Appendix G

Biological Assessment

Biological Assessment for the
Proposed Port Freeport Channel Widening Project
Brazoria County, Texas

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BIOLOGICAL ASSESSMENT FOR THE PORT FREEPORT CHANNEL WIDENING PROJECT BRAZORIA COUNTY, TEXAS

Prepared for:

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Acronyms and Abbreviations

°C	degrees Celsius
AOU	American Ornithologist's Union
BA	Biological Assessment
BU	beneficial use
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FM	Farm-to-Market Road
ft	feet/foot
FWS	U.S. Fish and Wildlife Service
GIWW	Gulf Intracoastal Water Way
GLO	General Land Office
GSMFC	Gulf States Marine Fisheries Commission
Gulf	Gulf of Mexico
HDR/SMA	HDR/Shiner, Moseley & Associates, Inc.
km	kilometers
km^2	square kilometer
mcy	million cubic yards
MLLW	mean low low water
NDD	Natural Diversity Database
NFWL	National Fish and Wildlife Laboratories
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NRC	National Research Council
NWI	National Wetlands Inventory
NWR	National Wildlife Refuge
ODMDS	Ocean Dredged Material Disposal Site
PA	placement area
TCEQ	Texas Commission on Environmental Quality
TED	turtle excluder devices
TOS	Texas Ornithological Society
TPWD	Texas Parks and Wildlife Department
UCPA	Upland Confined Placement Area
USACE	U.S. Army Corps of Engineer

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 Engineer's (USACE) requirements as outlined under Section 7(c) of the Endangered Species Act (ESA) of 1973, as amended. The proposed federal action requiring this assessment is the USACE's verification and authorization under Section 10 of the Rivers and Harbors Act of 1899 for the widening of Port Freeport in Brazoria County, Texas. This BA evaluates the potential impacts the Project may have on Federally listed endangered and threatened species. Table 1 presents a list of Federally listed endangered and threatened species that are addressed in this BA. This BA also describes the avoidance, minimization and conservation measures proposed by Port Freeport. For the purposes of this BA, the study area encompasses Brazoria County and a 10-mile radius into the Gulf of Mexico (Gulf) (Figure 1). The project area is defined as the areas where actual dredging would take place, proposed placement areas, and the proposed beneficial use (BU) sites where impacts might be expected (Figure 2).

This BA is offered to assist the U.S. Fish and Wildlife Service (FWS) and National Marine Fisheries Service (NMFS) personnel in fulfilling their obligations under the ESA. An Environmental Impact Statement (EIS) is being prepared to address the impacts of the Project.

1.2 ALTERNATIVES CONSIDERED

This section discusses alternatives considered during the preparation of the EIS. The proposed project involves the widening of the Freeport Harbor Jetty Channel using a combination of mechanical, pipeline, and hopper dredges; total channel length proposed for widening is 32,335 feet (ft) (6.1 miles).

While alternate sites might be considered alternatives for some projects that address a national or statewide-need, such is not the case for the 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 (i.e., widening of portions of the Freeport Harbor Jetty and Entrance Channels).

1.2.1 Channel-Widening Alternatives

Two possible alternative channel widths were evaluated for the proposed project; 500 and 600 ft. Studies suggest that in order to maintain jetty stability the maximum channel width should not exceed 600 ft (Fugro Consultants, Inc, 2005). Since the USACE had selected 600 ft as the maximum width alternative, 600 ft was the maximum width examined. The existing channel width of 400 ft is marginal for usage by 145-ft beam vessels, even with one-way traffic and under ideal conditions (i.e., less than 0.5 knot cross current). A channel width of 500 ft allows two-way traffic only for the 107-ft beam vessels under ideal

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Legend

← Freeport Channel Widening Project Area

Study Area

N W E S

10 5 0 10 Miles

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Figure 1
Port Freeport Channel Widening Study Area

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Prepared by: Emons

Date: 08/23/2006

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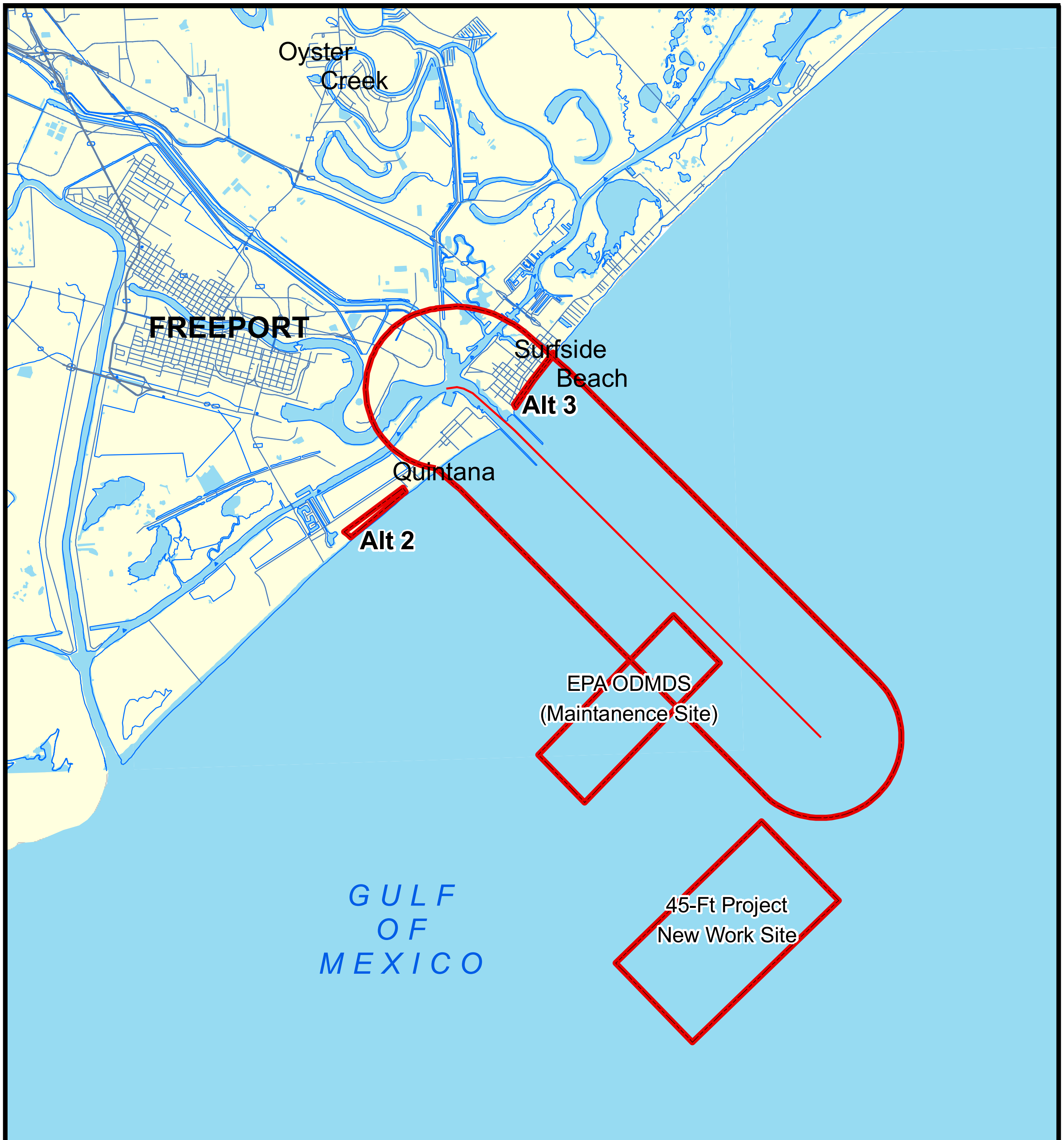

Legend

- Channel Centerline
- Project Area Components

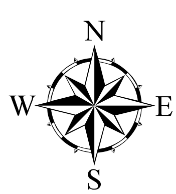

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Figure 2
Port Freeport
Channel Widening
Project Area

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conditions, while a 600-ft channel allows two-way traffic for vessels up to 133-ft beam under ideal conditions and one-way traffic for 148-ft beam vessels, even with a 3 knot cross current.

Since the benefits from the widening are directly related to reducing limitations on transits, the 600-ft width is the preferred alternative, and the 500-ft width was eliminated from further consideration because it does not effectively meet the purpose and need for the Project.

1.2.2 Beneficial Use Dredged Material Placement Area Alternatives

The following provides descriptions of the alternatives evaluated in this EIS; the No-Action alternative and the proposed action with two alternative BU placement areas. The proposed action would result in approximately 3.2 million cubic yards (mcy) of new work dredged material consisting of approximately 2.9 mcy of clay/silt material and about 300,000 cy of silty/sand material. If approved by the Environmental Protection Agency (EPA), the clay/silt material would be placed in an Ocean Dredged Material Disposal Site (ODMDS) that would be redesignated for use by EPA under USACE authority. Additional alternatives to the ODMDS were considered by the Dredged Material Management Plan (DMMP) Workgroup, which consisted of representatives from USACE, NMFS, FWS, Texas Parks and Wildlife Department (TPWD), Texas General Land Office (GLO), Texas Commission on Environmental Quality (TCEQ), Port of Freeport representatives, HDR/Shiner, Moseley & Associates, Inc. (HDR/SMA), and PBS&J. These alternatives included upland confined placement areas, beach nourishment, marsh restoration, upland BU, and offshore BU. Five types of BU placement options (habitat berm, feeder berm, energy dissipating berm, beach nourishment, and marsh restoration) were subjected to a preliminary feasibility analysis. Ultimately it was determined that beach nourishment, either at Surfside beach or Quintana beach in front of the Seaway Placement Area (PA) was the most practical and feasible BU alternative.

1.2.2.1 No-Action Alternative

Under the No-Action alternative, current navigation restrictions would continue and the Port of Freeport would not benefit from the elimination of those operational constraints. Vessels entering the Port of Freeport would continue to be delayed by one-way traffic and daylight-only restrictions, and vessel safety would not be improved.

1.2.2.2 Proposed Action with Placement At Quintana

Under this alternative, the 300,000 cy of silty/sand material would be used beneficially and placed on Quintana Beach. The beach on either side the preferred location (in front of the Seaway PA) has been enhanced through GLO or other programs, leaving a gap. Placement of material in this location would fill the gap, allowing for continuous beach use and providing some protection from erosion.

1.2.2.3 Proposed Action with Placement at Surfside

Under this alternative, the 300,000 cy of silty/sand material would be placed on Surfside Beach. Placement of the material in this area would provide some protection from erosion for homes located along the beach.

1.3 Project Area Habitat Description

For the purposes of this BA, the project area is limited to the immediate area of the Port Freeport Ship Channel and Jetties and includes the Freeport Harbor Jetty and Entrance Channels, totaling approximately 6.3 miles in length, as well as placement areas (see Figure 2). Placement of resulting dredged material may impact areas within and immediately adjacent to the project area.

The communities of Surfside and Quintana Beach, to the northeast and southwest of the Entrance Channel, respectively, are adjacent to the Port of Freeport Ship Channel. There is very little undeveloped area in the immediate vicinity of the ship channel other than the beach and dunes complex. This includes the beaches and dunes of the Gulf shoreline and interior wetlands that are hydrologically connected to the ship channel via natural and man-made (e.g., GIWW) channels.

The Project is located within Upper Coast division (Hatch et al., 1999) of the Gulf Coast Prairies and Marshes Ecoregion (Gould, 1975). This ecoregion is a nearly level plain less than 250 ft in elevation, covering approximately 10 million acres. The Gulf Coast Prairies include the coastal plain that extends approximately 30–80 miles inland while the Gulf Marshes are located in a narrow strip of lowlands that are adjacent to the coast and barrier islands (Hatch et al., 1999).

2.0 STATUS OF THE LISTED SPECIES

To assess the potential impacts of the proposed Project on Federal endangered and threatened species, PBS&J personnel: (1) conducted a review of the Natural Diversity Database (NDD) prepared by TPWD, FWS literature, and searched for other scientific data to determine species distributions, habitat needs and other biological requirements; (2) interviewed recognized experts on the listed species, including local and regional authorities and Federal and State wildlife personnel; and (3) conducted an on-site evaluation of the biological resources within the project area.

Literature sources consulted for this report include the FWS 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 (NWI) mapping and then field-verified. Field visits were conducted on various occasions by PBS&J ecologists and members of the DMMP. Input was also solicited from State and Federal Resource Agency personnel. Table 1 presents a list of federally protected species that have the potential to occur within Brazoria County, Texas.

2.1 LOGGERHEAD SEA TURTLE

2.1.1 Reasons for Status

The loggerhead turtle (*Caretta caretta*) was listed by the FWS as threatened throughout its range on 28 July 1978 (43 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, 2006a).

2.1.2 Habitat

The loggerhead turtle 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. They may remain associated with sargassum for perhaps 3 to 5 years (NMFS and FWS, 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 (Rebel, 1974; Hughes, 1974; Mortimer,

TABLE 1

FEDERALLY LISTED ENDANGERED AND THREATENED FISH AND WILDLIFE SPECIES OF POSSIBLE OCCURRENCE IN BRAZORIA COUNTY, TEXAS[1]

Common Name[2]	Scientific Name[2]	Status[3] FWS
REPTILES		
Leatherback sea turtle	*Dermochelys coriacea*	E
Hawksbill sea turtle	*Eretmochelys imbricata*	E
Kemp's ridley sea turtle	*Lepidochelys kempii*	E
Loggerhead sea turtle	*Caretta caretta*	E
Green sea turtle	*Chelonia mydas*	T
BIRDS		
Brown pelican	*Pelecanus occidentalis*	E
Whooping crane	*Grus americana*	E
Bald eagle	*Haliaeetus leucocephalus*	T-PDL
Piping plover	*Charadrius melodus*	T w/CH
MAMMALS		
Sei whale	*Balaenoptera borealis*	E
Blue whale	*Balaenoptera musculus*	E
Finback whale	*Balaenoptera physalus*	E
Humpback whale	*Megaptera novaeangliae*	E
Sperm whale	*Physeter macrocephalus*	E
Louisiana black bear	*Ursus americanus luteolus*	T
FISHES		
Smalltooth sawfish	*Pristis pectinata*	E
Gulf sturgeon	*Acipenser oxyrhinchus desotoi*	T

[1] According to Natural Diversity Database (NDD, 2005), NMFS (2006), FWS (2005, 2006).

[2] Nomenclature follows American Ornithologist's Union (AOU, 1998, 2000, 2002, 2003, 2004, 2005, and 2006), Crother et al. (2000, 2001, and 2003), NDD (2005), and FWS (2005 and 2006).

[3] FWS – U.S. Fish and Wildlife Service; TPWD – Texas Parks and Wildlife Department.

E – Endangered; T – Threatened; DL – Federally delisted; PDL – Proposed for delisting; C – Candidate for listing; NL – Not listed

1982). 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).

2.1.3 Range

The loggerhead is widely distributed in tropical and subtropical seas, being found in the Atlantic Ocean from Nova Scotia to Argentina, Gulf of Mexico, Indian and Pacific oceans (although it is rare in the eastern and central Pacific) and the Mediterranean Sea (Rebel, 1974; Ross, 1982; Iverson, 1986). 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, 2006a).

2.1.4 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. A large proportion of these deaths are the result of accidental capture by shrimp trawlers, where caught turtles drown and their bodies dumped 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 (Shaver, 2000). For the last 5 years, up to five nests per year have been recorded from the Texas coast (Shaver, 2006). 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 without protection, insufficient loggerheads exist to support a fishery.

2.1.5 Presence in the Project Area

This species has been recorded from the study area. Between 1995 and 2000, eight loggerheads were caught in Freeport Harbor and during the Freeport Harbor Project (13 July to 24 September 2002), one loggerhead was captured by a relocation trawler (NMFS, 2003).

2.2 KEMP'S RIDLEY SEA TURTLE

2.2.1 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 due to 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 (FWS and NMFS, 1992; NMFS, 2006a). 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, 2006a). 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 spoil dumping, degraded water quality/clarity and altered current flow (FWS 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 (Shaver, 2000); just over 10,000 nests were recorded there during the 2005 nesting season (Shaver, 2006). Similarly, increased nesting activity has been recorded on the Texas beaches in the last decade or so from four nests in 1995 to 51 nests in 2005 (National Park Service [NPS], 2006; Shaver, 2006). Some of these nests were from headstarted 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, 2006a).

2.2.2 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 (*Sargassum* sp.) and associated infauna, and other epipelagic species of the Gulf (FWS 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 (Pritchard and Marquez, 1973; Shaver, 1991; Campbell, 1995).

2.2.3 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 Ranch 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 (Shaver, 2000).

2.2.4 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); and 2005 (51 nests) (Shaver, 2000, 2006; NPS, 2006). As noted above, some of these nests were from headstarted ridleys. Of the 51 Kemp's ridley nests recorded for Texas in 2005, 28 were at the Padre Island National Seashore (Shaver, 2006). Such nestings, together with the proximity of the Rancho Nuevo rookery, probably accounts for the occurrence of hatchlings and subadults in Texas. According to Hildebrand (1982, 1986, 1987), sporadic ridley nesting in Texas has always been the case. This is in direct contradiction, however, to Lund (1974), who believed that Padre Island historically supported large numbers of nesting Kemp's ridleys, but that the population became extirpated because of excessive egg collection.

2.2.5 Presence in the Project Area

Kemp's ridley has been recorded from the study area. In 1994, a headstarted ridley was accidentally caught by a fisherman on a rod and reel in the GIWW and released alive (NDD, 2006). This species has also nested in the study area. One nest was found on Quintana Beach in 2002 and another was found near Surfside Beach in 2003 (Yeargan, 2006).

2.3 HAWKSBILL SEA TURTLE

2.3.1 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 713,850 kilograms, representing more than 670,000 turtles. The hawksbill is also used in the manufacture of leather, oil, perfume, and cosmetics (NMFS, 2006a).

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. In American Samoa, most sea turtles and eggs encountered by villagers are harvested (Tuato`o-Bartley et al., 1993). See FWS (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 Isla Mona and Isla Monito, Puerto Rico, seaward to 5.6 kilometers (km) (63 FR 46693–46701).

2.3.2 Habitat

Hawksbills generally inhabit coastal reefs, bays, rocky areas, passes, estuaries, and lagoons, where they occur at depths of less than 70 ft. 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 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, 2006a).

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, has been reported as food items for this turtle (Carr, 1952; Rebel, 1974; Pritchard, 1977; Musick, 1979; Mortimer, 1982). The young are reported to be somewhat more herbivorous than adults are (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).

2.3.3 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, 2006a). 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).

2.3.4 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, 2006a). 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, 2006; Shaver, 2006).

2.3.5 Presence in the Project Area

No documented records of hawksbills exist from Brazoria County, Texas (Dixon, 2000); however, this species is of potential occurrence in the study area.

2.4 GREEN SEA TURTLE

2.4.1 Reasons for Status

The green 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, 2006a). 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.

2.4.2 Habitat

The green 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; Green, D., unpubl. data)**.**

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; Green, unpubl. data). 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 (Meylan et al., 1990; Allard et al., 1994), although an individual might switch to a different nesting beach within a single nesting season (Green, D., unpubl. data).

2.4.3 Range

The green 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 (NMFS and FWS, 1991b; Hirth, 1997).

2.4.4 Distribution in Texas

The green 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 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 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 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.

Green turtle nests are rare in Texas. Five nests were recorded at the Padre Island National Seashore in 1998, none in 1999, and one in 2000 (Shaver, 2000; NPS, 2006). For the last 5 years, up to five nests per year have been recorded from the Texas coast (Shaver, 2006). Green turtles, however, nest more in Florida and in Mexico. Since long migrations of green turtles from their nesting beaches to distant feedings grounds are well documented (Meylan, 1982; Green, 1984), the adult green 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.

2.4.5 Presence in the Project area

No documented records of hawksbills exist from Brazoria County, Texas (Dixon, 2000); however, this species is of potential occurrence in the study area.

2.5 LEATHERBACK SEA TURTLE

2.5.1 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, 2006). 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 FWS, 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).

2.5.2 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).

2.5.3 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, 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, 2006a).

The leatherback migrates further 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 5,900 km to Ghana, West Africa, after nesting in Surinam (NMFS and FWS, 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.

2.5.4 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 FWS, 1992). According to FWS (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, 2006). The last two, one from the late 1920s and one from the mid-1930s, were both from Padre Island (Hildebrand, 1982, 1986).

2.5.5 Presence in the Project Area

A leatherback was caught by a relocation trawler in a shipping channel approximately 1.5 miles north of Aransas Pass in 2003 (i.e., south of the project area; NMFS, 2003). This species is unlikely to occur in the study area.

2.6 BROWN PELICAN

2.6.1 Reasons for Status

FWS listed the brown pelican (*Pelecanus occidentalis*) as endangered throughout its range outside the U.S. on 2 June 1970 (35 FR 8495) and throughout its U.S. range on 13 October 1970 (35 FR 16047). Population declines were largely the result of organochlorine pesticides, particularly endrin and DDT, entering the marine food web. Endrin resulted in direct mortality, while DDT impaired reproduction by causing eggshell thinning; thus, eggs desiccated and became susceptible to breaking during incubation (Shields, 2002). Other factors included human disturbance and habitat loss resulting from commercial and residential development (FWS, 1995a). Pelicans are large, heavy birds and easily flushed from the nest. Flushing exposes the eggs and young to predation, temperature stress, and permanent abandonment by the parents.

A ban on the use of DDT in the U.S. in 1972, together with efforts to conserve and improve remaining populations, has led to increased numbers of brown pelicans. Populations in some areas have increased to historical breeding levels or above, with stable population numbers and productivity. FWS has delisted the brown pelican along the U.S. Atlantic Coast and the Gulf coasts of Florida and Alabama. It remains endangered throughout the remainder of its range, which includes Mississippi, Louisiana, Texas, California, Mexico, Central and South America, and the West Indies. In May 1998, the FWS announced its intention to delist or downlist to threatened status numerous species, including the brown pelican (63 FR 25502–25512; 8 May 1998).

2.6.2 Habitat

Brown pelicans inhabit warm coastal marine and estuarine environments (Shields, 2002). They are generally rare inland, but permanent year-round populations exist at the Salton Sea, California, and Lake Okeechobee, Florida, and they regularly occur as postbreeding visitors to inland waters in the southwest U.S. and central Florida (Shields, 2002). Brown pelicans breed colonially on undisturbed offshore islands, where they build nests on the ground or in trees and small bushes (AOU, 1998; Shields, 2002). Preferred sites are those free from human disturbance, flooding, and terrestrial predators such as raccoons. Brown pelicans typically forage in shallow waters within 12 miles of nesting sites during breeding, and rarely venture more than 45 miles offshore during nonbreeding (Shields, 2002). Sandbars, offshore rocks and islands, mangrove islets, jetties, pilings, piers, wharves, and oil/gas platforms provide important roosting and loafing sites (Shields, 2002).

2.6.3 Range

The brown pelican occurs along the Pacific Coast of the Americas from southern British Columbia south to Cape Horn, and throughout the Atlantic, Gulf and Caribbean coastal areas from New Jersey south to eastern Venezuela. In North America, it occasionally ventures inland, with records from Idaho, Wyoming, North Dakota, Iowa, Wisconsin, Michigan, Ontario, and Quebec (AOU, 1998; Shields, 2002). Its breeding range is more restricted: along the Pacific Coast from central California south to Chile, including the Galápagos Islands; and from North Carolina, south to eastern Venezuela, the West Indies, Greater Antilles, and Virgin Islands (AOU, 1998). While some migration occurs after nesting in both subspecies, many individuals overwinter close to their breeding grounds (FWS, 1980). Atlantic Coast populations move southward in the fall, with most birds wintering in the U.S., particularly in Florida. Some birds, however, disperse to the Cuban coast (Clapp et al., 1982). Gulf Coast birds tend to remain on the Gulf

Coast, although banded Texas and Louisiana birds have occurred in Mexico and Cuba (Palmer, 1962; Clapp et al., 1982).

Two subspecies occur in North America: the eastern brown pelican (*P. o. carolinensis*) ranging from North Carolina south through Florida and west to Texas, and the California brown pelican (*P. o. californicus*) in California (NFWL, 1980). The eastern subspecies' present-day range is the same as its historical range, but it occurs in reduced numbers. It became extirpated in Louisiana in 1966, but has since (beginning in 1968) been reintroduced from Florida. No known nesting records exist from Mississippi or Georgia (FWS, 1980; 50 FR 4938, 9 February 1985). Brown pelican colonies occur on the east coast of Mexico off the eastern tip of the Yucatan Peninsula (Mabie, 1986, 1988).

Historically, the brown pelican was a common bird of the Texas Gulf Coast with an estimated breeding population of 5,000 pairs residing in 17 colonies in 1918 (Mabie, 1990). By the 1960s, however, it was nearing extirpation. In 1963, only 14 recorded breeding pairs were present along the Texas coast; in 1964, no known nesting occurred (Mabie, 1986). The decline started during the 1920s and 1930s in relation to human disturbance (Oberholser, 1974), and continued until the 1970s because of pesticide contamination (King et al., 1977; Mabie, 1986). Since the 1960s, the brown pelican has made a gradual comeback in Texas with an estimated 2,400 breeding pairs in 1995 (Campbell, 1995). The majority of breeding birds occur on Pelican Island in Corpus Christi Bay, Nueces County, and Sundown Island near Port O'Connor in Matagorda County. Smaller colonies occasionally nest on Bird Island in Matagorda Bay, a series of older dredged material islands in West Matagorda Bay, Dressing Point Island in East Matagorda Bay, and islands in Aransas Bay (Campbell, 1995).

2.6.4 Presence in Project Area

The majority of breeding birds in Texas occur from Nueces County to Galveston County (Texas Ornithological Society [TOS], 1995). The species is an uncommon resident in the general area (FWS, n.d.), but likely occurs in the open water and barrier island habitats in the study area. Brown pelicans are unlikely to nest in the study area, but are likely to be present throughout most of the year.

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 National Wildlife Refuge (NWR). Two experimentally introduced flocks are listed as experimental nonessential populations; in Florida (FR, 22 January 1993) and New Mexico (62 FR 38932). 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, 2006). 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, 2006), 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, 2006), 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 principle 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, and Canada. They winter primarily in the Aransas NWR and adjacent areas of the central Texas Gulf Coast (FWS, 1995a). 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 is not successfully breeding and will become extirpated. Introduction of another flock to Kissimmee Prairie in Florida began in 1993. The Florida population will be non-migratory (NatureServe, 2006).

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, 2006). The main stopover points in Texas for migrating birds are in the central and eastern panhandle (FWS, 1995a).

2.7.4 Presence in the Project Area

According to FWS (1995a), Brazoria County is within the species' migration corridor; however, the species is unlikely to occur in the study area because of the absence of suitable wintering habitat. NDD (2006) indicates documented records of whooping cranes from marshes west of the Brazos River; however, these likely represent vagrant birds and no wintering populations are present in the project area.

2.8 BALD EAGLE

2.8.1 Reasons for Status

The bald eagle (*Haliaeetus leucocephalus*) first received legal protection under the Eagle Protection Act on 8 June 1940 (amended 23 October 1972). FWS listed the bald eagle (*Haliaeetus leucocephalus*) (below the 40th parallel) as endangered on 11 March 1967 (32 FR 4001). Later it received protection under the ESA of 1973. The legal status of the species was changed on 14 February 1978 (43 FR 6233) to endangered in the conterminous U.S. except for Washington, Oregon, Minnesota, Wisconsin, and Michigan, where it was designated as threatened (FWS, 1984). FWS then downlisted the species to threatened on 12 July 1995 (60 FR 35999 36010). FWS proposed to remove the bald eagle from the Federal list of threatened and endangered species on 6 July 1999 (64 FR 36453 36464); however, a final decision is yet to be made.

Several factors have contributed to the decline of the bald eagle, including loss of habitat, mortality from shooting and trapping, and environmental contaminants (FWS, 1984). Human factors include direct mortality resulting from hunting, trapping, and poisoning, as well as indirect mortality resulting from collisions with power lines, structures, and vehicles and electrocution (Buehler, 2000). Mortality through shooting, however, is on the decline. Between 1975 and 1981, 18% of the total reported mortalities were due to shooting, compared to 62% between 1961 and 1965 (FWS, 1984).

Historically, increase in human population has resulted in extensive alterations in land use. Because the eagles nest near water, increased recreation and other human use of water resources have had negative effects on the bald eagle. The greater use of boats, off-road vehicles, and snowmobiles, and increased development of waterfront property have severely altered eagle habitat (Snow, 1981). The construction of reservoir has created new wintering and nonnesting habitat and nesting bald eagles may use these areas in the future, potentially resulting in a major redistribution of nesting (FWS, 1984).

Environmental contaminants are responsible for the greatest decline in eagle populations. Organochloride pesticides inhibit calcium metabolism, resulting in thin eggshells and, thus, reproductive failure. Since banning of the use of DDT and other organochloride pesticides in the U.S., the eagles have slowly recovered. Most populations of bald eagles appear to be producing young at a normal rate (FWS, 1984).

2.8.2 Habitat

The bald eagle inhabits coastal areas, rivers and large bodies of water. Water is the common feature of its nesting habitat. Because fish and waterfowl comprise the bulk of the bald eagle's diet, nests are seldom far from a river, lake, bay, or other waterbody. Bald eagles generally build nests in the largest trees available, which provide adequate flight access and visibility of the surrounding area (Buehler, 2000). Nest trees may be in woodlands, woodland edges, or open areas, and are frequently the dominant or co-dominant trees in the area (Green, 1985). Bald eagles also nest on cliffs and rock pinnacles, particularly in the southwestern U.S., and occasionally on the ground and on manmade structures (Buehler, 2000).

Water is also an important element of the winter habitat, with eagles usually frequenting lakes and major river systems. Wintering bald eagles also use habitats with little or no open water, if rabbits, carrion, or other food items are regularly available (Green, 1985; Buehler, 2000).

2.8.3 Range

The bald eagle ranges throughout North America. Two subspecies are currently recognized based on size and weight: the northern bald eagle (*H. l. alascanus*) and the southern bald eagle (*H. l. leucocephalus*), the former being larger and heavier than the latter. This delineation, however, is of questionable merit due to a continuous size gradient from north to south throughout the range; eagles in the central part of the U.S. are intermediate in size. The northern population nests from central Alaska and the Aleutian Islands, east through Canada, and in the northern states of the U.S. The southern population nests primarily in the estuarine areas of the Atlantic and Gulf coasts from New Jersey to Texas and the lower Mississippi Valley, northern California to Baja California (both coasts), Arizona and New Mexico (Snow, 1981). Wintering ranges of the two populations overlap. Many of the northern bald eagles migrate south for the winter and can occur as far south as Texas. The southern eagles tend to be more sedentary although there is some northward movement during the summer (Snow, 1981). The largest wintering group is in Alaska, where over 3,000 have congregated in the Chilkat Valley during the fall and winter months (Steenhof, 1978).

The southern subspecies nests in Texas along the Gulf Coast and on major inland lakes during the winter months, and migrates to more-northern latitudes during the summer. The northern bald eagle nests in the northern U.S. and Canada during spring and summer, and migrates to the southern U.S., including Texas, during the fall and winter. Concentrations of wintering northern eagles are often present around the shores of reservoirs in Texas, with most wintering concentrations occurring in the eastern part of the state. In Texas, wintering bald eagles have occurred as far south as Cameron County (Oberholser, 1974). In Louisiana, bald eagle nest primarily along the Gulf Coast (Buehler, 2000); in winter, occasionally observed on large lakes in northern and central parishes (Buehler, 2000).

Ortego (2002) identified 155 nesting territories statewide, of which at least four currently exist in Brazoria County. Ortego (2002) does not disclose the locations of bald eagle nests; therefore, the exact locations of the nests are unknown.

2.8.4 Presence in the Project Area

NDD (2006) indicates an active bald eagle territory north of Freeport, between Clute and Oyster Creek (TPWD nest #020-8A), approximately 6 miles north of the project area. The species is likely present in the general area at some time during the year; however, no suitable nesting habitat is present in the study area.

2.9 PIPING PLOVER

2.9.1 Reasons for Status

FWS listed the piping plover (*Charadrius melodus*) as threatened and endangered on 11 December 1985 (50 FR 50726 50734). 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.

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 (FWS, 1995a). Additional threats include human disturbances through recreational use of habitat, and predation of eggs by feral pets (FWS, 1995a).

2.9.2 Habitat

Piping plovers typically inhabit shorelines of oceans, rivers and inland lakes. Nest sites include sandy beaches, especially where scattered tufts of grass are present; sandbars; causeways; bare areas on dredge-created and natural alluvial islands in rivers; gravel pits along rivers; silty flats; and salt-encrusted bare areas of sand, gravel, or pebbly mud on interior alkali lakes and ponds (Haig and Elliott-Smith, 2004). On the wintering grounds, these birds use beaches, mudflats, sandflats, dunes, and offshore spoil islands (FWS, 1995a; AOU, 1998).

2.9.3 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.

Approximately 35% of the known global population of piping plovers winters along the Texas Gulf Coast, where they spend 60 to 70% of the year (Campbell, 1995; Haig and Elliott-Smith, 2004). The species is a common migrant and rare to uncommon winter resident on the upper Texas coast (Richardson et al., 1998; Lockwood and Freeman, 2004). Piping plover concentrations in Texas occur in the following counties: Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kleberg, Matagorda, Nueces, San Patricio, and Willacy (FWS, 1988). In Louisiana, the piping plover is a rare migrant statewide and uncommon winter resident along the Gulf Coast in Cameron and Jefferson parishes (FWS, 1994). Piping plovers may occur in the study area, but suitable habitat is of limited extent.

2.9.4 Presence in the Project Area

Because of a lawsuit, FWS has designated critical habitat for the species in its nesting and wintering range (65 FR 41781–41812, 6 July 2000). Designation of critical habitat became final on 10 July 2001 (66 FR 17; 36038–36143). Critical habitat includes the land from the seaward boundary of mean low low water (MLLW) to where densely vegetated habitat, not used by the species, begins and where the constituent elements no longer occur.

Critical Habitat Unit TX-36 encompasses approximately 388 acres between the mouth of the Brazos River and Farm-to-Market Road (FM) 1495 and includes Bryan Beach and adjacent beach habitat (66 FR 17; 36142, 10 July 2001), just southwest of the project area. NDD (2004) maps show no documented records within the project area. However, wintering piping plovers are of potential occurrence on beaches and sand and mudflats along the bay margins within the study area.

2.10 LOUISIANA BLACK BEAR/Black bear

2.10.1 Reason for Status

FWS listed the Louisiana black bear (*Ursus americanus luteolus*) as threatened on 7 January 1992 (57 FR 588–595). The Service also designates other free-living bears of the species *U. americanus*, within the Louisiana black bear's historic range, as threatened because of similarity in appearance. The primary threats to the Louisiana black bear are habitat destruction and modification. Human activities have reduced or fragmented much of the species' habitat throughout its historic range. Additional threats include human related mortality (i.e., hunting and trapping, automobile-related mortality) (FWS, 1995b).

2.10.2 Habitat

Black bear habitat must have a combination of adequate food, water, cover, and denning sites within sufficiently large and remote blocks of land. The Louisiana black bear requires large, relatively remote blocks of bottomland hardwood forest (FWS, 1995b). Forest types within the range of the species include bald cypress (*Taxodium distichum*), bald cypress-water tupelo (*T. distichum-Nyssa aquatica*), river birch-American sycamore (*Betula nigra-Platanus occidentalis*), cottonwood (*Populus deltoides*), sugarberry-American elm-green ash (*Celtis laevigata-Ulmus americana-Fraxinus pennsylvanica*), Nuttall oak-American elm-green ash (*Quercus nuttallii-Ulmus americana-F. pennsylvanica*), overcup oak-water hickory (*Q. lyrata-Carya aquatica*), sweetgum-water oak (*Liquidambar styraciflua-Q. nigra*), and swamp chestnut oak-cherrybark oak (*Q. michauxii-Q. falcata*) (FWS, 1995b). Other habitat types include freshwater and brackish marshes, agricultural fields, wooded levees along canals and bayous, and salt domes (FWS, 1995b).

A key component of Louisiana black bear habitat is remoteness, which is relative to forest tract size and the presence of roads (FWS, 1995b). Optimal habitat generally consists of tracts larger than 2,500 acres that are at least 0.5 mile from well maintained roads and development, or tracts with 0.3 mile or less of road per square kilometer (km^2) (0.3861 mi^2) of forest (FWS, 1995b). Larger, undisturbed tracts of forest decrease the likelihood of human disturbance.

2.10.3 Range

While *U. americanus* is a widely distributed species, its range has declined since European colonization of North America. The species formerly ranged from northern Alaska, and northern Canada, south to central northern Mexico (FWS, 1995b). The Louisiana subspecies once occurred in southern Mississippi, all of Louisiana, and eastern Texas (FWS, 1995b). In Texas, Louisiana black bears occurred in all counties east of and including Cass, Marion, Harrison, Upshur, Rusk, Cherokee, Anderson, Leon, Robertson, Burleson, Washington, Lavaca, Victoria, Refugio, and Aransas (FWS, 1995b). Today, the only remaining Louisiana black bear populations occur in the Tensas and Atchafalaya river basins in Louisiana (FWS, 1995b).

2.10.4 Presence in the Project Area

According to Garner (1995), Louisiana black bears historically ranged as far east as Aransas and Refugio counties, which suggests they may have occurred in Brazoria County; however, no recent documented sightings of black bears exist from the Texas Gulf Coast. It is unlikely that either subspecies of black bear would occur in the study area.

2.11 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 offshore waters; therefore, it is unlikely that any of these five species would regularly occur in the study area.

2.12 SMALLTOOTH SAWFISH

2.12.1 Reason for Status

Declines in smalltooth sawfish as been caused primarily by various fishing activities in the form of bycatch, especially in gill nets. Because adults can grow very large and can damage fishing gear, many incidentally captured sawfish are killed wantonly. Additionally habitat loss has been named a factor in directly affecting juveniles, which use shallow habitats with a lot of vegetation, such as mangrove forests, as important nursery areas. Much of these habitats have been converted or lost due development in Florida and other southeastern states (National Oceanic and Atmospheric Administration [NOAA], 2006c).

2.12.2 Habitat

Sawfish inhabit shallow coastal waters of tropical and temperate seas and estuaries along the Atlantic coast (i.e., New York to Central Brazil) including the Gulf, primarily from Louisiana to southern Florida. Specific habitat types include shallow waters very close to shore over muddy and sandy bottoms, sheltered bays, shallow banks, and in estuaries or river mouths (NOAA, 2006c).

2.12.3 Range

The sawfish is found in the Atlantic Ocean and Gulf. Historically, the U.S. population was common from Texas to Florida coasts, and along the east coast from Florida to Cape Hatteras. The current range of this species has been reduced to the Florida Peninsula, where smalltooth sawfish are relatively common only in the Everglades region in south Florida (NOAA, 2006c).

2.12.4 Presence in Project Area

Although the project area is in the historic range of sawfish, current data suggests that Florida is the only stronghold for the declining population. This species is more commonly found in the northern Gulf and is somewhat more common in tropical areas. Therefore, it is unlikely to occur within the study area.

2.13 GULF STURGEON

2.13.1 Reason for Status

FWS and NMFS listed the Gulf sturgeon (*Acipenser oxyrhinchus desotoi*), a subspecies of the Atlantic sturgeon (*A. oxyrhinchus*), as endangered on 30 September 1991 (56 FR 49653 49658). As with other sturgeon species, the damming of rivers has been the most significant threat to the Gulf sturgeon (NMFS, 2006b). Dams are now present on all of the major rivers within the gulf sturgeon's range (Pearl, Mississippi, and Alabama rivers), which prevents upstream migration for spawning. Other threats to the species include over-exploitation, incidental catch, dredging activities, the removal of snags, and dredged material placement associated with channel improvements and maintenance (FWS and Gulf States Marine Fisheries Commission [GSMFC], 1995; NMFS, 2006b).

2.13.2 Habitat

The Gulf sturgeon is anadromous, which means the species breeds in freshwater environments (i.e., river systems), but spends the remainder of the year in marine and estuarine environments. Spawning occurs in the deeper portions of rivers on clean rock or rubble bottoms. Mud and sand bottoms and seagrass communities are likely important marine habitats (FWS and GSMFC, 1995).

2.13.3 Range

The Gulf sturgeon historically ranged along the northeastern Gulf, in major rivers from the Mississippi delta in Louisiana, east to Charlotte Harbor, Florida, and in marine waters of the central and eastern Gulf (FWS and GSMFC, 1995; NMFS, 2006b). Its current range extends from Lake Pontchartrain and the Pearl River in Louisiana and Mississippi east to the Suwannee River in Florida. Sporadic records exist from as far west as the Rio Grande River between Texas and Mexico, and as far east and south as Florida Bay. Viable populations exist in the Mississippi, Pearl, Escambia, Yellow, Choctawhatchee, Appachicola, and Suwannee rivers (NMFS, 2006b).

2.13.4 Presence in Project Area

The NMFS has designated critical habitat for the Gulf sturgeon in Gulf rivers and tributaries (68 FR 13370, 19 March 2003). Although 14 critical habitat units have been identified in Florida, Alabama, Mississippi, and Louisiana, no critical habitat has been designated in Texas, and in fact, none is farther west than Lake Pontchartrain near New Orleans. The study area is not within the known historic range of the Gulf sturgeon. Fish are mobile species and frequently occur outside of their normal ranges, but it is unlikely that the species is present in the study area.

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3.0 ANALYSIS OF EFFECTS

3.1 Project-related Effects

The following species are unlikely to occur in the project area and, therefore, no impacts are expected: bald eagle, Louisiana black bear/black bear, whooping crane, gulf sturgeon, smalltooth sawfish, and listed whale species.

3.1.1 Sea Turtles

While rare in Texas waters, sea turtles may be present in the project area during certain times of the year. Thus, construction and post-construction maintenance activities could result in impacts to the sea turtle, should they be present in the project area. These impacts, however, would be temporary and local in nature. Feeding opportunities within the proposed channel could attract sea turtles, where they might be exposed to additional risks from boat traffic, contaminants, fishing activities, tangled fishing lines, and accumulated plastic detritus.

A pipeline dredge will be used in the bay and a hopper dredge will be used in the entrance channel. Sea turtles easily avoid pipeline dredges because of the slow movement of the dredge. The potential for the incidental take of sea turtles by hopper dredges would be minimized by the use of draghead deflectors and scheduling offshore dredging during the winter months when sea turtles are most likely to be elsewhere in warmer waters. A MOU agreement between NMFS and USACE is in place and implemented regarding the take of sea turtles with hopper dredges and measures are employed to ensure that significant impacts do not occur. Between 1980 and March 2006, maintenance dredging in the Freeport Harbor Channel by hopper dredges resulted in the lethal take of 10 sea turtles. Five loggerhead sea turtles were taken in 1996, one in 1999, and two in 2000. Two green sea turtles were taken in January and February 2006. Details of the sea turtle avoidance plan are included in Section 4.1.

The effects of placing dredged material on sea turtles at the proposed ODMDSs include: (1) a collision potential from vessel traffic; (2) the deposition of dredged material on turtles and forage areas, and (3) the possibility of trash and debris from the dredge operation.

Regarding the deposition of dredged material, modeling indicates that most of the dredged material is confined to a relatively small area. Because this is a short-term effect, and considering the mobility of the turtle species and the lack of limestone ledges in the proposed ODMDSs, the turtles should easily be able to avoid a descending plume and available food sources should not be seriously reduced (FWS, 2003). Regarding the vessel and debris possibility, it is the combined effect of many marine activities (e.g., oil spills, oil and gas operations, commercial fishing, marine transportation, etc.) that constitute the hazard and not a single activity such as a dredge operation. These activities, combined with natural predation and development on land, result in a cumulative adverse effect on sea turtles (DOI/MMS, 1987). As noted in Section 4.15.2.1 of the Port Freeport Channel Widening EIS to which this document is appended, it has been determined that the proposed ODMDS designation does not constitute an adverse impact on listed sea turtles. The proposed Project may have minor adverse impacts to sea turtles from potential mortality associated with dredging activities.

3.1.2 Brown Pelican

This species likely forages in portions of the project area; however, no active nesting colonies occur in the project area and therefore, the proposed Project is unlikely to adversely affect the brown pelican.

3.1.3 Piping Plover

Dredging activities, which would occur in open water, would not directly affect the piping plover. The greatest potential for impacts to the piping plover would be associated with the placement of dredged materials or beach nourishment activities in areas of suitable habitat.. Wintering piping plovers are of potential occurrence on beaches and sand and mudflats along the bay margins within the study area. FWS-designated critical habitat for the piping plover (Critical Habitat Unit TX-36) encompasses approximately 388 acres between the mouth of the Brazos River and FM 1495 and includes portions of Bryan Beach and other adjacent beach habitat (66 FR 17; 36142, 10 July 2001). No beach nourishment operations will be conducted within Critical Habitat. The project site is not likely to be an important feeding and resting area for piping plover due to year round human recreational use. Construction activities during the placement of material on the beach may temporarily preclude its use by piping plover for feeding and resting. The duration of the activity will be short and the size of the construction area would not be large enough to cause any significant loss of habitat for the piping plover. The resultant additional beach will provide additional habitat for piping plovers that might use the area. Therefore, the proposed activity may affect, but is not likely to adversely affect piping plovers; no impacts to piping plover critical habitat will occur.

4.0 VOLUNTARY AVOIDANCE, MINIMIZATION, AND CONSERVATION MEASURES

4.1 Sea Turtle Avoidance Plan

Avoidance measures would include implementation of 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 temporal dredging windows, 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. USACE should coordinate with NOAA 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: The USACE shall arrange 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 year-round in Texas waters between 1 April and 30 November, and whenever surface water temperatures are 11 degrees Celsius (°C) or greater.

- Screening: 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 by the USACE 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; or, (c) when 75% of a District's sea turtle species quota for a particular species has previously been met. Handling of sea turtles captured during relocation trawling in association with hopper dredging project in Gulf navigation channels and sand mining areas shall be conducted by NOAA Fisheries-approved endangered species observers.

Other conditions may also apply. A detailed outline of the conditions of the USACE's sea turtle avoidance is included in FWS's Biological Opinion for dredging of Gulf navigation channels and sand mining areas using hopper dredges (Consultation Number F/SER/2000/01287, November 19, 2003).

4.2 Shoreline Nourishment

Minimization measures would include gulf shoreline nourishment at Quintana or Surfside Beach. The 300,000 cy of silty/sand material dredged during construction of the proposed widening project would be used beneficially and placed on Quintana Beach in front of the Seaway Upland Confined Placement Area (UCPA). The beach on either side of this location has been enhanced through GLO or other programs, leaving a "gap" in front of the Seaway UCPA. Placement of the material in this location would fill in the gap, providing a continuous beach and some protection from erosion for the Seaway UCPA. The new beach would also provide potential foraging habitat for shorebirds.

5.0 SUMMARY

Because proper sea turtle avoidance measures will be implemented, the proposed Project is unlikely to adversely affect any Federally listed endangered or threatened species. The following species are unlikely to occur in the project area and, therefore, no impacts are expected: bald eagle, whooping crane, Louisiana black bear/black bear, gulf sturgeon, smalltooth sawfish, and listed whale species. The Project is unlikely to result in significant adverse effects on the following species: loggerhead sea turtle, Kemp's Ridley sea turtle, hawksbill sea turtle, leatherback sea turtle, green sea turtle, brown pelican, and piping plover. Proper turtle avoidance measures will be implemented according to the NMFS/USACE MOU. The piping plover will experience a beneficial effect from the proposed Project resulting from habitat enhancement (i.e., beach nourishment) through beneficial use of dredged material. No active brown pelican nesting colonies occur in the project area, and thus the project is unlikely to adversely affect the species.

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