summer (July, 5:00 p.m. to 6:00 p.m.), as emission factors change seasonally for some pollutants. These peak emission factors were averaged and used to calculate the annual emissions. For construction years 2020 through 2022, 2020 emission factors were used. A single year was used to calculate construction emission factors because it is assumed the same construction fleet will be used throughout the full construction schedule. The total number of miles traveled was estimated from the number of miles per trip multiplied by the total number of days of travel to and from the worksite times the number of vehicles. MOVES2014a on-road model CO_2e emission factors were used for estimating emissions of GHGs.

Emissions summary tables providing more detailed information are attached.

References:

U.S. Environmental Protection Agency (EPA). 2004. Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c. April 2004.

EPA. 2009. Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories. April 2009.

Table A-1. Project Dredge Schedule and Dredge Production Rates
MSCIP -Tentatively Selected Plan Alternative

Dredge	Total Volume Dredged	Production Rate CY/day	Total Days of Operation
Clamshell	5,696,672	8,088	704
Hoppers (2)	2,081,914	9,951	209
Hydraulic 1 (30")	11,857,940	13,518	877
Hydraulic 2 (30")	10,578,512	13,518	783
Total	**30,215,038**		

2020												
Dredge	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Clamshell	31	28	31	30	31	30	31	31	30	31	30	31
Hoppers (2)												
Hydraulic 1 (30")	31	28	31	30	31	30	31	31	30	31	30	31
Hydraulic 2 (30")				30	31	30	31	31	30	31	30	31

2021												
Dredge	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Clamshell	31	28	31	30	31	30	31	31	30	31	30	31
Hoppers (2)						30	31	31	30	31	30	31
Hydraulic 1 (30")	31	28	31	30	31	30	31	31	30	31	30	31
Hydraulic 2 (30")	31	28	31	30	31	30	31	31	30	31	30	31

2022												
Dredge	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
Clamshell	31	28	31	30	31	30	31	31	30			
Hoppers (2)	31	28	31	30	31	30	31	31	30	31	30	
Hydraulic 1 (30")	31	28	31	30	31	30	31	31	30			
Hydraulic 2 (30")	31	28	31	30	31	30	31	31	30	31	30	

Table A-2. Dredging Equipment Hours of Operation and Emission Factors
MSCIP -Tentatively Selected Plan Alternative

									Emission Factors (g/kW-hr)									Emission Factors (lb/hp-hr)										Emission Rates Per Unit (lb/hr)								
Equipment Type	**Quantity**	**Rated Horsepower (hp)**	**Rated Horsepower (kW)**	**% Load**	**Fuel Type**	**hrs/day**	**total days of operation per equiment unit**	**total hrs of operation per equipment unit**	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2**	**N20**	**CH4**	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2**	**N20**	**CH4**	**Emission Factor Source**	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2**	**N20**	**CH4**
Initial Dredge																																				
30" Hydraulic Dredge	2	13,200	9,843	60%	diesel	20	830	16,597	0.26	0.25	9.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0161	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	3.3593	3.2585	127.5997	65.1019	0.0846	3.5155	8,984	0.2604	1.1718
Hopper Dredge	2	18,000	13,423	60%	diesel	20	105	2,092	0.62	0.60	9.8	5	0.0065	0.50	690	0.02	0.09	0.0010	0.0010	0.0161	0.0082	0.00001	0.0008	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	10.9939	10.6641	173.9996	88.7753	0.1154	8.8775	12,251	0.3551	1.5980
Clamshell	1	2,340	1,745	60%	diesel	20	704	14,088	0.62	0.60	9.8	5	0.0065	0.50	690	0.02	0.09	0.0010	0.0010	0.0161	0.0082	0.00001	0.0008	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	1.4292	1.3863	22.6199	11.5408	0.0150	1.1541	1,593	0.0462	0.2077
Support Equipment																																				
Booster Pump Barge	2	5,400	4,027	60%	diesel	20	830	16,597	0.62	0.60	9.8	5	0.0065	0.50	690	0.02	0.09	0.0010	0.0010	0.0161	0.0082	0.00001	0.0008	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	3.2982	3.1992	52.1999	26.6326	0.0346	2.6633	3,675.2969	0.1065	0.4794
Dredge Tender Barge	4	150	112	69%	diesel	12	830	9,958	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.0439	0.0439	1.1570	0.8508	0.0011	0.0459	117.4053	0.0034	0.0153
Tug for Supply Barge	2	1,000	746	68%	diesel	12	72	864	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.2884	0.2884	7.6018	5.5896	0.0073	0.3018	771.3586	0.0224	0.1006
Tug for Hydraulic Dredge	2	850	634	68%	diesel	12	830	9,958	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.2452	0.2452	6.4615	4.7511	0.0062	0.2566	655.6548	0.0190	0.0855
Tug for Dump Scowl	1	3,500	2,610	68%	diesel	12	704	8,453	0.62	0.60	9.8	5	0.0065	0.50	690	0.02	0.09	0.0010	0.0010	0.0161	0.0082	0.00001	0.0008	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	2.4227	2.3501	38.3443	19.5634	0.0254	1.9563	2,699.7551	0.0783	0.3521
Work Boat	2	350	261	43%	diesel	10	830	8,299	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.0638	0.0638	1.6825	1.2371	0.0016	0.0668	170.7198	0.0049	0.0223
Survey Boat	2	350	261	43%	diesel	2	830	1,660	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.0638	0.0638	1.6825	1.2371	0.0016	0.0668	170.7198	0.0049	0.0223
Crew Boat	2	350	261	45%	diesel	2	830	1,660	0.26	0.26	6.8	5	0.0065	0.27	690	0.02	0.09	0.0004	0.0004	0.0112	0.0082	0.00001	0.0004	1.1344	0.00003	0.0001	EPA Guidance for Marine Vessels	0.0668	0.0668	1.7607	1.2946	0.0017	0.0699	178.6603	0.0052	0.0233
NONROAD Support Equipment									**Emission Factors (g/hp-hr)**									**Emission Factors (lb/hp-hr)**										**Emission Rates Per Unit (lb/hr)**								
Generator	2	7	5	43%	diesel	24	830	19,917	0.1366	0.1256	2.0277	273.8238	0.0063	6.6245	690.0000	0.0200	0.0900	0.0003	0.0003	0.0045	0.6037	0.00001	0.0146	1.5212	0.00004	0.0002	Nonroad 2008	0.0009	0.0008	0.0129	1.7418	0.0000	0.0421	4.3891	0.0001	0.0006
Welding Machine	2	10	7	21%	diesel	10	830	8,299	0.1366	0.1256	2.0277	273.8238	0.0063	6.6245	690.0000	0.0200	0.0900	0.0003	0.0003	0.0045	0.6037	0.00001	0.0146	1.5212	0.00004	0.0002	Nonroad 2008	0.0006	0.0006	0.0094	1.2677	0.0000	0.0307	3.1945	0.0001	0.0004
Air Compressor	2	55	41	43%	diesel	10	830	8,299	0.0718	0.0660	1.2030	12.8066	0.0043	0.7002	690.0000	0.0200	0.0900	0.0002	0.0001	0.0027	0.0282	0.0000	0.0015	1.5212	0.00004	0.0002	Nonroad 2008	0.0037	0.0034	0.0627	0.6677	0.0002	0.0365	35.9763	0.0010	0.0047

Notes:

1. The two hydraulic dredges will be pumping dredge material into marsh and/or upland sites.
2. The hopper dredge will be placing dredge material into an open bay disposal site.
3. Each hydraulic dredge will have a one booster pump.
4. The hydraulic and hopper dredges will be able to pump continuously.
5. Assumed the use of ultra-low sulfur diesel fuel. PM2.5 emission factors are estimated to be 97 percent of PM10 emissions for all vessels with horsepower greater than 1000 kW.
6. Load Factors for tenders, tugs, workboat, survey boat, and crew boat from the U.S. Environmental Projection Agency's, Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009, Table 3-4.
7. Emission factors in g/kW-hr for Initial Dredge and Support Equipment from the U.S. Environmental Projection Agency's, Current Methodologies in Preparing Mobile Source Port-Related Emissions Inventories, April 2009, Table 3-8.
8. Emission factors in g/hp-hr for NONROAD Support Equipment from MOVES2014a/NONROAD 2008 air emissions model.
9. The following assumptions were made to determine the total dredging duration:

13,518 CY/DAY
19,901 CY/DAY
16,175 CY/DAY
30,215,038 CY
1064 DAYS
2.92 YEARS
35.0 MONTHS

Table A-3. Total Dredging Emission Rates
MSCIP -Tentatively Selected Plan Alternative

	Total Project Emission Rates									
	(tons)									(Metric Tonnes)
Equipment Type	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2**	**N20**	**CH4**	**CO2e**
Initial Dredge										
30" Hydraulic Dredge	55.76	54.08	2,117.83	1,080.53	1.40	58.35	149,113	4.32	19.45	136,882
Hopper Dredge	23.00	22.31	364.05	185.74	0.24	18.57	25,632	0.74	3.34	23,530
Clamshell	10.07	9.77	159.33	81.29	0.11	8.13	11,218	0.33	1.46	10,298
Subtotal	88.82	86.16	2,641.22	1,347.56	1.75	85.05	185,963	5.39	24.26	170,710
Support Equipment										
Booster Pump Barge	54.74	53.10	866.39	442.03	0.57	44.20	61,001	1.77	7.96	55,997
Dredge Tender Barge	0.87	0.87	23.04	16.94	0.02	0.92	2,338	0.07	0.31	2,147
Tug for Supply Barge	0.25	0.25	6.57	4.83	0.01	0.26	666	0.02	0.09	612
Tug for Hydraulic Dredge	2.44	2.44	64.35	47.31	0.06	2.55	6,529	0.19	0.85	5,994
Tug for Dump Scowl	10.24	9.93	162.05	82.68	0.11	8.27	11,410	0.33	1.49	10,474
Work Boat	0.53	0.53	13.96	10.27	0.01	0.55	1,417	0.04	0.18	1,301
Survey Boat	0.11	0.11	2.79	2.05	0.003	0.11	283	0.01	0.04	260
Crew Boat	0.11	0.11	2.92	2.15	0.003	0.12	297	0.01	0.04	272
Generator	0.02	0.02	0.26	34.69	0.001	0.84	87	0.003	0.01	80
Welding Machine	0.01	0.005	0.08	10.52	0.000	0.25	27	0.001	0.003	24
Air Compressor	0.03	0.03	0.52	5.54	0.002	0.30	299	0.01	0.04	274
Subtotal	69.35	67.39	1,142.93	659.02	0.79	58.38	84,354	2.45	11.00	77,435
Totals	**158.17**	**153.55**	**3,784.15**	**2,006.58**	**2.55**	**143.43**	**270,317**	**7.84**	**35.26**	**248,145**

	Total 2020 Annual Emission Rates							Total 2021 Annual Emission Rates							Total 2022 Annual Emission Rates						
	(tons/yr)						(Metric Tonnes)	(tons/yr)						(Metric Tonnes)	(tons/yr)						(Metric Tonnes)
Equipment Type	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2e**	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2e**	**PM10**	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2e**
Initial Dredge																					
30" Hydraulic Dredge	18.05	17.51	685.59	349.79	0.45	18.89	44,312	20.59	19.97	782.00	398.98	0.52	21.54	50,543	17.12	16.60	650.24	331.75	0.43	17.91	42,027
Hopper Dredge	0.00	0.00	0.00	0.00	0.00	0.00	7,617.19	8.98	8.71	142.17	72.53	0.09	7.25	8,688	14.02	13.60	221.89	113.21	0.15	11.32	7,224
Clamshell	3.66	3.55	57.98	29.58	0.04	2.96	3,334	3.66	3.55	57.98	29.58	0.04	2.96	3,803	2.74	2.66	43.37	22.13	0.03	2.21	3,162
Subtotal	21.71	21.06	743.57	379.37	0.49	21.85	55,263	33.23	32.24	982.15	501.10	0.65	31.76	63,034	33.88	32.86	915.49	467.09	0.61	31.45	52,413
Support Equipment																					
Booster Pump Barge	17.72	17.19	280.47	143.10	0.19	14.31	18,128	20.21	19.61	319.91	163.22	0.21	16.32	20,677	16.81	16.30	266.01	135.72	0.18	13.57	17,193
Dredge Tender Barge	0.28	0.28	7.46	5.49	0.01	0.30	695	0.32	0.32	8.51	6.26	0.01	0.34	793	0.27	0.27	7.08	5.20	0.01	0.28	659
Tug for Supply Barge	0.00	0.00	2.25	1.66	0.00	0.09	198	0.09	0.09	2.25	1.66	0.00	0.09	226	0.09	0.09	2.25	1.66	0.00	0.09	188
Tug for Hydraulic Dredge	0.79	0.79	20.83	15.32	0.02	0.83	1,940	0.90	0.90	23.76	17.47	0.02	0.94	2,213	0.75	0.75	19.76	14.53	0.02	0.78	1,840
Tug for Dump Scowl	3.73	3.61	58.97	30.09	0.04	3.01	3,391	3.73	3.61	58.97	30.09	0.04	3.01	3,868	2.79	2.70	44.11	22.50	0.03	2.25	3,216
Work Boat	0.17	0.17	4.52	3.32	0.00	0.18	421	0.20	0.20	5.16	3.79	0.00	0.20	480	0.16	0.16	4.29	3.15	0.004	0.17	399
Survey Boat	0.03	0.03	0.90	0.66	0.001	0.04	84	0.04	0.04	1.03	0.76	0.001	0.04	96	0.03	0.03	0.86	0.63	0.001	0.03	80
Crew Boat	0.04	0.04	0.95	0.70	0.001	0.04	88	0.04	0.04	1.08	0.79	0.001	0.04	101	0.03	0.03	0.90	0.66	0.001	0.04	84
Generator	0.01	0.01	0.08	11.23	0.0003	0.27	26	0.01	0.01	0.09	12.81	0.0003	0.31	30	0.01	0.00	0.08	10.65	0.0002	0.26	25
Welding Machine	0.002	0.002	0.03	3.41	0.0001	0.08	8	0.002	0.002	0.03	3.88	0.0001	0.09	9	0.002	0.001	0.02	3.23	0.0001	0.08	7
Air Compressor	0.01	0.01	0.17	1.79	0.0006	0.10	89	0.01	0.01	0.19	2.05	0.0007	0.11	101	0.01	0.01	0.16	1.70	0.0006	0.09	84
Subtotal	22.78	22.13	376.63	216.76	0.26	19.24	25,067	25.54	24.82	420.99	242.77	0.29	21.51	28,593	20.94	20.35	345.50	199.63	0.24	17.65	23,775
Totals	**44.49**	**43.20**	**1,120.20**	**596.13**	**0.75**	**41.08**	**80,330**	**58.78**	**57.06**	**1,403.14**	**743.87**	**0.94**	**53.26**	**91,627**	**54.82**	**53.22**	**1,261.00**	**666.72**	**0.85**	**49.09**	**76,188**

Table A-4. NONROAD Diesel Engine Emission Factors for Year 2020
MSCIP -Tentatively Selected Plan Alternative

Equipment	Horsepower	Emission Factor (g/hp-hr)								Emission Factor (lb/hp-hr)							
		VOC	CO	NOx	PM10	PM2.5	SO2	CH4	CO2	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2
Light Commercial Generator Set	6-11	6.6245	273.8238	2.0277	0.1366	0.1256	0.0063	0.7850	1044	0.0003	0.0003	0.0045	0.6037	0.0000	0.0146	0.0017	2.3017
Light Commercial Air Compressors	75-100	0.6885	12.8067	1.2030	0.0718	0.0660	0.0043	0.055123	699	0.0002	0.0001	0.0027	0.0282	0.0000	0.0015	0.0001	1.5410
Crawler Dozer	175-300	0.1615	0.2045	0.6734	0.0289	0.0280	0.0027	0.01343	536	0.0001	0.0001	0.0015	0.0005	0.0000	0.0004	0.0000	1.1825
Excavator	175-300	0.1584	0.1679	0.5293	0.0210	0.0204	0.0026	0.013191	536	0.0000	0.0000	0.0012	0.0004	0.0000	0.0003	0.0000	1.1826
Off highway trucks	175-300	0.1558	0.1206	0.3219	0.0106	0.0102	0.0026	0.01296	536	0.0000	0.0000	0.0007	0.0003	0.0000	0.0003	0.0000	1.1826
Light Plant	175-300	0.2469	0.5647	2.4190	0.1171	0.1136	0.0031	0.014293	530	0.0003	0.0003	0.0053	0.0012	0.0000	0.0005	0.0000	1.1692
Crane	300-600	0.1827	0.4846	1.8260	0.0734	0.0712	0.0030	0.013741	531	0.0002	0.0002	0.0040	0.0011	0.0000	0.0004	0.0000	1.1696
Off highway trucks	300-600	0.1573	0.1953	0.5244	0.0208	0.0201	0.0026	0.01312	536	0.0000	0.0000	0.0012	0.0004	0.0000	0.0003	0.0000	1.1826

Source of emission factors in g/hp-hr : MOVES2014a/NONROAD 2008

Table A-5. Placement Area Construction Emissions
MSCIP -Tentatively Selected Plan Alternative

Portable Equipment Exhaust				Emissions (lb/hr)								Operation		total	annual
Equipment	Qty.	Rated hp	Load Factor	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	hours per week	total weeks	hours operated	hours operated
Cat D6 LPG Dozers	3	225	0.59	0.03	0.02	0.59	0.18	0.00	0.14	0.01	470.95	70	152	10640	3640
Hydraulic Excavator	3	250	0.59	0.02	0.02	0.52	0.16	0.00	0.15	0.01	523.28	70	152	10640	3640
200 ton Crane - Dragline	2	550	0.43	0.08	0.07	1.90	0.51	0.00	0.19	0.01	553.24	70	152	10640	3640
Spill Barge/Crane	2	416	0.43	0.06	0.06	1.44	0.38	0.00	0.14	0.01	418.45	168	152	25536	8736
Cat 325 Marshbuggy	2	250	0.59	0.01	0.01	0.21	0.08	0.00	0.10	0.01	348.86	70	152	10640	3640
Generator	2	7	0.43	0.00	0.00	0.03	3.63	0.000	0.088	0.010	13.856	70	152	10640	3640
Mules	2	50	0.59	0.00	0.00	0.04	0.02	0.00	0.02	0.00	69.77	70	152	10640	3640
Air Compressor	2	55	0.43	0.01	0.01	0.13	1.34	0.00	0.07	0.01	72.89	70	152	10640	3640
Dump Truck - 20 yard	4	430	0.59	0.05	0.05	1.17	0.44	0.01	0.35	0.03	1200.07	70	152	10640	3640
Light Plant	4	300	0.43	0.13	0.13	2.75	0.64	0.00	0.28	0.02	603.32	84	152	12768	4368

Equipment	Total Project Emissions (tons)								Metric Tonnes	Total 2020 Annual Emission Rates (ton/yr)								Metric Tonnes
	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	CO2e	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	CO2e
Cat D6 LPG Dozers	0.13	0.13	3.15	0.96	0.01	0.75	0.06	2505	2274	0.0463	0.0449	1.0790	0.3276	0.0043	0.2587	0.0215	859	780
Hydraulic Excavator	0.11	0.11	2.75	0.87	0.01	0.82	0.07	2784	2527	0.0374	0.0363	0.9424	0.2989	0.0047	0.2820	0.0235	955	867
200 ton Crane - Dragline	0.41	0.40	10.13	2.69	0.02	1.01	0.08	2943	2672	0.1397	0.1355	3.4751	0.9221	0.0056	0.3478	0.0262	1010	917
Spill Barge/Crane	0.74	0.72	18.39	4.88	0.03	1.84	0.14	5343	4850	0.2536	0.2460	6.3082	1.6739	0.0102	0.6313	0.0475	1833	1664
Cat 325 Marshbuggy	0.04	0.04	1.11	0.42	0.01	0.54	0.04	1856	1685	0.0125	0.0122	0.3821	0.1431	0.0031	0.1849	0.0154	637	578
Generator	0.01	0.01	0.14	19.33	0.00	0.47	0.06	74	68	0.0033	0.0030	0.0491	6.6323	0.0002	0.1605	0.0190	25	23
Mules	0.01	0.01	0.22	0.08	0.00	0.11	0.01	371	337	0.0025	0.0024	0.0764	0.0286	0.0006	0.0370	0.0031	127	116
Air Compressor	0.04	0.04	0.67	7.10	0.00	0.38	0.03	388	352	0.0137	0.0126	0.2289	2.4372	0.0008	0.1310	0.0105	133	121
Dump Truck - 20 yard	0.25	0.24	6.24	2.32	0.03	1.87	0.16	6384	5795	0.0848	0.0823	2.1411	0.7973	0.0107	0.6421	0.0536	2190	1988
Light Plant	0.85	0.83	17.57	4.10	0.02	1.79	0.10	3852	3496	0.2918	0.2830	6.0265	1.4068	0.0076	0.6150	0.0356	1321	1199
Totals	**2.58**	**2.50**	**60.37**	**42.76**	**0.14**	**9.59**	**0.75**	**26500**	**24057**	**0.89**	**0.86**	**20.71**	**14.67**	**0.05**	**3.29**	**0.26**	**9091**	**8253**

Notes:
1. Emissions (lb/hr) = Quantity x Rated hp x Load Factor x Emission Factor (lb/hp-hr)

2. Assumed the use of ultra-low sulfur diesel fuel.
3. Load Fractors from Appendix A of Median Life Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

Total 2021 Annual Emission Rates (ton/yr)								Metric Tonnes	Total 2022 Annual Emission Rates (ton/yr)								Metric Tonnes
PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	CO2e	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	CO2e
0.0463	0.0449	1.0790	0.3276	0.0043	0.2587	0.0215	859	780	0.0423	0.0411	0.9874	0.2998	0.0039	0.2367	0.0197	786	714
0.0374	0.0363	0.9424	0.2989	0.0047	0.2820	0.0235	955	867	0.0343	0.0332	0.8623	0.2735	0.0043	0.2581	0.0215	874	793
0.1397	0.1355	3.4751	0.9221	0.0056	0.3478	0.0262	1010	917	0.1278	0.1240	3.1799	0.8438	0.0052	0.3182	0.0239	924	839
0.2536	0.2460	6.3082	1.6739	0.0102	0.6313	0.0475	1833	1664	0.2321	0.2251	5.7724	1.5318	0.0094	0.5777	0.0434	1677	1522
0.0125	0.0122	0.3821	0.1431	0.0031	0.1849	0.0154	637	578	0.0115	0.0111	0.3497	0.1310	0.0028	0.1692	0.0141	583	529
0.0033	0.0030	0.0491	6.6323	0.0002	0.1605	0.0190	25	23	0.0030	0.0028	0.0449	6.0690	0.0001	0.1468	0.0174	23	21
0.0025	0.0024	0.0764	0.0286	0.0006	0.0370	0.0031	127	116	0.0023	0.0022	0.0699	0.0262	0.0006	0.0338	0.0028	117	106
0.0137	0.0126	0.2289	2.4372	0.0008	0.1310	0.0105	133	121	0.0125	0.0115	0.2095	2.2302	0.0007	0.1199	0.0096	122	111
0.0848	0.0823	2.1411	0.7973	0.0107	0.6421	0.0536	2190	1988	0.0776	0.0753	1.9593	0.7296	0.0098	0.5875	0.0490	2004	1819
0.2918	0.2830	6.0265	1.4068	0.0076	0.6150	0.0356	1321	1199	0.2670	0.2590	5.5146	1.2873	0.0070	0.5628	0.0326	1209	1098
0.89	**0.86**	**20.71**	**14.67**	**0.05**	**3.29**	**0.26**	**9091**	**8253**	**0.81**	**0.79**	**18.95**	**13.42**	**0.04**	**3.01**	**0.23**	**8319**	**7552**

Table A-6. Emission Factors - Mobile Sources
MSCIP -Tentatively Selected Plan Alternative

County	Type of Vehicle	EPA Category	Emisson Factor (g/mile)						
			CO	NO_X	$PM_{2.5}$	PM_{10}	SO_2	VOC	CO2e
Calhoun/Jackson	Vans	LDGV	9.3929	0.9718	0.0084	0.0095	0.0091	0.2007	479.5555
	Cars	LDGV	2.2020	0.1274	0.0033	0.0037	0.0056	0.0366	292.5140
	Pickups	LDGT1	3.8052	0.3450	0.0047	0.0053	0.0073	0.0981	381.6870

Notes:
1. LDGV = light duty gasoline-fueled vehicles designated for transport of up to 12 people
   LDGT1 = light duty gasoline-fueled trucks with a gross vehicle weight (GVW) rating of 6000 pounds or less
2. Emission factors are derived from MOVES2014a for Calhoun County.

Table A-7. Number of Commuters and Trips
MSCIP -Tentatively Selected Plan Alternative

Employee Information	Quantity	Trips/month
Dredge and Support Crew		
Leverman	6	60
Dredge Tender Operator	2	60
First Assistant Engineer	2	60
Second Assistant Engineer	3	60
Third Assistant Engineer	2	60
Deckhand	10	60
Shoreman	4	60
Fireman	3	60
Mechanic	3	60
Oiler	3	60
First Cook	2	60
Second Cook	2	60
Mess Person	2	60
Janitor-Cabin Person	2	60
Crewboat Operator	3	60
Tug Boat Operator	2	60
Radio/Lookout	3	60
Truck Driver	1	30
Welder	3	30
Dozer Operator	3	30
Marshbuggy Operator	3	30
Marshbuggy Oiler	2	30
Management Staff		
Surveyor	3	30
Engineer	2	30
QA/QC Manager	2	15
Superintendent	1	15
Safety	2	15
Constr. Oversite Personnel	3	15

Notes:

1. The dredge crew usually work 12-hour shifts, returning to the mainland after their shift is done. Therefore, the number of trips were estimated taking this into account.
2. The estimates are for all 4 dredges, assuming that the 2 hydraulic dredges will be dumping into marsh areas or other BUS and the hopper dumping offshore or open bay.
3. A trip is to and from the work site.

Table A-8. Total Commuter Vehicle Emissions
MSCIP -Tentatively Selected Plan Alternative

Type of Vehicle	EPA Category	Daily Vehicles (/day)	Total (VMT/day)	Travel Days (days)	Total Travel (VMT)	Total Project Commuter Vehicle Emissions (tons)						Metric Tonnes	Annual Commuter Vehicle Emissions (tpy)						Metric Tonnes
						CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC	CO2e	CO	NO_x	$PM_{2.5}$	PM_{10}	SO_2	VOC	CO2e
Vans	LDGV	10	50.0	1,049	524,712	5.4327	0.5621	0.00484	0.00548	0.00528	0.1161	251.6244	1.8637	0.1928	0.00166	0.00188	0.00181	0.0398	86.3185
Cars	LDGV	8	50.0	1,049	419,770	1.0189	0.0590	0.00152	0.00172	0.00259	0.0170	122.7865	0.3495	0.0202	0.00052	0.00059	0.00089	0.0058	42.1213
Pickups	LDGT1	17	50.0	525	446,005	1.8707	0.1696	0.00232	0.00262	0.00358	0.0482	170.2316	0.6417	0.0582	0.00079	0.00090	0.00123	0.0165	58.3971
					Totals	**8.3224**	**0.7907**	**0.0087**	**0.0098**	**0.0114**	**0.1812**	**544.6425**	**2.85**	**0.27**	**0.0030**	**0.0034**	**0.0039**	**0.06**	**187**

Notes:
1. Total VMT is assumed to be 50 miles/day round trip.
2. Total travel = Daily vehicles * Total VMT * Travel days.
3. Project emissions = Emission factor * Total travel * 1lb/453.6 grams * 1ton/2000lb
4. Annual emissions = Project Emissions / Project Duration in years; Assumed nearly 3 year project duration

Table A-9. Total Maintenance Dredge Emissions
MSCIP -Tentatively Selected Plan Alternative

	Total Maintenance Dredging Emissions (tons per year)								
	PM10	**PM2.5**	**NOx**	**CO**	**SO2**	**VOC**	**CO2**	**CH4**	**CO2e**
Maintenance Dredging by One Hydraulic Dredge	23.55	22.86	635.37	329.00	0.43	21.95	45402	5.92	41,322
Maintenance Dredging by One Hopper Dredge	3.02	2.93	47.93	24.54	0.03	2.44	3386	0.44	3,082
Placement Area Construction	0.43	0.41	10.00	7.08	0.02	1.59	4391	0.12	3,986
Totals	26.99	26.21	693.30	360.62	0.48	25.98	53179	6	48,390

Notes:
1. The following assumptions were made in calculating total maintenance dredging emissions per cycle:

Lavaca Bay and Matagorda Bay Maintenance Dredging

New Work Volume Dredged by One Hydraulic Dredge =	11,857,940	CY
Maintenance Volume to be Dredged per yr, 2-year cycle =	4,878,900	CY
Maintenance-to-New Work Ratio (Hydraulic) =	0.4114	

Offshore Maintenance Dredging

New Work Volume Dredged by One Hopper Dredge =	2,081,914	CY
Maintenance Volume to be Dredged per yr, 4-year cycle =	272,000	CY
Maintenance-to-New Work Ratio (Hopper) =	0.1306	

Total Maintenance Dredging

Total Maintenance Volume to be Dredged per year =	5,150,900	CY

Maintenance Dredging Duration

Hydraulic Dredge Production Rate =	27,036	CY/day
Hopper Dredge Production Rate =	19,901	CY/day
2-year Maintenance Dredging Days per year =	163	days
4-year Maintenance Dredging Days per year =	14	days
Total Maintenance Dredging Days per year =	176	days
	25	weeks

Table A-10. Placement Area Construction - Maintenance Emissions
MSCIP -Tentatively Selected Plan Alternative

Portable Equipment Exhaust				Emissions (lb/hr)								Operation		total	annual	Annual Emission Rates (tons/yr)								Metric Tonnes
Equipment	Qty.	Rated hp	Load Factor	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	hours per week	total weeks	hours operated	hours operated	PM10	PM2.5	NOx	CO	SO2	VOC	CH4	CO2	CO2e
Cat D6 LPG Dozers	3	225	0.59	0.025	0.025	0.591	0.180	0.002	0.142	0.012	470.947	70	25	1763	1763	0.02	0.02	0.52	0.16	0.00	0.12	0.01	415.13	376.84
Hydraulic Excavator	3	250	0.59	0.021	0.020	0.516	0.164	0.003	0.155	0.013	523.283	70	25	1763	1763	0.02	0.02	0.46	0.14	0.00	0.14	0.01	461.27	418.71
200 ton Crane - Dragline	2	550	0.43	0.077	0.074	1.904	0.505	0.003	0.191	0.014	553.236	70	25	1763	1763	0.07	0.07	1.68	0.45	0.00	0.17	0.01	487.67	442.69
Spill Barge/Crane	2	416	0.43	0.058	0.056	1.440	0.382	0.002	0.144	0.011	418.448	168	25	4231	4231	0.12	0.12	3.05	0.81	0.00	0.30	0.02	885.26	803.61
Cat 325 Marshbuggy	2	250	0.59	0.007	0.007	0.209	0.078	0.002	0.101	0.008	348.861	70	25	1763	1763	0.01	0.01	0.18	0.07	0.00	0.09	0.01	307.52	279.14
Generator	2	7	0.43	0.002	0.002	0.027	3.634	0.000	0.088	0.010	13.856	70	25	1763	1763	0.00	0.00	0.02	3.20	0.000	0.08	0.01	12.21	11.29
Mules	2	50	0.59	0.001	0.001	0.042	0.016	0.000	0.020	0.002	69.772	70	25	1763	1763	0.00	0.00	0.04	0.01	0.00	0.02	0.00	61.50	55.83
Air Compressor	2	55	0.43	0.007	0.007	0.125	1.335	0.000	0.072	0.006	72.888	70	25	1763	1763	0.01	0.01	0.11	1.18	0.00	0.06	0.01	64.25	58.40
Dump Truck - 20 yard	4	430	0.59	0.046	0.045	1.173	0.437	0.006	0.352	0.029	1200.071	70	25	1763	1763	0.04	0.04	1.03	0.39	0.01	0.31	0.03	1057.85	960.25
Light Plant	4	300	0.43	0.133	0.129	2.752	0.642	0.003	0.281	0.016	603.316	84	25	2116	2116	0.14	0.14	2.91	0.68	0.00	0.30	0.02	638.18	579.34
															Totals	**0.43**	**0.41**	**10.00**	**7.08**	**0.02**	**1.59**	**0.12**	**4390.84**	**3986.11**

Notes:

1. Emissions (lb/hr) = Quantity x Rated hp x Load Factor x Emission Factor (lb/hp-hr)
2. Assumed the use of ultra-low sulfur diesel fuel.
3. Load Fractors from Appendix A of Median Life Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling, EPA Office of Air and Radiation Report Number NR-005c, April 2004.

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Enclosure 8 – Coastal Zone Management Act Compliance

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Draft Feasibility Report and Environmental Impact Assessment

February 2019

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INTRODUCTION

The Calhoun Port Authority and U.S. Army Corps of Engineers (USACE), in coordination with an interagency Dredged Material Management Plan (DMMP) Working Group comprising numerous State and Federal agencies, including the Texas General Land Office, developed a DMMP that uses dredged material in an environmentally acceptable and economically practical manner. The DMMP offers direct public and ecological benefits (Appendix F to the Matagorda Ship Channel [MSC] Project Environmental Impact Statement [EIS]) and includes shoreline (e.g., beach and estuaries) protection and wildlife habitat creation (i.e., bird islands, marshes, and oyster reefs).

IMPACTS ON COASTAL NATURAL RESOURCE AREAS

Several of the Coastal Natural Resource Areas (CNRAs) listed in 31 Texas Administrative Code (TAC) §501.3 are found within close proximity to areas discussed in this Draft EIS (DEIS). A short description of each CNRA near the project and of methods to minimize or avoid potential impacts is provided below.

Waters of the Open Gulf of Mexico

Dredged maintenance material from the Jetty and Entrance Channels will be placed in the open Gulf of Mexico (Gulf) in Placement Area (PA) 1 (the maintenance material [Ocean Dredged Material Disposal Site (ODMDS)]) and construction material from the Jetty and Entrance Channel and some of the in-bay reach will be placed in the virgin material ODMDS designated as PA O5. PA 1 was officially designated as an ODMDS as required by §102 of the Marine Protection, Research, and Sanctuaries Act (MPRSA) of 1990. An EIS that described the alternatives evaluated was prepared for this designation. In total, the 453 acres (ac) in the designated routine maintenance material ODMDS (PA 1) will be intermittently disturbed for the life of the project, as it has since designation in 1990, and the 1,600-ac virgin material ODMDS will be disturbed once during construction. Sediment from the offshore and Matagorda Bay reaches will be evaluated for contaminants.

Waters under Tidal Influence

The entire project is located in a region that experiences tidal influence. Dredging and placement activities represent a minimal impact because the release of suspended solids is minimized by reducing the amount of open-bay placement and using existing PAs where open-bay placement will occur or PAs would be constructed with levees.

Submerged Lands

The areas immediately adjacent to the project alignment, as well as all PAs except the upland confined PA, are characterized as submerged land. Impacts to these areas are minimized by placement of dredged material into the historically used placement areas in portions of Matagorda Bay and minimizing the size of confined sites by going vertically to the extent practical. Most PAs will cover submerged lands; however, this placement will result in a net increase in several CNRAs, as noted below.

Coastal Wetlands

Impacts to coastal wetlands include burial of a total of 1.1 ac of low marsh and 17.9 ac of high marsh by PA ER3/D. Additionally, changes in salinity from the project may alter coastal wetlands; however, hydrodynamic modeling has indicated that salinity changes near existing wetlands would be minimal.

Submerged Aquatic Vegetation

This navigation project is located near areas not characterized as having large expanses of seagrasses. There will be few, if any, direct or indirect adverse impacts to seagrass beds.

Tidal Sand and Mud Flats

The only potential impacts to tidal sand and mud flats would be a slight change in tidal amplitude (a few centimeters). Some PA designs may result in additional subtidal and intertidal sand and mudflats and include PAs A2 and ER3/D, and H4 (these PAs include designs that, at least temporarily until seagrass or marsh vegetation colonizes the area, would provide additional acres of tidal sand and mud flats).

Oyster Reefs

With the change in salinity with the project, there will be adverse impacts to oyster resources as a result of the proposed project. As noted in Appendix B to the MSC EIS, there will be direct impacts to 132.6 ac of oyster reef from PAs. Approximately 133 ac of oyster reef would be created to compensate for these losses.

Hard Substrate Reefs

There are no naturally occurring hard substrate formations in the vicinity of the project. The closest serpulid worm reefs are located farther south in the Laguna Madre and Baffin Bay.

Coastal Barriers

Three coastal barrier areas occur in the vicinity of the project. One of the areas extends along Matagorda Island and Matagorda Peninsula (T08P), one on Matagorda Peninsula (T07), and the other is located near Palacios (TX-10, or Shell Beach). Matagorda Island and Matagorda Peninsula, undeveloped areas, are located between Matagorda Bay and the Gulf, and Matagorda Peninsula encompasses the Jetty Channel.

Based on modeling conducted for the project and the USACE Jetty Stability Study (USACE, 2006; Krause, 2006), adverse impacts to these coastal barriers are not expected to occur as a result of dredging and dredged material placement operations.

Coastal Shore Areas

These resource areas function as buffers, protecting upland habitats from erosion and storm damage and adjacent marshes and waterways from water quality degradation. This type of area is located at the Entrance Channel, where the channel traverses Matagorda Peninsula to the Gulf, and along the shoreline of Matagorda Peninsula and Matagorda and Lavaca bays. No placement is expected for Matagorda Peninsula. Therefore, adverse impacts to coastal shore areas are not expected to occur as a result of dredging and dredged material placement operations.

Gulf Beaches

Gulf beaches border the Gulf and extend inland from the line of mean low tide to the natural line of vegetation. Matagorda Peninsula, through which the MSC cuts, contains Gulf beaches, as does Matagorda Island to the southwest. Neither is developed. For several miles updrift (northeast) of the Entrance Channel, Matagorda Peninsula is advancing into the Gulf. Immediately downdrift (southwest) of the Entrance Channel, Matagorda Peninsula is eroding. At the southwest end of Matagorda Peninsula at Pass Cavallo, accretion is occurring (Krause, 2006; Krause, et al., 2006; USACE, 2006). No placement of dredged material on Matagorda Peninsula is included in the DMMP, and modeling has shown that the wider channel would not significantly affect erosion/accretion rates on Matagorda Peninsula. No placement of dredged material on Matagorda Peninsula is included in the DMMP. Therefore, impacts to Gulf beaches are not expected to occur as a result of dredging and dredged material placement operations.

Critical Dune Areas

The Gulf beaches on both sides of the MSC Entrance Channel can be characterized as having active sand dune systems. Since no placement of dredged material on Matagorda Peninsula is included in the DMMP, adverse impacts to dune areas are not expected to occur as a result of dredging and dredged material placement operations.

Special Hazard Areas

Special hazard areas are areas designated by the administrator of the Federal Insurance Administration under the National Flood Insurance Act as having special flood, mudslide, and/or flood-related erosion hazards. Much of the project area qualifies as special hazard areas on the Flood Insurance Rate Maps.

Except from improvements caused by shoreline protection measures in the DMMP, project dredging and placement activities do not affect these low-lying areas because dredging is within and adjacent to the existing channel and disposal is within contained upland sites and sites in open waters. One upland confined PA (PA P1) is proposed as part of the DMMP and would occur on an area currently used for rice production and waterfowl habitat. The 248-ac area would be leveed and filled with primarily maintenance dredged material over the 50-year life of the project. Drainage from the area is proposed to occur via a drainage ditch, thus the proposed P1 should not affect drainage or flooding of nearby lands, residences, or communities.

Critical Erosion Areas

These areas are those Gulf and bay shorelines that are undergoing erosion and are designated by the Commissioner of the General Land Office under Texas Natural Resources Code, §33.601(b). Only one critical erosion area is designated in the project area, and it is located along the shoreline from Chocolate Bay to Powderhorn Lake, including Alamo Beach, Magnolia Beach, and Indianola. Another is located in the study area, along the shoreline along the Welder Flats State Coastal Preserve, just east of the mouth of San Antonio Bay. Because of the distance from the project, no impacts could be expected to this CNRA. Therefore, the project will have beneficial impacts on the only Critical Erosion Area in the project area and no impacts on any other.

Coastal Historic Areas

Sites listed or eligible for the National Register of Historic Places and State Archeological Landmarks are present in the project area. Compliance with the Texas Coastal Management Program (TCMP) regarding coastal historic areas is accomplished through procedures established by Section 106 of the National Historic Preservation Act of 1965 (NHPA), as amended. These coastal historic sites, as well as noncoastal historic sites, are discussed in Section 2.4 of the MSC Project, with impacts discussed in Section 5.4. Coordination with the Texas Historic Commission is ongoing, but it is expected that impacts to significant sites will be avoided.

Coastal Preserves

This natural resource includes only State lands and parks. There is one designated Texas Coastal Preserve (Welder Flats State Coastal Preserve), located in the MSC study area, just east of the mouth of San Antonio Bay. Also, there is another State-owned land in the study area (Perry R. Bass Research Station) located on the shoreline of Matagorda Bay between Carancahua and Turtle Bays. Based on their distance from the project channel and hydro-salinity modeling conducted for the project, impacts are not expected to occur from dredging or material placement operations to these state-owned lands.

COMPLIANCE WITH GOALS AND POLICIES

The following goals and policies of the TCMP were reviewed for compliance (TAC Title 31, Part 16, Chapter 501 Subchapter B).

§501.15 – Policy for Major Actions

1 §501.25 – Dredging and Dredged Material Disposal and Placement

2

§501.15 – Policy for Major Actions

(a) For purposes of this section, "major action" means an individual agency or subdivision action listed in §505.11 of this title (relating to Actions and Rules Subject to the Coastal Management Program), §506.12 of this title (relating to Federal Actions Subject to the Coastal Management Program), or §505.60 of this title (relating to Local Government Actions Subject to the Coastal Management Program), relating to an activity for which a Federal environmental impact statement under the National Environmental Policy Act, 42 United States Code Annotated, §4321, et seq. is required.

(b) Prior to taking a major action, the agencies and subdivisions having jurisdiction over the activity shall meet and coordinate their major actions relating to the activity. The agencies and subdivisions shall, to the greatest extent practicable, consider the cumulative and secondary adverse effects, as described in the Federal environmental impact assessment process, of each major action relating to the activity.

(c) No agency or subdivision shall take a major action that is inconsistent with the goals and policies of this chapter. In addition, an agency or subdivision shall avoid and otherwise minimize the cumulative adverse effects to coastal natural resource areas of each of its major actions relating to the activity.

Compliance: This project involves action subject to §506.12 and constitutes a major action. Therefore, a Federal EIS is required under National Environmental Policy Act (NEPA), 42 USC, §4321, et seq. Both State and Federal agencies have met and coordinated on the identification and mitigation of project impacts and beneficial uses of dredged material. The purpose of this letter is to demonstrate that the Tentatively Selected Plan is consistent with the TCMP. All project planning has made efforts to avoid and otherwise minimize the cumulative adverse effects to coastal natural resource areas relating to the activity.

Section 501.25 Dredging and Dredged Material Disposal and Placement

(a) Dredging and the disposal and placement of dredged material shall avoid and otherwise minimize adverse effects to coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches to the greatest extent practicable. The policies of this section are supplemental to any further restrictions or requirements relating to the beach access and use rights of the public. In implementing this section, cumulative and secondary adverse effects of dredging and the disposal and placement of dredged material and the unique characteristics of affected sites shall be considered.

Compliance: Dredged material will be placed on a variety of areas and will have some effects on coastal waters and submerged lands such as temporarily burying benthic organisms and increasing turbidity in the area. Habitat losses and gains will result from measures outlined in the DMMP (Appendix F to the MSC EIS). In some instances, impacts include losses to bay bottom habitat. Although these measures will result in bay bottom loss, this bay bottom will change elevation and oyster reef habitats will be created on top of the placement material, creating potentially more-productive habitat. Other actions include placement onto agricultural land in an inland area and use of ODMDSs. Proposed measures of the DMMP are the result of coordination among agency personnel and other interested parties.

(1) Dredging and dredged material disposal and placement shall not cause or contribute, after consideration of dilution and dispersion, to violation of any applicable surface water quality standards established under §501.21 of this title.

Compliance: Sediment samples have been taken from both maintenance and virgin sediments in the project area and subjected to elutriate preparation and suspended

particulate bioassays. No Texas Water Quality Standards or U.S. Environmental Protection Agency (EPA) Water Quality Criteria were exceeded, and nothing in the results of the bioassays indicates any cause for concern. Although contaminated sediments (i.e., mercury) occur within the Alcoa/Lavaca Bay Superfund Site, these sediments would not be dredged. Further, DMMP measures would cap these sediments preventing any dispersion or dilution. For all placement areas, adequate dilution and dispersion would occur so that applicable surface water standards are not violated (EIS Section 5.3).

(2) Except as otherwise provided in paragraph (4) of this subsection, adverse effects on critical areas from dredging and dredged material disposal or placement shall be avoided and otherwise minimized, and appropriate and practicable compensatory mitigation shall be required, in accordance with §501.23 of this title.

Compliance: CRNAs will be impacted by the project, as discussed above; however, DMMP measures will result in creation and restoration of critical areas. For example, DMMP measures will have a direct impact on about 132 ac but will also create approximately 133 ac. Additionally, although 20 ac of marsh will be impacted by placement measures, impacts will be mitigated and 26 ac of marsh will be created.

(3) Except as provided in paragraph (4) of this subsection, dredging and the disposal and placement of dredged material shall not be authorized if:

(A) there is a practicable alternative that would have fewer adverse effects on coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches, so long as that alternative does not have other significant adverse effects.

Compliance: Channel construction and placement of new work and maintenance material have been designed to minimize adverse impacts to the environment. Placement of new work and maintenance material only in existing placement areas was not an available option for this project due to the volumes of dredged material and expected project life (50-year timeframe). Sufficient upland sites are not available. See the DMMP (Appendix F to the MSC EIS) for a discussion of all placement areas and alternatives that were evaluated.

(B) all appropriate and practicable steps have not been taken to minimize adverse effects on coastal waters, submerged lands, critical areas, coastal shore areas, and Gulf beaches.

Compliance: All practicable steps, including upland placement to the extent practicable, minimum channel size to meet the project needs, and extensive beneficial uses, have been taken to minimize adverse affects on these resources. See the DMMP (Appendix F to the MSC EIS) for a discussion of all placement areas that were evaluated and associated minimization of adverse effects.

(C) significant degradation of critical areas under §501.23(a)(7)(E) of this title would result.

Compliance: Some critical areas will be affected by the project, as noted above. However, impacts to critical areas have been minimized to the greatest extent practicable, and net environmental benefits will result from the proposed DMMP measures discussed above. See the DMMP (Appendix F to the MSC EIS) for a discussion of all placement areas that were evaluated and associated minimization of adverse effects.

(4) A dredging or dredged material disposal or placement project that would be prohibited solely by application of paragraph (3) of this subsection may be allowed if it is determined to be of overriding importance to the public and national interest in light of economic impacts on navigation and maintenance of commercially navigable waterways.

Compliance: Dredging and placement is not precluded by paragraph (3), as noted above.

(b) Adverse effects from dredging and dredged material disposal and placement shall be minimized as required in subsection (a) of this section. Adverse effects can be minimized by employing the techniques in this subsection where appropriate and practicable.

Compliance: Adverse effects of dredging and disposal, as described in this EIS and associated DMMP, have been minimized as described under "Compliance" for paragraph (1) of this subsection. See the DMMP (Appendix F to the MSC EIS) for a discussion of all placement areas that were evaluated and associated minimization of adverse effects.

(1) Adverse effects from dredging and dredged material disposal and placement can be minimized by controlling the location and dimensions of the activity. Some of the ways to accomplish this include:

(A) locating and confining discharges to minimize smothering of organisms;

(B) locating and designing projects to avoid adverse disruption of water inundation patterns, water circulation, erosion and accretion processes, and other hydrodynamic processes;

(C) using existing or natural channels and basins instead of dredging new channels or basins, and discharging materials in areas that have been previously disturbed or used for disposal or placement of dredged material;

(D) limiting the dimensions of channels, basins, and disposal and placement sites to the minimum reasonably required to serve the project purpose, including allowing for reasonable overdredging of channels and basins, and taking into account the need for capacity to accommodate future expansion without causing additional adverse effects;

(E) discharging materials at sites where the substrate is composed of material similar to that being discharged;

(F) locating and designing discharges to minimize the extent of any plume and otherwise control dispersion of material; and

(G) avoiding the impoundment or drainage of critical areas

.

Compliance: Placement areas have been designed to minimize bay bottom impacts by using vertical storage of dredged material to create marshes or uplands or using upland confined placement, wherever practical. Changes in water circulation and salinity should have minimal impacts to fisheries. Channel configuration will not change, except for expansion, and except for beneficial uses and upland placement, placement areas will not change. Oyster reef production may be reduced due to increases in salinity; however, oyster reef production reductions will be offset through the creation of about 133 ac of oyster reef. Discharges will be confined with reinforced levees where applicable. No impoundment or draining of critical areas will occur.

(2) Dredging and disposal and placement of material to be dredged shall comply with applicable standards for sediment toxicity. Adverse effects from constituents contained in materials discharged can be minimized by treatment of or limitations on the material itself. Some ways to accomplish this include:

(A) disposal or placement of dredged material in a manner that maintains physiochemical conditions at discharge sites and limits or reduces the potency and availability of pollutants;

(B) limiting the solid, liquid, and gaseous components of material discharged;

(C) adding treatment substances to the discharged material; and

(D) adding chemical flocculants to enhance the deposition of suspended particulates in confined disposal areas.

Compliance: Sediments to be dredged from the MSC have been tested for a variety of chemical parameters of concern. There appears to be no cause for concern relative to placing these sediments in the Gulf or using them beneficially. A summary of these results is included in the MSC EIS. PA ER3/D is proposed in areas with potential mercury-contaminated sediments. New work clay material will be used to cap these areas in Lavaca Bay known to contain higher mercury levels in the sediments. Concern has been expressed relative to the possibility of resuspending higher-mercury-concentration sediments by mud waves from capping these sediments, but the technique outlined in the DMMP should eliminate any concerns.

(3) Adverse effects from dredging and dredged material disposal or placement can be minimized through control of the materials discharged. Some ways of accomplishing this include:

(A) use of containment levees and sediment basins designed, constructed, and maintained to resist breaches, erosion, slumping, or leaching;

(B) use of lined containment areas to reduce leaching where leaching of chemical constituents from the material is expected to be a problem;

(C) capping in-place contaminated material or, selectively discharging the most contaminated material first and then capping it with the remaining material;

(D) properly containing discharged material and maintaining discharge sites to prevent point and nonpoint pollution; and

(E) timing the discharge to minimize adverse effects from unusually high water flows, wind, wave, and tidal actions.

Compliance: Proposed measures would include the construction of reinforced containment levees where applicable. PA ER3/D is designed to cap mercury-contaminated sediments; several measures will be employed to reduce the potential disturbance of mercury-impacted sediment and include a rigid barrier (most likely a PVC sheetpile), a toe berm, and construction sequencing to work from the outside to the inside of the PA during levee construction. The rigid barrier will be placed along the outside of ER3 prior to any material placement. Calhoun Port Authority would implement control measures such as turbidity curtains or rigid barriers adequately designed for the site-specific location. Discharge controls to direct material flow away from sensitive habitats would reduce potential impacts. Lastly, the timing of discharge would be planned in a manner to reduce or avoid adverse impacts from unusually high water flows, wind, wave, and tidal actions.

(4) Adverse effects from dredging and dredged material disposal or placement can be minimized by controlling the manner in which material is dispersed. Some ways of accomplishing this include:

(A) where environmentally desirable, distributing the material in a thin layer;

(B) orienting material to minimize undesirable obstruction of the water current or circulation patterns;

(C) using silt screens or other appropriate methods to confine suspended particulates or turbidity to a small area where settling or removal can occur;

(D) using currents and circulation patterns to mix, disperse, dilute, or otherwise control the discharge;

(E) minimizing turbidity by using a diffuser system or releasing material near the bottom;

(F) selecting sites or managing discharges to confine and minimize the release of suspended particulates and turbidity and maintain light penetration for organisms; and

(G) setting limits on the amount of material to be discharged per unit of time or volume of receiving waters.

Compliance: All of the sites minimize or avoid adverse dispersal effects to the greatest extent practicable and incorporated hydro-salinity and sedimentation modeling of the area of interest. Sequenced discharge points will be used to disperse material across ODMDSs. There are no sediments of concern with regards to dredged material placement.

(5) Adverse effects from dredging and dredged material disposal or placement operations can be minimized by adapting technology to the needs of each site. Some ways of accomplishing this include:

(A) using appropriate equipment, machinery, and operating techniques for access to sites and transport of material, including those designed to reduce damage to critical areas;

(B) having personnel on site adequately trained in avoidance and minimization techniques and requirements; and

(C) designing temporary and permanent access roads and channel spanning structures using culverts, open channels, and diversions that will pass both low and high water flows, accommodate fluctuating water levels, and maintain circulation and faunal movement.

Compliance: Where applicable, all sites in this project meet this requirement. Contracts will be written to ensure compliance with all standards. The ODMDSs are accessed by vessel and the upland sites can be accessed by land-based equipment without damaging critical areas.

(6) Adverse effects on plant and animal populations from dredging and dredged material disposal or placement can be minimized by.

(A) avoiding changes in water current and circulation patterns that would interfere with the movement of animals;

(B) selecting sites or managing discharges to prevent or avoid creating habitat conducive to the development of undesirable predators or species that have a competitive edge ecologically over indigenous plants or animals;

(C) avoiding sites having unique habitat or other value, including habitat of endangered species;

(D) using planning and construction practices to institute habitat development and restoration to produce a new or modified environmental state of higher ecological value by displacement of some or all of the existing environmental characteristics;

(E) using techniques that have been demonstrated to be effective in circumstances similar to those under consideration whenever possible and, when proposed development and restoration techniques have not yet advanced to the pilot demonstration stage, initiating their use on a small scale to allow corrective action if unanticipated adverse effects occur;

(F) timing dredging and dredged material disposal or placement activities to avoid spawning or migration seasons and other biologically critical time periods; and

(G) avoiding the destruction of remnant natural sites within areas already affected by development.

Compliance: Dredged material placement sites meet these requirements. No sites that are advantageous for colonization of predators or nonindigenous species are proposed. Proper coordination with U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS), under the requirements of the Endangered Species Act, was implemented. Cutterhead suction dredges reduce or eliminate the impact to sea turtle nesting or migration. Impacts to sea turtles will be avoided or minimized: (1) hopper dredging will be limited to the cooler months, when possible, when sea turtle activity and abundance is lowest; and (2) dredges will employ all reasonable and prudent measures included in the Biological Opinion prepared by NMFS (Appendix B of the EIS). Any information regarding sea turtle impacts from project efforts would be submitted accordingly to FWS and NMFS.

(7) Adverse effects on human use potential from dredging and dredged material disposal or placement can be minimized by:

(A) selecting sites and following procedures to prevent or minimize any potential damage to the aesthetically pleasing features of the site, particularly with respect to water quality;

(B) selecting sites which are not valuable as natural aquatic areas;

(C) timing dredging and dredged material disposal or placement activities to avoid the seasons or periods when human recreational activity associated with the site is most important; and

(D) selecting sites that will not increase incompatible human activity or require frequent dredge or fill maintenance activity in remote fish and wildlife areas.

Compliance: Temporary and minor adverse effects to fisheries may result from altering or removing productive fishing grounds and interfering with fishing activity near or in the ODMDSs. However, beneficial use sites will contribute significantly to the human use potential of Matagorda and Lavaca bays. The sites will create an estuarine environment of higher ecological quality and productivity for fish and wildlife. This will benefit and attract recreational fishermen.

(8) Adverse effects from new channels and basins can be minimized by locating them at sites:

(A) that ensure adequate flushing and avoid stagnant pockets; or

(B) that will create the fewest practicable adverse effects on CNRAs from additional infrastructure such as roads, bridges, causeways, piers, docks, wharves, transmission line crossings, and ancillary channels reasonably likely to be constructed as a result of the project; or

(C) with the least practicable risk that increased vessel traffic could result in navigation hazards, spills, or other forms of contamination which could adversely affect CNRAs;

(D) provided that, for any dredging of new channels or basins subject to the requirements of §501.15 of this title (relating to Policy for Major Actions), data and information on minimization of secondary adverse effects need not be produced or evaluated to comply with this paragraph if such data and information is produced and evaluated in compliance with §501.15(b)(1) of this title.

Compliance: The MSC deepening and widening constitutes new work dredging to the existing ship channel. Some new access channels will have to be dredged to allow construction of beneficial use sites but these will be as minimal as possible and will not create stagnant pockets, impact any CNRAs except submerged lands, or navigation hazards.

(c) Disposal or placement of dredged material in existing contained dredge disposal sites identified and actively used as described in an environmental assessment or environmental impact statement issued prior to the effective date of this chapter shall be presumed to comply with the requirements of subsection (a) of this section unless modified in design, size, use, or function

.

Compliance: No existing confined placement areas are being modified with new work material.

(d) Dredged material from dredging projects in commercially navigable waterways is a potentially reusable resource and must be used beneficially in accordance with this policy.

Compliance: The majority of the new work material from this project, which has the proper characteristics and is from a feasible location, is being used for shoreline protection or habitat creation. Heavy clay material will be used to cap higher-mercury concentration sediments. Other uses include shoreline restoration and marsh creation.

(1) If the costs of the beneficial use of dredged material are reasonably comparable to the costs of disposal in a non-beneficial manner, the material shall be used beneficially.

(2) If the costs of the beneficial use of dredged material are significantly greater than the costs of disposal in a non-beneficial manner, the material shall be used beneficially unless it is demonstrated that the costs of using the material beneficially are not reasonably proportionate to the costs of the project and benefits that will result. Factors that shall be considered in determining whether the costs of the beneficial use are not reasonably proportionate to the benefits include, but are not limited to:

(A) environmental benefits, recreational benefits, flood or storm protection benefits, erosion prevention benefits, and economic development benefits;

(B) the proximity of the beneficial use site to the dredge site; and

(C) the quantity and quality of the dredged material and its suitability for beneficial use.

(3) Examples of the beneficial use of dredged material include, but are not limited to:

(A) projects designed to reduce or minimize erosion or provide shoreline protection;

(B) projects designed to create or enhance public beaches or recreational areas;

(C) projects designed to benefit the sediment budget or littoral system;

(D) projects designed to improve or maintain terrestrial or aquatic wildlife habitat;

(E) projects designed to create new terrestrial or aquatic wildlife habitat, including the construction of marshlands, coastal wetlands, or other critical areas;

(F) projects designed and demonstrated to benefit benthic communities or aquatic vegetation;

(G) projects designed to create wildlife management areas, parks, airports, or other public facilities;

(H) projects designed to cap landfills or other waste disposal areas;

(I) projects designed to fill private property or upgrade agricultural land, if cost-effective public beneficial uses are not available; and

(J) projects designed to remediate past adverse impacts on the coastal zone.

(e) If dredged material cannot be used beneficially as provided in subsection (d)(2) of this section, to avoid and otherwise minimize adverse effects as required in subsection (a) of this section, preference will be given to the greatest extent practicable to disposal in:

(1) contained upland sites;

(2) other contained sites; and

(3) open water areas of relatively low productivity or low biological value.

Compliance: The DMMP includes the use of maintenance material in a beneficial manner, where feasible. The majority of the new work material from this project, which has the proper characteristics and is from a feasible location, will be used for almost all of the uses in the aforementioned sections. New work material not capable of being used for these purposes will be placed in an ODMDS.

(f) For new sites, dredged materials shall not be disposed of or placed directly on the boundaries of submerged lands or at such location so as to slump or migrate across the boundaries of submerged lands in the absence of an agreement between the affected public owner and the adjoining private owner or owners that defines the location of the boundary or boundaries affected by the deposition of the dredged material.

Compliance: Placement areas are designed to prevent impacts to adjoining private lands. All property rights and boundaries associated with submerged lands will be observed.

(g) Emergency dredging shall be allowed without a prior consistency determination as required in the applicable consistency rule when:

(1) there is an unacceptable hazard to life or navigation;

(2) there is an immediate threat of significant loss of property; or

(3) an immediate and unforeseen significant economic hardship is likely if corrective action is not taken within a time period less than the normal time needed under standard procedures.

The council secretary shall be notified at least 24 hours prior to commencement of any emergency dredging operation by the agency or entity responding to the emergency. The notice shall include a statement demonstrating the need for emergency action. Prior to initiation of the dredging operations the project sponsor or permit-issuing agency shall, if possible, make all reasonable efforts to meet with council's designated representatives to ensure consideration of and consistency with applicable policies in this subchapter. Compliance with all applicable policies in this subchapter shall be required at the earliest possible date. The permit-issuing agency and the applicant shall submit a consistency determination within 60 days after the emergency operation is complete.

Compliance: The project would comply with *section (g)* in the event that emergency dredging is necessary.

(h) There will be no mining of sand, shell, marl, gravel, or mudshell for project purposes. Dredged new work and maintenance material will be placed within ODMDSs, which are located within submerged lands, and shall be prohibited unless there is an affirmative showing of no significant impact on erosion within the coastal zone and no significant adverse effect on coastal water quality or terrestrial and aquatic wildlife habitat within any CNRA.

Compliance: Placement within the ODMDSs would result in placement of dredged material within submerged lands, but these offshore placement areas are dispersive by nature, have been previously used, and will likely revert to the in situ topography prior to the next dredged material disposal. No significant adverse effect on coastal water quality or terrestrial and aquatic wildlife habitat within any CNRA would occur as a result of the project.

(i) The Texas General Land Office (GLO) and the SLB shall comply with the policies in this section when approving oil, gas, and other mineral lease plans of operation and granting surface leases, easements, and permits and adopting rules under the Texas Natural Resources Code, Chapters 32, 33, and 51 - 53, and Texas Water Code, Chapter 61, for dredging and dredged material disposal and placement. Texas Department of Transportation (TxDOT) shall comply with the policies in this subchapter when adopting rules and taking actions as local sponsor of the Gulf Intracoastal Waterway under Texas Transportation Code, Chapter 51. The TCEQ and the RRC shall comply with the policies in this section when issuing certifications and adopting rules under Texas Water Code, Chapter 26, and the Texas Natural Resources Code, Chapter 91, governing certification of compliance with surface water quality standards for Federal actions and permits authorizing dredging or the discharge or placement of dredged material. The TPWD shall comply with the policies in this section when adopting rules at Chapter 57 of this title (relating to Fisheries) governing dredging and dredged material disposal and placement. The TPWD shall comply with the policies in subsection (h) of this section when adopting rules and issuing permits under Texas Parks and Wildlife Code, Chapter 86, governing the mining of sand, shell, marl, gravel, and mudshell.

Compliance: This project does not pertain to oil, gas, and other mineral lease plans of operation and granting surface leases, easements, and permits; *section (i)* is not applicable.

CONCLUSION

The proposed MSC Project is consistent with the Federal goals and objectives of the CZM. Any concerns expressed by the GLO will be addressed before the permit is granted.

REFERENCES

Kraus, N.C. 2006. Coastal inlet functional design: Anticipating morphologic response. In *Proceedings, Coastal Dynamics '06*. Reston, VA: American Society of Civil Engineers.

Kraus, N.C., L. Lin, B.K. Batten, and G.L. Brown. 2006. Matagorda Ship Channel, Texas: Jetty Stability Study. Technical Report ERDC/CHL-06-7. U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. U.S. Army Corps of Engineers (USACE). 2006. Matagorda Ship Channel, Texas: Jetty Stability Study. Coastal and Hydraulics Laboratory, ERDC/CHL TR-06-7. August 2006.

TEXAS GENERAL LAND OFFICE
GEORGE P. BUSH, COMMISSIONER

January 8, 2019

Department of the Army
Galveston District, Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Re: Draft Integrated Feasibility Study and Environmental Impact Statement for the proposed USACE Matagorda Ship Channel Project
Calhoun and Matagorda Counties, Texas
CMP#: 19-1251-F2

Dear Applicant:

Based on information provided to the Texas Coastal Management Program (TCMP) on the above project, it has been determined that it will likely not have adverse impacts on coastal natural resource areas in the coastal zone and is consistent with the goals and policies of the TCMP.

If you have any questions or concerns, please contact me at (361) 886-1630 or at federal.consistency@glo.texas.gov

Sincerely,

Jesse Solis, Jr.
Coastal Protection
Texas General Land Office

email cc: Michael Brown, USACE

Enclosure 9 – Coastal Barrier Resources Act Compliance

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects

Integrated Draft Feasibility Report and Environmental Impact Assessment

June 2019

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INTERAGENCY CBRA CONSULTATIONS

The Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq.*) encourages the conservation of hurricane prone and biologically rich coastal barriers. No new expenditures or financial assistance may be made available under authority of any Federal law for any purpose within the System Units of the John H. Chafee Coastal Barrier Resources System (CBRS) including: construction or purchase of roads, structures, facilities, or related infrastructure, and most projects to prevent the erosion of or otherwise stabilize any inlet, shoreline, or inshore area. However, the appropriate Federal officer, after consultation with the U.S. Fish and Wildlife Service (Service), may make Federal expenditures and financial assistance available within System Units for activities that meet one of the CBRA's exceptions (16 U.S.C. 3505). The CBRA imposes no restrictions on actions and projects within the CBRS that are carried out with State, local, or private funding. Any response from the Service to a CBRA consultation request is in the form of an opinion only. The Service has not been granted veto power. **The responsibility for complying with the CBRA and the final decision regarding the expenditure of funds for a particular action or project rests with the Federal funding agency.**

There are two types of units within the CBRS, System Units and Otherwise Protected Areas (OPAs). OPAs are denoted with a "P" at the end of the unit number (e.g., "FL-64P"). Most new Federal expenditures and financial assistance, including Federal flood insurance, are prohibited within System Units. The only Federal spending prohibition within OPAs is on Federal flood insurance; other Federal expenditures are permitted. **Consultation with the Service is not needed if the proposed action or project is located within an OPA.** However, agencies providing disaster assistance that is contingent upon a requirement to purchase flood insurance after the fact are advised to disclose the OPA designation and information on the restrictions on Federal flood insurance to the recipient prior to the commitments of funds.

The Service has developed the attached template to help facilitate the CBRA consultation process. This form, and any additional documentation, may be submitted to the appropriate Ecological Services Field Office to fulfill the CBRA's consultation requirement.

Additional Resources:

CBRS Mapper: *https://www.fws.gov/cbra/maps/mapper.html*

CBRS shapefile and Web Map Service: *https://www.fws.gov/cbra/maps/Boundaries.html*

CBRA consultations: *https://www.fws.gov/cbra* under "Project Consultations"

CBRS in/out property determinations: *https://www.fws.gov/cbra/Determinations.html*

Ecological Services Field Office contact information: *https://www.fws.gov/offices*

June 19, 2019

Mr. Charles Ardizzone
U.S. Fish and Wildlife Service
Texas Coastal Ecological Services
17629 El Camino Real
Houston, TX 77058

The Department of the Army, Galveston District, Corps of Engineers requests a consultation with the U.S. Fish and Wildlife Service (Service) under the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 *et seq.*) for the proposed Matagorda Ship Channel, Port Lavaca, TX.

Project Location

The project location is the Matagorda Ship Channel (MSC) in Calhoun and Matagorda Counties, Texas. The MSC is a deep-draft navigation channel connecting the Port of Port Lavaca-Point Comfort with the Gulf of Mexico. Extending 25 miles long, it passes through Matagorda Bay, intersects the Gulf Intracoastal Waterway and cuts through Matagorda Peninsula for approximately one mile. The land cut is bordered by jetties. The area lies within CBRA unit T07 and Otherwise Protected Area (OPA) T07P. A map of the location was created through the John H. Chafee Coastal Barrier Resources System (CBRS) Mapper Program (Figure 1) (https://www.fws.gov/cbra/maps/mapper.html).

Description of the Proposed Action or Project

The MSC Project would widen the in-bay channel to 350 feet and deepen the channel to -47 feet Mean Lower Low Water (MLLW). The Entrance Channel would be widened to 600 feet and deepened to -49 feet MLLW (Figure 2). Approximately 21 million cubic yards (mcy) of new work material and 154 mcy of maintenance material will be generated over the 50-year span of the project. Approximately 3.2 mcy of new work material would be placed in an offshore dispersive site, 1.4 mcy of new work material would be placed in a sand engine feature southwest of the entrance channel jetties, and 14.0 mcy would be placed in new unconfined open bay placement areas along the western side of the channel (Figure 3). Maintenance material will be placed as follows: 9.0 mcy in the above mentioned sand engine, 114.2 mcy in new unconfined open bay placement, and 17.9 mcy in an existing offshore dispersive site (Figure 3). During future maintenance dredging, a portion of the increased volume of maintenance material from the widened entrance channel will also be placed in the sand engine location to mitigate for the anticipated change in sediment dynamics at the entrance caused by the deepening project. The Calhoun Port Authority is partnering with the Audubon Society to use a portion of the dredged material beneficially to support the continued viability of Sundown Island (also known as Bird Island and Chester Island). Approximately 1.2 mcy of new work material is slated to be used for the expansion and maintenance plans of the island, in accordance with the long term plans of the Audubon Society. Within CBRA Unit T07 dredging will occur to widen the Entrance Channel to 600 feet and deepen the channel to -49 feet MLLW. In addition, within T07 1.4 mcy of new work material and 9 mcy of maintenance material over the 50 year project life will be placed in a sand engine feature southwest of the entrance channel jetties. No other work will occur within a CBRA unit.

Applicable Exception(s) under 16 U.S.C. 3505(a)

Identify the appropriate exception(s) for the action or project under the CBRA (16 U.S.C. 3505(a)).

General Exceptions

- ☐ 16 U.S.C. 3505(a)(1): Any use or facility necessary for the **exploration, extraction, or transportation of energy resources** which can be carried out only on, in, or adjacent to a coastal water area because the use or facility requires access to the coastal water body.
- ☒ 16 U.S.C. 3505(a)(2): The **maintenance or construction of improvements of existing Federal navigation channels** (including the Intracoastal Waterway) and related structures (such as jetties), including the disposal of dredge materials related to such maintenance or construction. A Federal navigation channel or a related structure is an existing channel or structure, respectively, if it was authorized before the date on which the relevant System unit or portion of the System Unit was included within the CBRS.
- ☐ 16 U.S.C. 3505(a)(3): The maintenance, replacement, reconstruction, or repair, but not the expansion, of **publicly owned or publicly operated roads, structures, or facilities that are essential links** in a larger network or system.
- ☐ 16 U.S.C. 3505(a)(4): **Military activities** essential to national security.
- ☐ 16 U.S.C. 3505(a)(5): The construction, operation, maintenance, and rehabilitation of **Coast Guard facilities** and access thereto.

Specific Exceptions

These exceptions must also be consistent with all three purposes of the CBRA (see "Justification" section below).

- ☐ 16 U.S.C. 3505(a)(6)(A): **Projects for the study, management, protection, and enhancement of fish and wildlife resources and habitats**, including acquisition of fish and wildlife habitats, and related lands, stabilization projects for fish and wildlife habitats, and recreational projects.
- ☐ 16 U.S.C. 3505(a)(6)(B): Establishment, operation, and maintenance of **air and water navigation aids** and devices, and for access thereto.
- ☐ 16 U.S.C. 3505(a)(6)(C): Projects under the **Land and Water Conservation Fund Act** of 1965 (16 U.S.C. 4601-4 through 11) and the **Coastal Zone Management Act** of 1972 (16 U.S.C. 1451 et seq.).
- ☐ 16 U.S.C. 3505(a)(6)(D): **Scientific research,** including aeronautical, atmospheric, space, geologic, marine, fish and wildlife, and other research, development, andapplications.
- ☐ 16 U.S.C. 3505(a)(6)(E): Assistance for **emergency actions essential to the saving of lives and the protection of property and the public health and safety**, if such actions are performed pursuant to sections 5170a, 5170b, and 5192 of title 42 **and are limited to actions that are necessary to alleviate the emergency.**
- ☐ 16 U.S.C. 3505(a)(6)(F): Maintenance, replacement, reconstruction, or repair, but not the expansion (except with respect to United States route 1 in the Florida Keys), of **publicly owned or publicly operated roads, structures, and facilities.**
- ☐ 16 U.S.C. 3505(a)(6)(G): **Nonstructural projects for shoreline stabilization** that are designed to mimic, enhance, or restore a natural stabilization system.

Justification for Exception(s)

The Matagorda Ship Channel is an existing Federal navigation channel, which was initially authorized under Public Law 85-500, RHA of July 3, 1958. The CBRS system in the project area consists of units T07 and T07P (Figure 1). The deepening and widening of the existing channel will bisect each of these units. No upland placement of dredged material will occur within these units. Although the navigation exception as a 16 USC 3505 (a) 1-5 exception does not require the agency to further demonstrate consistency with the purposes of the Act, the project as planned would. The area consists mainly of wetlands and other low-lying areas that would flood from rainfall and surge events. Many of these areas would still be in jurisdictional wetlands and would require Section 10/404 permits and compensatory mitigation for impacting these areas. No roads lead to Matagorda Island, so delivery of building materials would be costly, although some camps do exist on the island. Sundown Island is Audubon's largest bird sanctuary island along the Gulf Coast and is a protected area. These factors and the existing available upland areas for development outside of the coastal barrier system at a much lower cost act in a manner that would not encourage development in these areas.

Construction of the proposed action is anticipated to allow for a safer channel to navigate, as well as protect and enhance fish and wildlife resources and habitats in a manner consistent with the purposes of CBRA.

Contact Information

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US Army Corps of Engineers
Regional Planning and Environmental Center
P. O. Box 1229
Galveston, TX 77553-1229
(409) 766-3837
Harmon.Brown@usace.army.mil

Douglas C. Sims, PMP, RPA
Chief, Environmental Branch
Regional Planning and Environmental Center

DATE

6/19/19

U.S. Fish and Wildlife Service Response

Below is the Service's response to U.S. Army Corps of Engineers request for a consultation under the CBRA for MSC Jetty Deficiency Study. This response represents the Service's opinion. **The final decision regarding the expenditure of funds for this action or project rests with the Federal funding agency.** US Army Corps of Engineers has fulfilled its obligation to consult with the Service under the CBRA for this particular action or project within the CBRS. Please note that any new commitment of Federal funds associated with this action or project, or change in the project design and/or scope, is subject to the CBRA's consultation requirement.

The Service has reviewed the information provided by U.S. Army Corps of Engineers, and believes the referenced action/project is:

- ☐ Not located within a System Unit of the CBRS and the CBRA does not apply (except with respect to the restrictions on Federal flood insurance)
- ☑ Located within a System Unit of the CBRS and meets the exception(s) to the CBRA selected above
- ☐ Located within a System Unit of the CBRS and meets different exception(s) than the one(s) selected above (see additional information/comments below)
- ☐ Located within a System Unit of the CBRS and does not meet an exception to the CBRA (see additional information/comments below)

- ☐ Due to many competing priorities, the Service is unable to provide an opinion on the applicability of the CBRA's exceptions to this action/project at this time. The Department of the Army, Galveston District, Corps of Engineers may elect to proceed with the action/project if it has determined that the action/project is allowable under the CBRA. Please note that any new commitment of Federal funds associated with this action/project or a related future project is subject to the CBRA's consultation requirement.

Additional Information/Comments

If you have any questions, please contact Denise Ruffino, Fish and Wildlife Biologist, at 281-212-1514 or at denise_ruffino@fws.gov.

This response does not constitute consultation for any project pursuant to section 7 of the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*) or comments afforded by the Fish and Wildlife Coordination Act (48 Stat. 401; 16 U.S.C. 661 *et seq.*); nor does it preclude comment on any forthcoming environmental documents pursuant to the National Environmental Policy Act (83 Stat. 852; 42 U.S.C. 4321 *et seq.*).

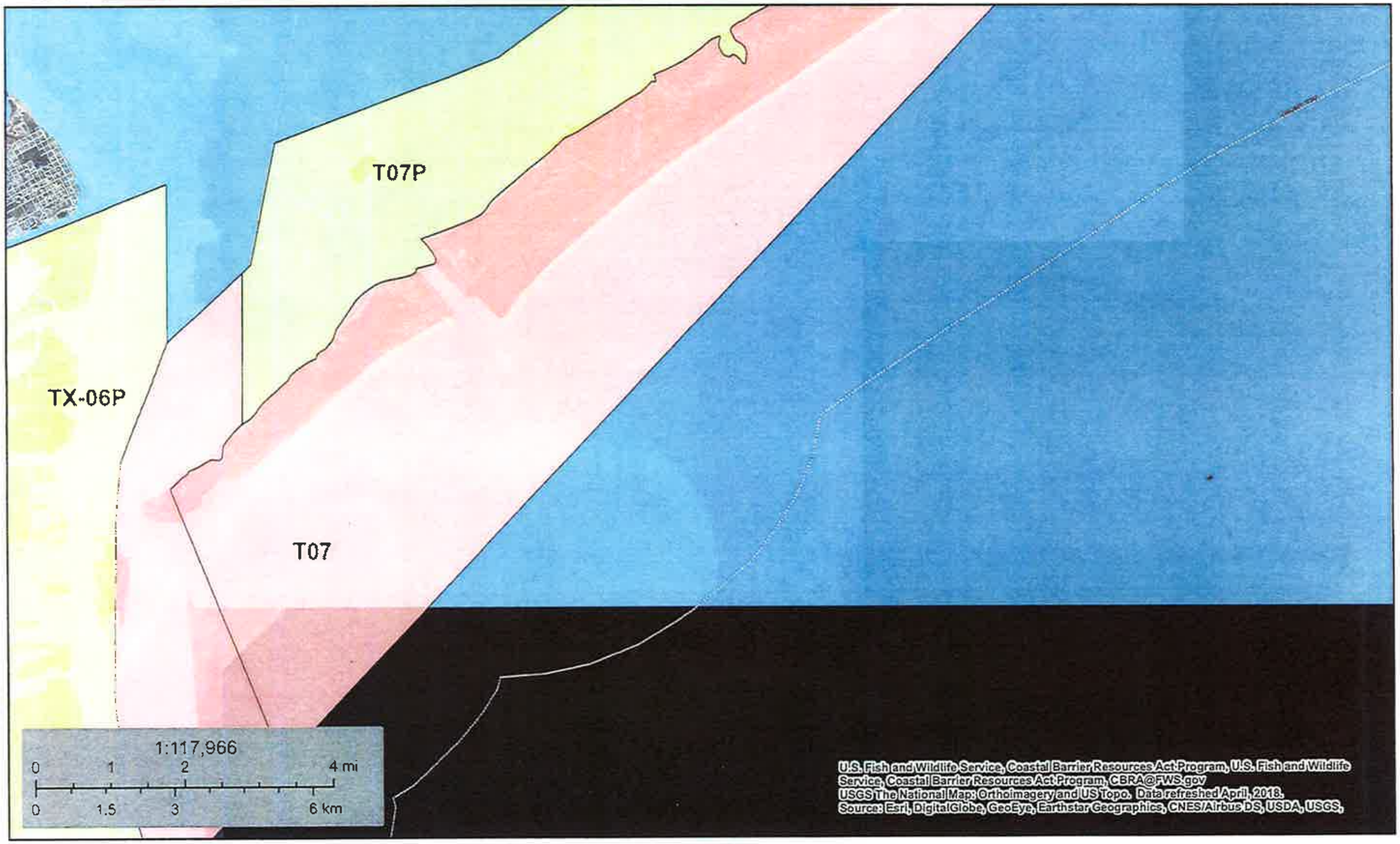
SERVICE FIELD OFFICE SIGNATORY AND TITLE | DATE

project leader | 26 June 2019

U.S. Fish and Wildlife Service

Coastal Barrier Resources System

MSC



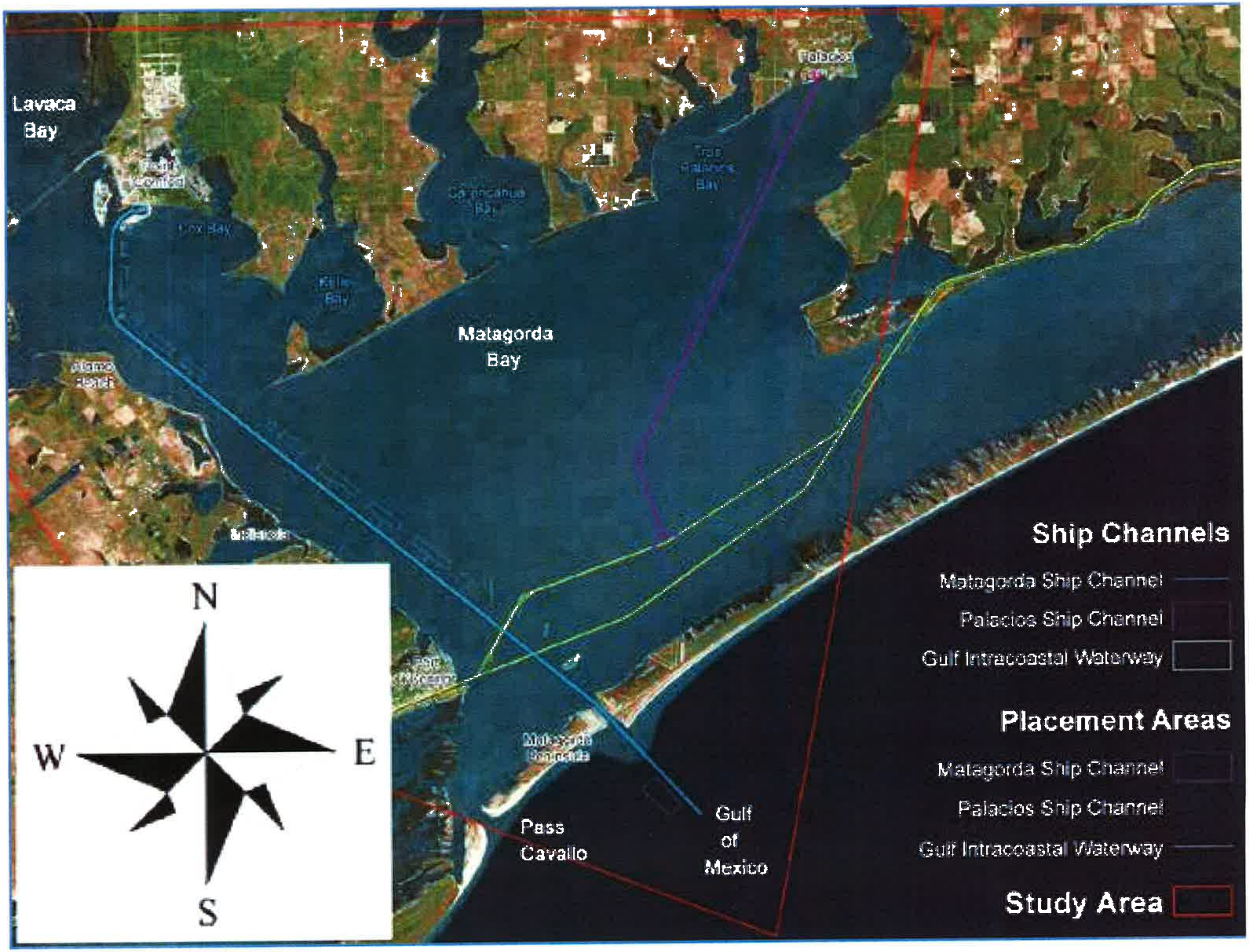
February 13, 2019

This map is for general reference only. The Coastal Barrier Resources System (CBRS) boundaries depicted on this map are representations of the controlling CBRS boundaries, which are shown on the official maps, accessible at http://www.fws.gov/cbra/maps/index.html. All CBRS related data should be used in accordance with the layer metadata found on the CBRS Mapper website.

The CBRS Buffer Zone represents the area immediately adjacent to the CBRS boundary where users are advised to contact the Service for an official determination (http://www.fws.gov/cbra/Determinations.html) as to whether the property or project site is located "in" or "out" of the CBRS.

CBRS units normally extend seaward out to the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS mapper.

This page was produced by the CBRS Mapper


Lavaca Bay
Palacios
Tres Palacios Bay
Carancahua Bay
Cox Bay
Keller Bay
Matagorda Bay
Alamo Beach
Matagorda Peninsula
Pass Cavallo
Gulf of Mexico
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Ship Channels
Matagorda Ship Channel
Palacios Ship Channel
Gulf Intracoastal Waterway
Placement Areas
Matagorda Ship Channel
Palacios Ship Channel
Gulf Intracoastal Waterway
Study Area

PLAN

0 5000 10000 15000

SCALE IN FEET

U.S. Army Corps of Engineers

Drawing No.

Plate D-01

File: C:\Users\m3ecbcb9\Desktop\Matagorda Geotechnical Information\Coordination Files\MSC Final DMMP.dgn
Model Name: Copy of ALT-1
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Enclosure 10 - Monitoring and Adaptive Management Plan

Matagorda Ship Channel, TX

Section 216 – Review of Completed Projects
Integrated Feasibility Report and Environmental Impact Assessment

May 2019

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Contents

List of Tables

List of Acronyms

DMMP Dredge Material Management Plan
MSC Matagorda Ship Channel
TPWD Texas Parks and Wildlife Department
USACE United States Army Corps of Engineers

1.0 Introduction

In accordance with Section 2036(a) of the Water Resources Development Act of 2007 a monitoring and adaptive management plan must be developed and included along with a final feasibility report that includes mitigation requirements. The monitoring and adaptive management plan is intended to detail how the ecological success of mitigation measures will be measured.

The Matagorda Ship Channel (MSC) recommended plan includes a requirement for 130 acres of oyster reef mitigation for unavoidable impacts. In addition, the Dredge Material Management Plan (DMMP) for the plan includes the possibility, though unlikely, of impacts to freshwater marsh that would require 2.0 acres of mitigation. This monitoring and adaptive management plan will address both the oyster and marsh measures.

2.0 Oysters

2.1 Post-construction survey

The criteria for the construction of the oyster reef mitigation sites is detailed in the mitigation plan (Appendix B, Enclosure 1). Not later than 21 days following the completion of the oyster reef construction a notice of completion must be provided to USACE. A post-construction survey will be conducted in the first October-December time period following completion and the cultch has settled by 70% (“70% Settling Date”). This date will be determined through detailed geotechnical assessments and the date provided to USACE. The post-construction survey will be conducted by a Registered Professional Land Surveyor to determine if the projected aerial size and elevation specifications have been achieved. Upon completion of the survey, a Post-Construction Report will be prepared and delivered to USACE within 60 days of completion. The report will include the following:

Summary of construction activities
Baseline survey showing reef area, configuration, and elevation
Estimated depths of overlying water
Information to establish that the construction criteria have been met

Within 30 days of receiving the report, the USACE reserves the right to establish a date for a construction inspection. After reviewing the report, and any subsequent inspections, if the USACE agrees that the construction criteria have been met, the USACE shall issue a written notice certifying completion of construction of the oyster reef mitigation plan within 60 days after receipt of the Post-Construction Report. If, however, it is determined the construction criteria have not been met, a discussion will be between the USACE and the non-federal sponsor to decide whether any additional steps are needed to meet the construction criteria.

2.2 Performance criteria

Reasonable assurance of the long-term success of the oyster reefs can be provided by meeting short-term milestones. The performance criteria for the oyster mitigation plan are broken down into two categories: design-based and ecological.

2.2.1 Design-Based Criteria

The building up of an oyster reef benefits from the presence of a suitable clay reef base that has a surface elevation that is at least one foot above the surrounding bay bottom. Low areas would be raised with additional rock or shell material to meet the height criteria. While the reefs will consist of multiple reef segments constructed at the same site, the combined aerial size of the segments will be measured as the area of reef created and will not include the area of open water between segments. The area of reef will be no less than 130 acres.

Compliance with the design-based performance criteria shall be documented during each monitoring event that will occur during the October-December time period approximately 6, 18, and 30 months after construction has been completed.

2.2.2. Ecological Criteria

Oyster colonization will be compared to other sampled reefs in Lavaca Bay at the end of the first growing season (6 months), the second growing season (18 months) and third growing season (30 months). Compliance with the ecological performance criteria may be determined during any of the scheduled monitoring events or other inspections approved by the USACE.

2.3 Contingencies

Successful establishment of a productive oyster reef depends on a number of environmental factors that cannot be controlled. Severe flooding, drought, disease, or tropical storms can kill oysters on a reef, or prevent them from colonizing. If conditions exist that would prevent the success of reef colonization at the time of construction, reefs would not be constructed until conditions are favorable for oyster set and growth.

2.4 Performance Monitoring

Reef monitoring will be conducted at scheduled intervals following reef construction. The schedule and objectives of post-construction monitoring events are shown in **Table 1** below. A written report following each monitoring event will be submitted to the USACE for review.

Table 1. Post-Construction Reef Monitoring Events

Monitoring Schedule	Characteristics to Evaluate	Methods
October-December after 70% Settling Date	Evidence of oyster colonization	Sampling based on TPWD oyster survey methodology
	Average reef surface elevation and aerial extent	Baseline survey by a Registered Professional Land Surveyor
October-December approximately 18 months following certification of completion of construction	Evidence of oyster colonization (if not documented during prior monitoring event)	Sampling based on TPWD oyster survey methodology
	Average reef surface elevation	Confirmation survey by a Registered Professional Land Surveyor
October-December approximately 30 months following certification of completion of construction	Evidence of oyster colonization (if not documented during prior monitoring event)	Sampling based on TPWD oyster survey methodology

2.5 Corrective Actions

If corrective actions are required approval will be obtained from the USACE prior to their performance. These actions may include:

a. Mobilization of heavy equipment to rework the existing base material in order to provide gaps, passes, or deflectors designed to improve circulation and/or reduce sedimentation.
b. Reconstruction or augmentation of the reef base to address settlement or subsidence below target elevations.
c. Mechanical manipulation of the upper reef surface to increase surface attachment area if the spat set is not successful and is negatively colonized by algae.

Construction of a new reef is not considered a corrective action. These corrective actions may be triggered by the following:

a. Subsidence or settling of the reef base below target elevations (as confirmed by surveys).
b. Lack of colonization of sessile mollusks in any scheduled post-construction monitoring event.

An additional monitoring event may be added by the USACE if the ecological performance criterion has not been met by the time of the 30-Month Post-Construction Monitoring Event.