APPENDIX I

ENDANGERED SPECIES ACT COORDINATION
BRAZOS ISLAND HARBOR
CHANNEL IMPROVEMENT PROJECT
CAMERON COUNTY, TEXAS

U.S. Army Corps of Engineers, Galveston District
2000 Fort Point Road
Galveston, Texas 77550

July 2014

Appendix I
Endangered Species Act Coordination
Brazos Island Harbor Channel Improvement Project
Table of Contents

US Army Corps of Engineers ®
Galveston District

FINAL
BIOLOGICAL ASSESSMENT FOR
FEDERALLY-LISTED
THREATENED AND ENDANGERED SPECIES

BRAZOS ISLAND HARBOR CHANNEL IMPROVEMENT PROJECT
TENTATIVELY SELECTED PLAN (52 FEET BY 250 FEET PROJECT)
CAMERON COUNTY, TEXAS

PREPARED BY U.S. ARMY CORPS OF ENGINEERS
GALVESTON DISTRICT
2000 FORT POINT ROAD
GALVESTON, TEXAS 77550

May 2014

Table of Contents

List of Figures

List of Tables

List of Acronyms

Biological Assessment (BA)
Biological Opinion (BiOp)
Brazos Island Harbor (BIH)
Brownsville Navigation District (BND)
Cubic yards (CYs)
Distinct Population Segment (DPS)
Endangered Species Act (ESA)
Gulf of Mexico (GOM)
Laguna Atascosa National Wildlife Refuge (LANWR)
Lower Rio Grande Valley (LRGV)
Mean lower low water (MLLW)
National Marine Fisheries Service (NMFS)
National Wildlife Refuge (NWR)
Padre Island National Seashore (PINS)
Port of Brownsville (POB)
Reasonable and Prudent Measures (RPM)
Relative sea-level rise (RSLR)
Submerged aquatic vegetation (SAV)
Tentatively Selected Plan (TSP)
Texas General Land Office (GLO)
Total suspended solids (TSS)
Turtle extruder devices (TEDs)
United States (U.S.)
United States Army Corps of Engineers (USACE)
United States Fish and Wildlife Service (USFWS)

1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

This Biological Assessment (BA) is being prepared for the purpose of fulfilling 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, and to assist the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) personnel in fulfilling their obligations under the ESA. The proposed Federal action is a channel improvement project for the Brazos Island Harbor (BIH) Project, an existing Federal deep-draft navigation project in Cameron County, Texas (USACE, 1990). The tentatively selected plan (TSP) would deepen the existing 42-foot authorized project to an authorized depth of 52-feet mean lower low water (MLLW).

This BA addresses potential new construction to deepen the channel and associated placement of new work materials, and operations and maintenance dredging activities for the 50-year period of analysis. However, for the purposes of Section 7 consultation with NMFS, operation and maintenance dredging activities for the proposed project would be covered by the existing Biological Opinion Consultation No. F/SER/2000/01287 with the National Marine Fisheries Service (NMFS, 2003).

1.2 PROJECT SETTING

The existing BIH navigation project services the Port of Brownsville (POB), which is situated at the western end of the man-made BIH navigation channel in Cameron County, Texas (Figure 1). The non-Federal sponsor for the study is the Brownsville Navigation District (BND). The existing project includes the BIH Entrance-Jetty Channel which extends about 2.5 miles into the Gulf of Mexico, and the Brownsville Main Channel which terminates at a turning basin about 17 miles inland from the Gulf of Mexico (Table 1). The POB is located at the turning basin, about three miles north of the Rio Grande River (the international border with Mexico) and five miles east of the City of Brownsville. In this assessment, the footprint of proposed navigation improvements and placement areas will be referred to as the "project area."

The" study area" encompasses the entire project area, as defined above, and is a larger area for which environmental effects of alternative plans have been analyzed. The study area consists of approximately 103,250 acres (160 square miles) in the Brownsville Navigation District (BND and extends 3 miles north, south, and west of the BIH channel and 5 miles offshore into the Gulf of Mexico. The study area also is extended for 10 miles along the Gulf of Mexico beach on both sides of Brazos Santiago Pass for the purpose of evaluating potential shoreline impacts from

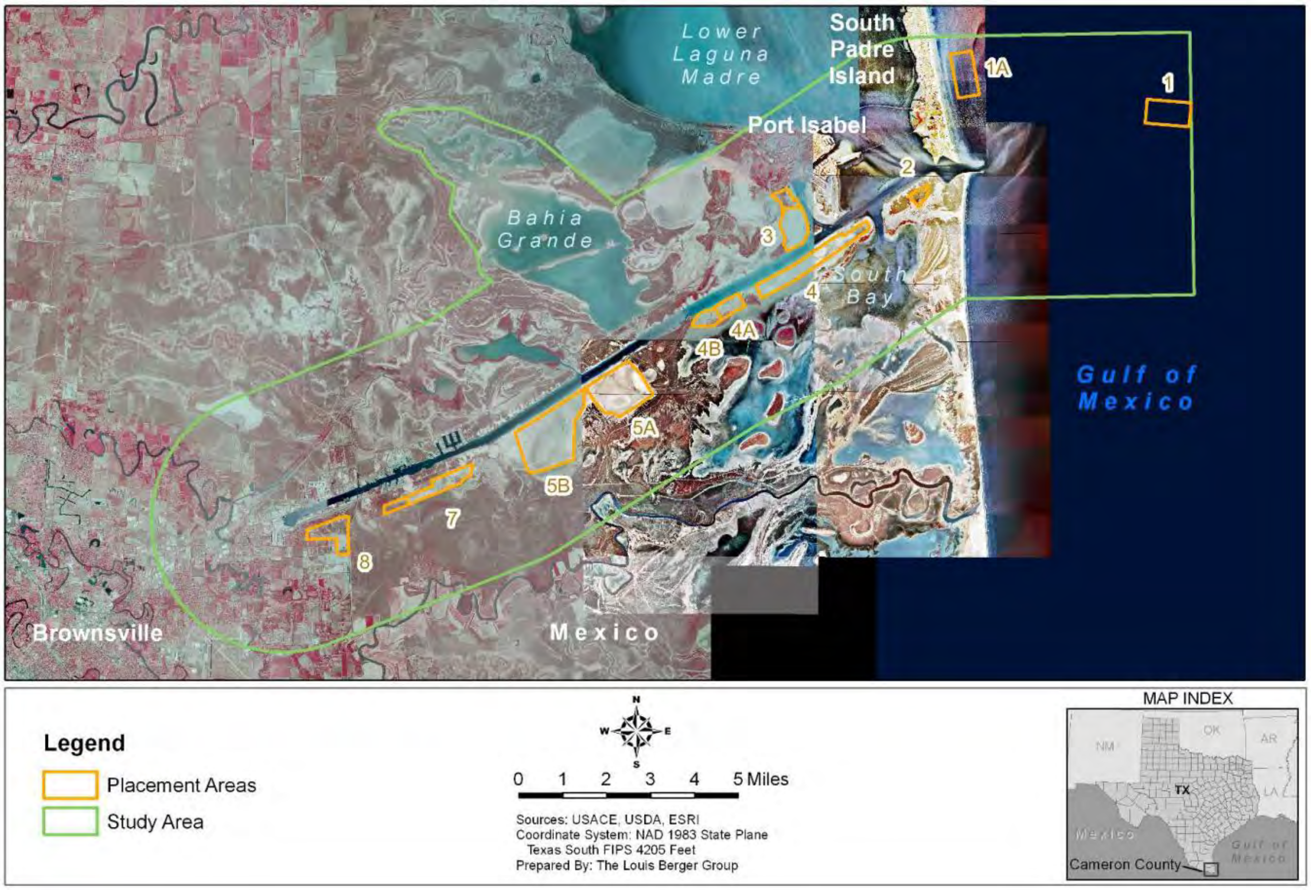


Figure 1: BIH Project Vicinity Map and Study Area

deepening and extending the Entrance Channel.

1.3 HABITATS IN THE STUDY AREA

Biological communities from the desert, coastal, temperate, sub-tropical, and tropical zones converge at the LRGV, creating one of the most biologically diverse areas in North America (McMahan et al., 1984). The diversity of ecosystems located within the project area provide habitat for an array of terrestrial and coastal flora and fauna, including a variety of threatened and endangered species, as well as providing an important stopping point for a substantial number of migratory birds.

Consistent with much of the Texas Gulf coast, the study area includes barrier islands, shallow inland lagoons, and a relatively flat inland area. South Padre Island and Brazos Island, which border the Entrance Channel to the north and the south, respectively, are barrier islands. Unique to the area are extensive mud tidal flats and clay dune formations, or lomas, several of which lie adjacent to the ship channel. Emergent elevations within the study area range from sea level to a maximum of 12 feet above sea level, with an average land elevation of 1.2 feet above sea level.

Table 1: Dimensions of Existing and Proposed Brazos Island Harbor Project

Channel Reach	Constructed Depth (feet, MLLW)	Proposed Depth (feet, MLLW)	Constructed Bottom Width (feet)	Proposed Bottom Width (feet)	Channel Length (miles)
Entrance Channel Extension		54		300	0.75
Entrance Channel (Gulf of Mexico to offshore end of jetties)	44	54	300	same as existing	1.3
Jetty Channel (Gulf of Mexico to Laguna Madre)	44	54	Transitions from 300 to 400	same as existing	1.1
Main Channel (Laguna Madre to Turning Basin Extension)	42	52	Varies 250 to 400	same as existing	15.1
Turning Basin Extension	Transitions from 42 to 36	same as existing	Transitions from 400 to 325	same as existing	1.3
Turning Basin	36	same as existing	Transitions from 325 - 1,200	same as existing	0.6

The major inland bay is the Laguna Madre, a long, narrow, shallow, hypersaline lagoon extending from Corpus Christi Bay to the southern end of Port Isabel. Only the Lower Laguna Madre is within the project study area; it lies between the Texas mainland and South Padre Island. One of two main inlets connecting Laguna Madre to the Gulf of Mexico, the Brazos-Santiago Pass Inlet, is also located within the study area.

The Laguna Madre is the largest estuarine system on the Texas coast and is characterized as a hypersaline lagoon having little freshwater inflow, clear waters, and abundant submerged aquatic vegetation (SAV). In the Lower Laguna Madre, SAV cover approximately 118,000 acres of water bottom, or slightly more than 65 percent of the total water bottom. Seagrasses grow in patchy strips along the banks of navigation channels where water depths and clarity are sufficient to allow light penetration, including along portions of the GIWW and BIH channels. Although shoal, turtle, and manatee grasses are the primary SAV in the study area, widgeon grass may occur where salinity levels are lowest; South Bay contains small patches of star grass.

Important fish and wildlife habitats in the study area include thornscrub forest and brush, mesquite savannahs, tidal and wind-tidal algal flats, clay lomas, coastal dunes, and bays and deepwater habitats.

- The thornscrub forest and brush serve as travel corridors for the federally-listed ocelot (*Leopardus pardalis*) and jaguarundi (*Herpailurus yaguarondi*). Many birds only found in the LRGV use thornscrub forest and brushland as habitat. Within the study area, thornscrub forest occurs along resacas in and near the City of Brownsville and on high depositional ridges and lomas throughout the Rio Grande Delta.
- Mesquite savannahs mostly occur south of the Main Channel and north of the Rio Grande (Jahrsdoerfer and Leslie,1988) . The open grassland or savannah habitats have scattered mesquite trees or yucca (Yucca spp.). The grassland is a good hunting area for Northern Aplomado Falcon (*Falco femoralis*) and the yuccas are resting and nesting habitat.
- Tidal flats provide important habitat for a variety of coastal wildlife from migratory waterfowl, shorebirds (like the federally listed piping plover, *Charadrius melodius*), wading birds, and other estuarine-dependent species like shrimp and various finfish (White, 1986). Some portions of study area are unique in that wind and storm events dictate inundation, as opposed to typical, astronomically driven tidal regimes. Since wind and storm events only rarely inundate these flats, they are called wind-tidal flats (Tunnel and Judd, 2002). Conditions on wind-tidal flats are not conducive to marsh vegetation, and consequently these flats are usually barren except for large areas colonized by blue-green algae mats called algal flats.
- Clay lomas are brush-covered clay dunes situated within tidal and wind-tidal flats. Since lomas are dunes situated within tidal zones, the abrupt topographic reliefs create unique habitats. Lomas can reach a height of 30 feet above surrounding flats. Texas fiddlewood, Texas ebony and other woody brush typically colonize lomas while base vegetation usually consists of sea ox-eye daisy and glasswort (Jahrsdoerfer and Leslie, 1988). Clay lomas occur within wind-tidal flats north and south of the Main Channel and are located primarily in the eastern portion of the study area.
- Coastal dunes are mounds or ridges associated with barrier islands and beaches that are formed from sands that are transported and deposited by the wind and the Gulf longshore current. Coastal dunes occur in the study area on Brazos and South Padre islands. In the study area, primary dunes generally occur immediately landward of the beachfront and are usually the largest. Immediately behind the primary dunes, secondary and back island dunes form. Although a variety of wildlife species use coastal dunes and barrier islands, coastal dune habitats are especially known to include species like the Gulf Coast kangaroo rat, keeled earless lizard, and the spotted ground squirrel. Migrating peregrine falcons also use study area coastal dunes and barrier islands as stopover habitat (Tunnel and Judd, 2002).
- Bays and deepwater habitats are extensive in the study area and include the Main Channel, South Bay, the Laguna Madre, and the open Gulf of Mexico (USFWS, 2012). These bays and deepwater areas are important habitats for a variety of marine species, such as commercially and recreationally important finfish, federally endangered sea turtles, marine

mammals and benthos. The Lower Laguna Madre is one of the most productive estuaries in Texas, supporting a diversity of fish species, plankton, and benthic organisms and has great importance as a finfish and shellfish nursery area (Armstrong et al., 1987, Tunnel and Judd, 2002).

1.4 ALTERNATIVES CONSIDERED

A lengthy array of alternatives was considered during plan formulation. The alternatives were developed from ideas provided by the public, resource agencies, USACE, and the non-Federal sponsor. Alternatives considered were the “no-action” plan (retaining the existing 42 feet deep by 250 feet wide channel), non-structural plans (improving traffic scheduling, modifying traffic rules, utilizing another port), and numerous structural alternatives which consisted of variations of channel depths (ranging from 45 to 55 feet deep), widths (ranging from the existing 250-foot width to a 650-foot width) and turning basin location (moving the primary turning basin closer to the Gulf of Mexico). An initial array, an evaluation array, and a final array of alternatives were screened to identify the TSP. All of the alternatives were evaluated in terms of whether they met the planning objective and produced a positive preliminary benefit to cost ratio. The planning objective is to develop a comprehensive plan to increase the efficiency of ship and offshore rig traffic on the BIH while avoiding and minimizing impacts to the area’s environmental resources. The TSP, the Final Array alternative plan which maximizes net excess benefits, is the 52 feet by 250-foot plan which would deepen the channel to -52 feet MLLW with no widening.

1.5 DESCRIPTON OF THE TENTATIVELY SELECTED PLAN (TSP)

The 52 by 250 feet TSP for the BIH channel improvement project would:

- extend the Brazos Island Harbor (BIH) Entrance Channel 0.75 miles farther into the Gulf of Mexico (station -17+000 to -13+000) at a depth of -54 feet mean lower low water (MLLW) and a width of 300 feet;
- deepen the existing BIH Entrance Channel from station -13+000 to -6+000 to a depth of -54 feet MLLW at the existing width of 300 feet;
- deepen the BIH Jetty Channel to -54 feet MLLW from station -6+000 to -1+026 at the existing width of 300, transitioning to the existing 400 feet width through station 0+000;
- deepen the Brownsville Main Channel to a depth of -52 feet MLLW at the existing 400 feet width from station 0+000 to 1+517, transitioning to the existing 250 feet width at station 2+329;
- deepen 15.5 miles of the Brownsville Main Channel to a depth of -52 feet MLLW at existing widths ranging from 250 to 400 feet from station 2+239 to station 84+200; and maintain existing depth of -42 feet MLLW and width of 325 feet from station 84+200 to

86+000, and existing depth of -36 feet MLLW and width ranging from 325 to 1200 feet from station 86+000 through the end of the channel and turning basin at station 89+500.

New work material from channel deepening would be distributed among the existing New Work ODMDS and upland, confined PAs as shown in Table 2. All project channels and PAs are shown on draft plan drawings presented in Appendix A. Under the first construction contract, a hopper dredge would be used to construct the Entrance and Jetty Channels, with a total length (after extension of the Entrance Channel) of 3.2 miles. Although the authorized depth of the offshore channels would be -54 feet MLLW, the potential dredging depth of the Entrance and Jetty Channels could actually be -58 feet MLLW, after accounting for 2 feet of advance maintenance and 2 feet of allowable overdepth. One hopper dredge would be operated continuously for an

Table 2: BIH TSP - New Work Quantities and Placement Area Dike Elevations

Channel Stations		Placement Area (PA)	Current PA Acreage	Deepening Dredge Quantity in Cubic Yards (CY)	Existing PA Dike Elevation in Feet (NAVD 88)	New Work Dike Elevation in Feet (NAVD 88)
-17+000	00+000	New Work ODMDS	350	2,066,300		
00+000	07+000	2	71	937,200	27	36
07+000	25+000	4B	243	2,688,800	7	19
25+000	50+000	5A	704	3,611,800	6	12
50+000	70+000	5B	1020	2,599,000	12	15
70+000	82+000	7	257	1,804,000	20	26
82+000	89+500	8	288	438,900	22	25
			Total CY	14,146,000		

estimated duration of seven months to remove approximately 2,066,300 cubic yards of new work material from the Entrance and Jetty Channels. Bed leveling may be performed at the conclusion of dredging by dragging a metal bar to smooth over high spots. All of the material would be placed at the existing New Work Ocean Dredged Material Disposal Site (ODMDS) (EPA, 1991). This site is located in a dispersive offshore environment and has unlimited capacity. It is located approximately four miles from shore in 60-70 feet of water. The 350-acre site is large enough to contain the all new work material that would be placed there during construction.

It is estimated that five subsequent contracts would be awarded for cutterhead suction dredging of the Brownsville Main Channel through station 84+200 for a total length of 15.9 miles. The remainder of the channel (the Turning Basin Extension and Turning Basin) would remain at existing depths. The authorized depth for the inland Main Channel would be -52 feet MLLW, but the potential dredging depth could actually be -55 feet MLLW, after accounting for 2 feet of advance maintenance and 1 foot of allowable overdepth. Two or three cutterhead dredges would be working simultaneously to remove approximately 12,079,700 cubic yards of new work material over an estimated 29 months. New work material from the Brownsville Main Channel (stations 0+000 through 84+200) would be pumped from the dredges through a combination of fully submerged and floating hydraulic pipelines into existing upland confined PAs managed by the Brownsville Navigation District (PAs 2, 4B, 5A, 5B, 7 and 8). In addition, new work material may be placed in PA 3, a PA managed by the San Benito Navigation District and generally used for Port Isabel Channel material. The clay new work material would be stockpiled and used to raise the PA 3 dikes for later, unrelated maintenance dredging of the Port Isabel Channel. Specific quantities going to PA 3 are unknown at this time; should PA 3 be utilized, quantities going to PA 2 and/or 4B would be reduced. None of the existing PAs would need to be expanded and no new PAs would be needed. Construction to raise the containment dikes to heights needed to accommodate new work quantities would be done within the footprints of the existing PAs. The resulting elevations of the PA dikes for the new work placement activities are also shown in Table 3. They would range from a total elevation of 12 feet NAVD 88 around PA 5A to a total elevation of 36 feet around PA 2. Armoring of the exterior toe of the PA 4A and 4B dikes on the side facing the channel would be necessary from station 22+000 to 33+800.

Maintenance dredging would generally be conducted by hopper and cutterhead dredges, with material being distributed among a nearshore Feeder Berm or the existing Maintenance ODMDS, and upland, confined PAs as shown in Table 4. Maintenance dredging would utilize the same placement areas as those utilized for existing conditions, and the duration and frequency of dredging events would be within the range occurring under current conditions. Dredging of the Entrance and Jetty Channels and the first 11,000 feet of the Main Channel (+11+000 to -17+000) would generally be performed by a hopper dredge, and material would be placed in the nearshore Feeder Berm Site 1A, located between 1.5 and 2.5 miles from the north jetty and from 0.4 to 0.9 miles from shore (USACE, 1988). Sediment removed by maintenance dredging would therefore be regularly placed back into the littoral system, available for cross-shore and longshore sediment transport to the beaches of South Padre Island. Monitoring of material placed at the Feeder Berm has demonstrated that it moves toward the beach and disperses with the major movement being in the alongshore direction (McLellan et al. 1997;

CETN; 1989). If for some reason the Feeder Berm cannot be used, maintenance material from the Entrance and Jetty Channels (station -17+000 to 0+000) could be placed in the Maintenance ODMDS which is located approximately 2.5 nautical miles from shore and north of the channel (USACE, 1975; 1999). The ODMDS and Feeder Berm are located in dispersive environments and have unlimited capacities.

Maintenance material from the remainder of the Main Channel (stations 11+000 through 89+500) would be placed in existing PAs 4A, 4B, 5A, 5B, 7 and 8. Upland PAs and containment dikes are sized to accommodate total quantities over the 50-year period of analysis. None of the existing PAs would need to be expanded and no new PAs would be needed. Construction to raise the containment dikes to heights needed to accommodate the 50-year maintenance quantities would be done within the footprints of the existing PAs. Dikes would be raised incrementally as needed to contain maintenance quantities. The resulting elevations of the PA dikes for the 50-year placement plan are also shown in Table 3. They range from a total elevation of 17 feet NAVD 88 around PA 5A to a total elevation of 38 feet around PA 7.

Table 3: BIH TSP - O&M Quantities and Placement Area Dike Elevations

Stations		Shoaling Rate in Cubic Yards/ Year (CY/YR)	Placement Area	Dredge Cycle (years)	Number of Cycles in 50 years	Quantity per Cycle (CY/Cycle)	Total O&M Quantity in 50 Years (CY)	Total Dike Elevation in 50 yrs (feet NAVD88)
-17+000	0+00	470,630	Nearshore Feeder Berm Site 1A	5	10	2,353,150	23,531,500	N/A
0+00	11+000	161,595	Nearshore Feeder Berm Site 1A	3	16	484,785	7,756,600	N/A
11+000	28+000	183,995	4A	4	12	735,980	8,831,800	35
28+000	34+000	43,047	4B	4	12	172,188	2,066,300	24
34+000	50+000	123,527	5A	4	12	494,108	5,929,300	17
50+000	65+000	143,577	5B	5	10	717,885	7,178,900	19
65+000	79+000	98,637	7	6	8	591,822	4,734,600	38
79+000	89+500	30,377	8	7	7	212,639	1,488,500	28
				Total CY		5,762,557	61,517,500	

2.0 FEDERALLY-LISTED THREATENED AND ENDANGERED SPECIES AND CRITICAL HABITAT

The study area is located entirely in Cameron County, Texas. USACE contacted the USFWS and NMFS by letter, requesting information on threatened and endangered species in the study area. The agency responses are provided in Appendix B. The USFWS and NMFS consider the endangered or threatened species contained in Table 5 as possibly occurring in this county. The status, range, habitat and presence in the study area are presented below for the species listed in Table 4. The USFWS has also identified Critical Habitat for the wintering piping plover in the study area. No other species, and no other designated or proposed critical habitat, were identified as occurring in study area.

Table 4: Threatened and Endangered Species, Cameron County, Texas

Common Name	Scientific Name	Listing Status	Jurisdiction
BIRDS			
brown pelican	*Pelecanus occidentalis*	Delisted/Monitoring	USFWS
piping plover	*Charadrius melodus*	Threatened	USFWS
Northern Aplomado falcon	*Falco femoralis septentrionalis*	Endangered/ Experimental Non-Essential Population	USFWS
MAMMALS			
Gulf Coast jaguarundi	*Herpailurus (=Felis) yagouaroundi cacomitli*	Endangered	USFWS
ocelot	*Leopardus (=Felis) pardalis*	Endangered	USFWS
West Indian manatee	*Trichechus manatus*	Endangered	USFWS
blue whale	*Balaenoptera musculus*	Endangered	NMFS
finback whale	*Balaenoptera physalus*	Endangered	NMFS
humpback whale	*Megaptera novaeangliae*	Endangered	NMFS
sei whale	*Balaenoptera borealis*	Endangered	NMFS
sperm whale	*Physeter macrocephalus*	Endangered	NMFS
REPTILES			
green sea turtle	*Chelonia mydas*	Threatened	USFWS; NMFS
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	USFWS; NMFS

Common Name	Scientific Name	Listing Status	Jurisdiction
loggerhead sea turtle	*Caretta caretta*	Threatened	USFWS; NMFS
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	USFWS; NMFS
leatherback Sea turtle	*Dermochelys coriacea*	Endangered	USFWS; NMFS
PLANTS			
South Texas Ambrosia	*Ambrosia cheiranthifolia*	Endangered	USFWS
Texas Ayenia	*Ayenia limitaris*	Endangered	USFWS
CANDIDATE SPECIES			
red knot	*Calidris canutus rufa*	Candidate	USFWS
red-crowned parrot	*Amazona viridigenalis*	Candidate	USFWS
Sprague's pipit	*Anthus spragueii*	Candidate	USFWS
scalloped hammerhead shark	*Sphyrna lewini*	Candidate	NMFS
boulder star coral	*Montastraea annularis*	Candidate	NMFS
boulder star coral	*Montastraea franksi*	Candidate	NMFS
elliptical star coral	*Dichocoenia stokesii*	Candidate	NMFS
Lamarck's sheet coral	*Agaricia lamarcki*	Candidate	NMFS
mountainous star coral	*Montastraea faveolata*	Candidate	NMFS
pillar coral	*Dendrogyra cylindrus*	Candidate	NMFS
rough cactus coral	*Mycetophyllia ferox*	Candidate	NMFS
SPECIES OF CONCERN			
dusky shark	*Carcharhinus obscurus*	Species of Concern	NMFS
sand tiger shark	*Carcharias taurus*	Species of Concern	NMFS
opossum pipefish	*Microphis brachyurus lineatus*	Species of Concern	NMFS
warsaw grouper	*Epinenphelus nigritus*	Species of Concern	NMFS
speckled hind	*Epinephelus drummondhayi*	Species of Concern	NMFS

Sources: USFWS and NMFS websites:
http://www.fws.gov/southwest/es/ES_Lists_Main.cfm (accessed June 6, 2013)
http://sero.nmfs.noaa.gov/pr/esa/specieslst.htm (accessed June 6, 2013)
http://www.nmfs.noaa.gov/pr/species/esa/other.htm (accessed June 6, 2013)
http://sero.nmfs.noaa/gov/pr/SOC.htm (accessed June 6, 2013)

2.1 BROWN PELICAN

The adult brown pelican (*Pelecanus occidentali)s* is a large dark gray-brown water bird with white about the head and neck which lives primarily in coastal marine and estuarine environments along the coast of the Gulf of Mexico from Mississippi to Texas and the coast of Mexico, and other coastal zones of the Caribbean, the Pacific Coast and the West Indies. The brown pelican almost completely disappeared from the coast of Texas by the 1960s, largely due to the use of agricultural pesticides which bioaccumulate in the marine food chain and cause reproductive failure (TPWD, 2013a). Since then, the use of chlorinated hydrocarbons for pest control has declined and the brown pelican has recovered and spread through its original range. It is now common along the Texas coast and nests on several isolated islands where they are safe from predators such as raccoons and coyotes. The brown pelican forages and rests in the coastal and near-shore zones of the study area. In 2010, four brown pelican nests were sighted on small islands in the Bahia Grande (Brownsville Herald, 2010). However, the majority of breeding brown pelicans in Texas occur from Nueces County to Galveston County (USFWS, 2009a). The species was delisted in 2009 due to recovery but is currently being monitored by the USFWS (USFWS, 2013a).

2.2 PIPING PLOVER

2.2.1 Status, Habitat and Presence in the Study Area

USFWS listed the piping plover (*Charadrius melodus*) as threatened and endangered on 11 December 1985 (50 FR 50726, December, 11 1985). The piping plover is an endangered species in the northern Great Plains and Great Lakes where it breeds in the summer. Piping plovers wintering in Texas are part of the northern Great Plains and Great Lakes populations and, therefore, are listed as threatened (USFWS, 2009b). The wintering range on the Atlantic and Gulf coasts stretches from North Carolina to Mexico (AOU, 1998; 50 FR 50726, December, 11 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). Approximately 35 percent of the known global population of piping plovers winters along the Texas Gulf Coast, where they spend 60 to 70 percent of the year. Piping plover concentrations in Texas occur in the following counties: Aransas, Brazoria, Calhoun, Cameron, Chambers, Galveston, Jefferson, Kleberg, Matagorda, Nueces, San Patricio, and Willacy. On their wintering grounds, piping plover use beaches, mudflats, sandflats, dunes, and offshore emergent placement areas (USFWS, 1995; AOU, 1998), as well as sandflats in existing USACE placement areas. Piping plovers are known to frequent the study area.

Threats to piping plovers and their habitat in their migration and wintering ranges indicates a continuing loss and degradation of habitat due to sand placement projects, inlet stabilization, sand mining, groins, seawalls and revetments, exotic and invasive vegetation and wrack removal (USFWS, 2009b). There is also concern with projects that would impede the ability of barrier islands to respond to natural habitat building processes in the context of "accelerating sea-level rise".

2.2.2 Critical Habitat

USFWS has designated critical habitat for the overwintering piping plover in the study area (66 FR 36137, July 10, 2001a) (Figure 2). Unit TX-1 is located on the south side of the Brazos Island Harbor Jetty Channel and Brownsville Main Channel, extending from the coast on Brazos Island inland about 5.5 miles. Unit TX-2 is located on the Laguna Madre side of South Padre Island on both sides of the Queen Isabella Causeway. Critical habit in Unit TX-3 is divided into subunits 3A (Gulf of Mexico Shoreline) and 3B (South Padre Island interior) (74 FR 23476, May 19, 2009). The Unit 3A beach unit and the 3B interior unit begin about 5 miles and 6 miles, respectively, from Brazos Santiago Pass and extend northward well past the study area boundary. Threats identified in these areas are oil and gas activities, including stockpiling materials, dredge disposal, and discharging fresh water; residential and commercial development; recreational use, including beach maintenance, human, vehicle, and domestic animal disturbance; and predation. Critical habitat is comprised of areas considered essential for the conservation of a listed species. Piping plovers spend the majority of the year on the wintering grounds. Due to the difficulty of separating out the populations of piping plover (Great Lakes, Northern Great Plains, and Atlantic) when on their wintering grounds, critical habitat was designated for all wintering piping plover.

The primary constituent elements (PCEs) for the piping plover wintering habitat are those habitat 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 tide and annual high tide) and associated dune systems and flats above annual high tide. The USFWS describes the important components of the PCEs as follows (66 FR 36137, July 10, 2001a):

> Important components (primary constituent elements) of intertidal flats include sand and/or mud flats with no or very sparse emergent vegetation. In some cases, these flats may be covered or partially covered by a mat of blue- green algae. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers. Such sites may have debris, detritus

Figure 2: Piping Plover Critical Habitat in BIH Study Area

(decaying organic matter), or micro-topographic relief (less than 50 cm above substrate surface) offering refuge from high winds and cold weather. Important components of the beach/dune ecosystem include surf-cast algae for feeding of prey, sparsely vegetated backbeach (beach area above mean high tide seaward of the dune line, or in cases where no dunes exist, seaward of a delineating feature such as a vegetation line, structure, or road) for roosting and refuge during storms, spits (a small point of land, especially sand, running into water) for feeding and roosting, salterns (bare sand flats in the center of mangrove ecosystems that are found above mean high water and are only irregularly flushed with sea water and washover areas for feeding and roosting. Washover areas are broad, unvegetated zones with little or no topographic relief, that are formed and maintained by the action of hurricanes, storm surge, or other extreme wave action. Several of these components (sparse vegetation, little or no topographic relief) are mimicked in artificial habitat types used less commonly by piping plovers, but that are considered critical habitat (e.g., dredge spoil sites).

Unit TX–01 (South Bay and Boca Chica) is located south of the BIH channel and is 7,217 acres in size. The northern half (approximately) of the interior of the unit and the entire Gulf beach part of the unit are located in the study area. The general boundaries of the unit are the BIH channel on the north, the MLLW line along the Gulf of Mexico beach on the east, the Rio Grande River on the south, and a line from Loma de Las Vacas to Loma Ochoa on the east. The unit is comprised mainly of wind tidal flats that are infrequently inundated by seasonal winds; it does not include densely vegetated habitat. Beaches within the unit reach from the mouth of the Rio Grande northward to Brazos Santiago Pass. The unit boundaries mark the change in habitat from wind tidal flats, preferred by the piping plover, to densely vegetated habitat that is not used by the piping plover. Portions of this unit are owned and managed by the Lower Rio Grande Valley National Wildlife Refuge, the South Bay Coastal Preserve, Boca Chica State Park, and private citizens. BIH PAs 2, 4A, and most of 4B are located within Unit TX-01. They are considered critical habitat because they mimic naturally-formed critical habitat, containing sand and mud flats with sparse vegetation and little or no topographic relief. Sparsely vegetated sand and mud flats result from the periodic placement of hydraulic dredged material into the PAs. These events disturb the existing habitat for a few months, and then new sand or mud flats form that again serve as habitat.

Unit TX–02 (Queen Isabella Causeway) is a 6 acre-area bisected by the Queen Isabella Causeway on the Laguna Madre side of South Padre Island. All of this unit is located within the study area, but there are no project features in or adjacent to this unit. The southern boundary is the Queen Isabella State Fishing Pier, and the northern boundary is at the shoreline at the end of Sunny Isles Street. The eastern boundary is the where developed areas and/or dense vegetation begin, and the western boundary is the MLLW line. This unit contains lands known as wind tidal flats that are infrequently inundated by seasonal winds.

Subunit TX–3A (South Padre Island – Gulf of Mexico Shoreline). This subunit consists of 2,891 acres in Cameron and Willacy Counties, Texas. It is a beach 30 miles long on the gulfside of South Padre Island. The eastern boundary is the estimated MLLW line, and the western boundary is the dune line where the habitat changes from lightly vegetated, sandy beach to densely vegetated dunes. The vegetated dune and Park Road 100, which runs north-south along the western side of the dune, separates Subunits TX–3A and 3B. Approximately one quarter of the subunit is in the Laguna Atascosa National Wildlife Refuge (LANWR), and approximately 64 percent is in private ownership. Ten percent is State land managed by the Texas General Land Office (GLO), and a small portion at the southern end is County park land managed by Andy Bowie County Park. The southern five miles of TX-3A is in the Gulf shoreline study area of the BIH project, but there would be no project construction activities in this unit.

Subunit TX–3B (South Padre Island –Laguna Madre side) consists of 44,137 acres in Cameron and Willacy Counties, Texas. The general boundaries of the unit are from about latitude 26° 09’ 19.00’’ N on the south, the edge of the intertidal mudflats bordering the lower Laguna Madre on the west, the Mansfield Channel on the north, and dense vegetation, dunes or the western boundary of Park Road 100 on the east. Within that boundary, areas that do not contain PCEs have been excluded from critical habitat designation. Approximately 42 percent of the land is in the LANWR, and approximately 38 percent is State owned and managed by the GLO. The remaining 20 percent is privately-owned. None of this subunit is located within the study area and there would be no project construction activities in this unit.

2.3 NORTHERN APLOMADO FALCON

The Northern aplomado falcon (*Falco femoralis septentrionalis*) is one of three subspecies of the aplomado falcon and the only subspecies recorded in the U.S. Historically, these falcons occurred throughout coastal prairie habitat along the southern Gulf coast of Texas, and in savanna and grassland habitat along both sides of the Texas-Mexico border, southern New Mexico, and southeastern Arizona, and extended south through Mexico and into Central America (USWFS, 2006). Although this falcon continued to nest in the U.S. as late as 1952, it disappeared from most of its U.S. range by 1940 (Hector, 1990).

It was listed as an endangered, nonessential experimental population species in 1986 (51 FR 6686; 25 February 1986) in response to extirpation from the United States (U.S.) and evidence of population declines and severe pesticide contamination in eastern Mexico (Hector, 1990). However, reasons for the decline are poorly known. Poisoning of prairie dogs could have had adverse effects on the falcons, and loss of the ecosystems generated by the prairie dogs could have degraded habitat conditions (NatureServe Explorer, 2013a). Other causes could include widespread shrub encroachment resulting from control of range fires and agricultural or pasture development of grassland habitats (71 FR 42298, July 26, 2006). No critical habitat has been designated.

The USFWS finalized its plan to reintroduce this species into their historic habitat in southern New Mexico and Arizona in 2006 (71 FR 42298, July 26, 2006). It is hoped that current reintroduction efforts may reestablish this bird as a breeder in the southwestern U.S. Captive-bred falcons were released onto private lands in Texas, beginning in 1985. In the study area, releases have occurred on the LANWR. By 2006, these releases had established at least 44 pairs in southern Texas and adjacent Tamaulipas, Mexico, and pairs or reintroduced falcons began breeding in 1995 ((71 FR 42298, July 26, 2006). Nests have been located on a variety of structures, both artificial and natural. Nesting productivity increased by about 40 percent in 2003 and 2004, when falcons were provided with artificial nesting structures that prevent predators (such as horned owls, raccoons, and coyotes) from entering. The USFWS is using information learned from the reintroduction effort in south Texas to inform a reintroduction effort within the species' historical range in New Mexico and Arizona.

Essential habitat elements appear to be open terrain with scattered trees (such as mesquite and yucca in the study area), relatively low ground cover, an abundance of small to medium-sized birds along with insects, rodents, snakes, and lizards for prey, and a supply of nest sites (USFWS, 2013b). The species appears to be non-migratory with most pairs using the vicinity of previous season's nesting platforms as a hunting, roosting, and display area throughout the year. Pairs nest in old stick nests of other bird species such as hawks, caracaras and ravens (NatureServe Explorer, 2013a). Suitable habitat for these falcons in the study area is located primarily in the mesquite/yucca flats south of the placement areas which line the Brownsville Main Channel, and in the Laguna Atascosa NWR, north of the Main Channel.

2.4 GULF COAST JAGUARUNDI

The Gulf Coast Jaguarundi (*Herpailurus yagouaroundi cacomitli*) is listed as endangered throughout its range, from southern Texas into the eastern portion of Mexico in the states of Coahuila, Nuevo Leon, Tamaulipas, San Luis Potosi and Veracruz. The last confirmed siting of this subspecies within the U.S. was in 1986 when a roadkill specimen, found near Brownsville, Texas, was positively identified. In Mexico, as recently as 2010, jaguarundis were photographed by remotely-triggered cameras in central and southern Tamaulipas. Since 1990, little additional information has been obtained and since 1986, no new sightings in Texas have been confirmed. The Gulf Coast subspecies of jaguarundi is currently believed to occur in areas of northeastern

Mexico, where suitable habitat exists but there is no information on current population size or distribution in Mexico (USFWS, 2012b).

In 1975, USFWS proposed listing the Gulf Coast Jaguarundi as an endangered species because it was included in a list of species presented as Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora and it was not already listed as threatened or endangered in the U.S. (40 FR 44329, September 26, 1975). The final rule listing the jaguarundi as endangered was published in 1976 (41 FR 21062, June 14, 1976). This species is currently listed under the Act as *Herpailurus (=Felis) yagouaroundi cacomitli*. Recent genetic work has assigned the jaguarundi to the genus *Puma*, and this has become the generally accepted nomenclature. USFWS has therefore accepted the new scientific name as *Puma yagouaroundi* for its recovery plan. No critical habitat has been designated.

The Gulf Coast jaguarundi is found in the Tamaulipan Biotic Province where it uses dense thorny shrublands or woodlands and bunchgrass pastures if dense brush or woody cover is nearby. Information on life history aspects of jaguarundi in the wild is limited (USFWS, 2012b). Jaguarundis are solitary, except during mating season (November and December in Mexico), or when a female is raising kittens. Jaguarundis prey mainly on birds, small mammals, and reptiles. The jaguarundi is the only cat in northeastern Mexico which is primarily active during the day, whereas the other cats, such as ocelot, are primarily nocturnal. Jaguarundis are still difficult to observe because they prefer the cover provided by dense woody communities and bunchgrass pastures. The home range of jaguarundis in Tamaulipas was sometimes similar in size to ocelot home ranges—about 3.3 to 4.5 square miles. However, home range sizes vary greatly, with reports of up to 38.6 square miles.

Primary known threats are habitat destruction, degradation, and fragmentation associated with agriculture and urbanization, and to some extent, border security activities (lighting; road, tower, and fence construction and maintenance; brush clearing; human activity) In the U.S., the habitat historically used by the Gulf Coast jaguarundi was once extensive throughout the Lower Rio Grande Valley (LRGV) but has been converted to agriculture and urban development. Roads may cause mortality through collisions with vehicles and by fragmenting habitat, increasing demographic and genetic isolation of populations. Competition with bobcats may be a potential limiting factor in the northern portion of its range (USFWS, 2012b).

Patches of dense brush and woody cover are present in the study area, especially behind the foredune along the Gulf shoreline south of the BIH channel, on isolated lomas, and north of the channel in the LANWR. None of these dense brush areas are located within upland PAs.

2.5 OCELOT

The ocelot (*Leopardus pardalis*) is listed as endangered throughout its range in the western hemisphere where it is distributed from southern Texas and southern Arizona through Central and South America into northern Argentina and Uruguay (USFWS, 2010a). The U.S. contains only a small proportion of the ocelot's current range and habitat. At one time, this species inhabited brushland in the southwestern U.S. as far north as the Texas panhandle and central Arizona.

In 1972, USFWS added the ocelot to the U.S. List of Endangered Foreign Fish and Wildlife (37 FR 6476, March 30, 1972). However, due to an oversight, the U.S. population of this species was not officially listed as an endangered species until a final ruling was issued in 1982 (47 FR 31670, July 21, 1982). No critical habitat has been designated.

Habitats used by the ocelot throughout its range vary from tropical rainforest, pine forest, gallery forest, riparian forest, semi-deciduous forest, and dry tropical forest, to savanna, shrublands, and marshlands. In south Texas, the ocelot inhabits dense thornscrub communities on LANWR and on private lands in three Texas counties. The ocelot requires dense vegetation (greater than 75 percent canopy cover), with 95 percent cover of the shrub layer preferred in Texas. Its prey consists primarily of rabbits, rodents, birds, and lizards (USFWS, 2010a).

As of February 2010, there were fewer than 25 total known individuals in the two populations in south Texas, with the possibility that more cats inhabit surrounding ranches (USFWS, 2010). One population occurs in Willacy and Kenedy Counties (Arroyo Colorado Unit) primarily on private ranches and the other occurs in eastern Cameron County primarily on the LANWR. Both populations are isolated from each other and occupy remnant habitat fragments. Individuals have occurred outside of these two populations, but there is no recent evidence that a breeding population occurs in other areas of Texas.

Habitat conversion, fragmentation, and loss are the primary threats to the ocelot today. Human population growth and development continue throughout the ocelot's range. In Texas, more than 95 percent of the dense thornscrub habitat in the LRGV has been converted to agriculture, rangelands, or urban land uses, and less than one percent of south Texas supports the extremely dense thornscrub used by ocelots. Small population sizes in Texas and isolation from conspecifics in Mexico threaten the ocelot in Texas with inbreeding. Issues associated with border barrier development and patrolling the boundary between the U.S. and Mexico further exacerbate the isolation of Texas and Arizona ocelots from those in Mexico. Commercial exploitation and illegal hunting were significant threats to the species when the ocelot was originally listed, but the harvest and export of ocelots has significantly declined and is controlled by international convention (USFWS, 2010a).

USFWS published a draft recovery plan for the ocelot in 1990 and a first revision in 2010 (USFWS, 2010a). The major focus of this recovery plan is on two cross-border management units, the Texas/Tamaulipas Management Unit (TTMU) and the Arizona/Sonora Management Unit. The TTMU emphasizes efforts to reduce habitat loss and fragmentation of remaining suitable habitat in these borderland areas, to facilitate connectivity with ocelots in Tamaulipas.

Patches of dense brush and woody cover are present in the study area, especially behind the foredune along the Gulf shoreline south of the BIH channel, on isolated lomas, and north of the channel in the LNWR. None of these dense brush areas are located within upland PAs.

2.6 WEST INDIAN MANATEE

Manatees (*Trichechus manatus*) are marine mammals found in marine, estuarine, and freshwater environments. The manatee ranges from the southeastern U.S. and coastal regions of the Gulf, through the West Indies and Caribbean, to northern South America. U.S. populations occur primarily in Florida, where they are effectively isolated from other populations by the cooler waters of the northern Gulf and the deeper waters of the Straits of Florida (NatureServe, 2013b) .

USFWS listed the West Indian manatee (*Trichechus manatus*) as endangered in 1967 (32 FR 4001, March 11,1967). Later it received protection under the ESA of 1973. Critical habitat has been designated in Florida, but none in Texas.

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. 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. 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 usually avoid areas with strong currents (NatureServe, 2013b). Manatees are primarily dependent upon submergent, emergent, and floating vegetation, with the diet varying according to plant availability.

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, 2001b). 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 (USFWS, 2001b). The low reproductive rate and habitat loss make it difficult for manatee populations to recover.

The West Indian manatee historically inhabited the Laguna Madre, the Gulf, 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 River (Schmidly, 2004). In May 2005, a live manatee appeared in the Laguna Madre near Port Mansfield (Blankinship, 2005). The occurrence of the West Indian manatee in the study area is unlikely.

2.7 WHALES

NMFS identifies five endangered whale species of potential occurrence in the Gulf. These are the sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), 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).

2.8 GREEN SEA TURTLE

The green turtle (*Chelonia mydas*) 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 USFWS, 1991a; Hirth, 1997).

The green turtle was listed in 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, July 28, 1978a). In 1998, NMFS designated critical habitat to include the coastal waters around Culebra Island, Puerto Rico (63 FR 46693, September 2, 1998).

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 almost exclusively 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. Most green turtles nest in Florida and in Mexico. 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). Green turtle nests are rare in Texas. In 1987 the first confirmed nesting of a green sea turtle on the Texas coast was recorded (Shaver and Amos, 1988). More recently, two green turtle nests were documented in 2006 and three in 2007; all but one in 2007 were from the Padre Island National Seashore (PINS) (Echols, 2006). In 2012, six green sea turtle nests were reported from PINS and two from South Padre Island . The 2012 nest total sets a new record for the number of green turtle nests documented in Texas in a year. The previous record of 6 nests was set during 2011 (NPS, 2012).

The principal cause of the historical, worldwide decline of the green turtle is long-term harvest of eggs and adults on nesting beaches, and juveniles and adults on feeding grounds. These harvests continue in some areas of the world and compromise efforts to recover this species. Incidental capture in fishing gear, such as gillnets and trawls, is a serious ongoing source of mortality that also adversely affects the species' recovery (NMFS, 2013a). 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). Incidental take of ridleys has been documented with hopper dredges.

Of the green turtle strandings reported from 2004 through 2007 (last year reported) along the Texas Coast, 374 were from Zone 21, which extends from the mouth of the Rio Grande to the vicinity of Yarborough Pass (STSSN, 2013). In 2007, 233 green turtles were reported stranded; of these, at least 147 were cold-stunned turtles resulting from a strong cold front that passed in January (Sea Turtle, Inc., 2008).

Since 1995, the BIH Entrance Channel has been dredged 12 times using hopper dredges; green turtles were captured by the dredge during all of these dredging events. During the course of dredging, 23 green turtles were documented as dredge takes: four in 1995, two of which survived; two in 1999; four in 2002 (two separate dredging contracts); three in 2003; two in 2006; five in 2007, and one each in 2008, 2009 and 2013 (USACE, 2013a). Between 2002 and 2009, pre-dredging and during-dredging relocation trawling was conducted in conjunction with BIH maintenance dredging projects. During the course of this trawling, 118 green turtles were tagged and released unharmed: seven in 2002; 13 in 2003; 34 in 2006; and 64 in 2007 (USACE, 2013a).

2.9 KEMP'S RIDLEY SEA TURTLE

The Kemp's ridley sea turtle (*Lepidochelys kempii*) is the smallest of the sea turtles, with adults reaching about 2 feet in length and weighing up to 100 pounds. 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.

The Kemp's ridley sea turtle was listed as endangered throughout its range in 1970 (35 FR 18319, December 2, 1970a). It is considered to be the most seriously endangered of all sea turtles (USFWS and NMFS, 1992; NPS, 2013b). In 2010, a petition was filed by the WildEarth Guardians to designate critical habitat for nesting beaches along the Texas coast and marine habitats in the Gulf of Mexico and Atlantic Ocean. No critical habitat has yet been designated.

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 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 (Pritchard and Marquez, 1973; Shaver, 1991; Campbell, 1995).

Populations of this species have declined since 1947, when an estimated 42,000 females nested in one day, 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 capture in fishing gear, primarily in shrimp trawls, but also in gill nets, longlines, and traps (USFWS and NMFS, 1992; NMFS, 2013b). The National Research Council's (NRC) Committee on Sea Turtle Conservation estimated in 1990 that 86 percent of the human-caused deaths of juvenile and adult loggerheads and Kemp's ridleys resulted from shrimp trawling (Campbell, 1995).

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 percent of the sea turtles had eaten some type of marine debris. 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).

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, 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, 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. From 1996 through the 2007 nesting season, 59 nests were from Headstart turtles (NPS, 2013b).

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.

Egg collection was an extreme threat to the population, but since nesting beaches were afforded official protection in 1966, this threat no longer poses a major concern. This together with the requirement to use TEDs in shrimp trawls and other measures to reduce turtle bycatch are some of the primary factors in recovery of this species (NMFS, 2013b).

Kemp's ridley appears to be in the earliest stages of recovery. During the 2000 nesting season, an estimated 2,000 females nested at Rancho Nuevo, a single arribada of 1,000 turtles was reported in 2001, and an estimated 3,600 turtles produced over 8,000 nests in 2003. In 2006, a record number of nests were recorded since monitoring began in 1978; 12,143 nests were documented in Mexico, with 7,866 of those at Rancho Nuevo (NMFS, 2013b).

Kemp's ridleys may have nested sporadically in Texas in the last 50 years; however, the number of nests over recent years has shown an ever-increasing trend: 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 2007 (128 nests); 2008 (195 nests); 2009 (197 nests); 2010 (141 nests); 2011 (199 nests), and 2012 (209 nests) (NPS, 2012 and 2013a). As noted above, some of these nests were from headstarted ridleys. The majority of the Kemp's ridley nests recorded in Texas were at the PINS. Such nestings, together with the proximity of the Rancho Nuevo rookery, probably account for the occurrence of hatchlings and subadults in Texas.

Kemp's ridley occurrence in Texas may well be a reflection of crustacean-rich feeding areas in the northern Gulf and breeding grounds in Mexico. Kemp's ridley nests have been reported in the study area; in 2012, 106 were report from the PINS (most of which lies outside of the study area), 59 were reported from South Padre island, and 10 were located on Boca Chica Beach, south of the BIH Channel (USFWS, 2013a). Of the latest reported ridley standings (2007) along the Texas Coast, 35 were from Zone 21, which extends from the Mouth of the Rio Grande to the vicinity of Yarborough Pass (STSSN, 2013).

Since 1995, the BIH Entrance Channel has been dredged 12 times using hopper dredges; Kemp's ridley turtles were killed by the dredge during three of these dredging events: one each in 1995, 1997 and 2009 (USACE, 2013a). Between 2002 and 2009, pre-dredging and during-dredging relocation trawling was conducted in conjunction with BIH maintenance dredging projects. During the course of this trawling, three Kemp's ridley turtles were tagged and released unharmed. All three relocations occurred in 2008 (USACE, 2013a).

2.10 LOGGERHEAD SEA TURTLE

Loggerhead sea turtles (*Caretta caretta*) were named for their relatively large heads, which support powerful jaws and enable them to feed on hard-shelled prey, such as whelks and conch. 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 (Rebel, 1974; Ross, 1982; Iverson, 1986), and is the most abundant sea turtle species in U.S. coastal waters (NMFS, 2013c). 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 Northwest Atlantic Ocean population of the loggerhead turtle was listed as threatened in 2011 (76 FR 58868, September 22, 2011). In 2011, the NMFS and USFWS determined that the loggerhead sea turtle is composed of nine distinct population segments (DPSs) that constitute ''species'' that may be listed as threatened or endangered under the ESA. Formerly, all populations of the loggerhead were determined threatened throughout its range (43 FR 32808, July 28, 1978b). In the 2011 final rule, four DPSs were listed as threatened and five as endangered under the ESA. The four threatened DPSs are located in the Northwest Atlantic Ocean, the South Atlantic Ocean, the Southeast Indo-Pacific Ocean, and the Southwest Indian Ocean. The five endangered DTSs are located in the Mediterranean Sea, the North Indian Ocean, the North Pacific Ocean, the Northeast Atlantic Ocean and the South Pacific Ocean. NMFS and USFWS also announced they intend to propose the designation of critical habitat for the two loggerhead sea turtle DPSs occurring within the U.S. (the Northwest Atlantic and North Pacific Oceans) in a future rulemaking. The proposal to designate critical habitat in the Northwest Atlantic was published in 2013 (78 FR 17999, March 25, 2013c). The proposed critical habitat is located in coastal counties in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi.

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. They may remain associated with sargassum for perhaps 3 to 5 years (NMFS and USFWS, 1991b). 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, 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).

Recent analyses of nesting data from southeast Florida show the population is declining. Similarly, long-term nesting data show loggerhead nesting declines in North Carolina, South Carolina, and Georgia (NMFS, 2013c). The decline of the loggerhead, like that of most sea turtles, is the result of overexploitation by man, and inadvertent mortality associated with fishing and trawling activities. The most significant threats to its population are incidental capture in fishing gear, directed harvest, coastal development, increased human use of nesting beaches, and pollution (NMFS, 2013c). Incidental take of ridleys has been documented with hopper dredges.

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 stranded turtles on the Texas coast each year (STSSN, 2013). 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. Since that time, several nests have been recorded along the Texas coast. Two to five loggerhead nests were confirmed along the Texas Coast each year from 1999 through 2005 (USACE, 2007). During the last decade, nesting has remained relatively stable on the Texas coast, with 0-6 nests per year. Although nests have been found state-wide, the largest numbers have been located at the National Seashore (NPS, 2013c).

This species has been recorded in the study area. Loggerhead nests were recorded at South Padre Island in 2001, 2003, 2005, 2006, and 2007. In 2012, one nest was recorded at the PINS and one was recorded on South Padre Island (NPS, 2012). Since 1995, the BIH Entrance Channel has been dredged 12 times using hopper dredges; loggerhead turtles were killed by the dredge during five of these dredging events: one each in 1997, 2007 and 2008, and two in 2009 (USACE, 2013a). Between 2002 and 2009, pre-dredging and during-dredging relocation trawling was conducted in conjunction with BIH maintenance dredging projects. During the course of this trawling, 16 loggerhead turtles were tagged and released unharmed (USACE, 2013a).

2.11 HAWKSBILL SEA TURTLE

The hawksbill sea turtle (*Eretmochelys imbricata*) 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, 2013d). 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).

The hawksbill sea turtle was Federally listed as endangered in 1970 on (35 FR 84952, June 2, 1970b). In 1998, NMFS and USFWS designated critical habitat near Mona Island and Isla Monito, Puerto Rico, seaward to 5.6 kilometers (km) (63 FR 46693, September 2, 1998).

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.

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, (Carr, 1952; Rebel, 1974; Pritchard, 1977; Musick, 1979; Mortimer, 1982). 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).

The primary global threat to hawksbills is habitat loss of coral reef communities. Coral reefs are vulnerable to destruction and degradation caused by human activities. Historically, commercial exploitation was the primary cause of the decline of hawksbill sea turtles. There remains a continuing demand for the hawksbill's shell as well as other products, including leather, oil, perfume, and cosmetics. Additionally, hawksbills are harvested for their eggs and meat while whole stuffed turtles are sold as curios in the tourist trade. In addition to directed harvest, increased human presence is a threat to hawksbills. In particular, increased recreational and commercial use of nesting beaches, beach camping and fires, litter and other refuse, general harassment of turtles, and loss of nesting habitat from human activities negatively impact hawksbills. Incidental capture in fishing gear, primarily gillnets, and vessel strikes also adversely affect this species' recovery (NMFS, 2013d).

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, 2013d). On 13 June 1998, the first hawksbill nest recorded on the Texas coast was found at PINS. This nest remains the only documented hawksbill nest on the Texas coast (NPS, 2013d). Stranding data from 2004 through 2007 show that 59 hawksbills were found along Texas waters or shorelines (STSSN, 2013). Of the hawksbill standings reported from 2004 through 2007 along the Texas Coast, 17 were from Zone 21, which extends from the mouth of the Rio Grande to the vicinity of Yarborough Pass (STSSN, 2013). No hawksbills have been killed or captured during relocation trawls during BIH maintenance dredging projects since record-keeping began in 1995 (USACE, 2013a).

2.12 LEATHERBACK SEA TURTLE

Leatherback sea turtles (*Dermochelys coriacea*) are named for their appearance. They do not have shells as other sea turtles do. Instead, their backs are covered by a slate black to bluish-black leathery skin with irregular white or pink patches. They are the largest turtles in the world, reaching over 6 feet in length and 650-1,200 pounds in weight (NPS, 2013e).

The leatherback sea turtle was listed as endangered throughout its range in 1970 (35 FR 84952, June 2, 1970), with critical habitat designated in the U.S. Virgin Islands in 1978 and 1979 (43 FR 43688, September 26, 1978 and 44 FR 17710, March 23, 1979, respectively). In 2011, USFWS announced that revision of the critical habitat to include the coastline and offshore waters of the Northeast Ecological Corridor of Puerto Rico may be warranted and that assessment of the need for revisions to critical habitat would be conducted during a future planned status review (76 FR 47133, August 4, 2011c).

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). 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. 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.

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). The U.S. Caribbean, primarily Puerto Rico and the U.S. Virgin Islands, and southeast Florida support minor nesting colonies, but represent the most significant nesting activity within the United States (NMFS, 2013e).

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, 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).

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. Major threats include egg collecting and mortality associated with bycatch in longline, trawl and gillnet fisheries throughout their range although they are jeopardized to some extent by harvesting of adult females, destruction or degradation of nesting habitat, and ingestion of floating trash (Nature Serve, 2013d). This species is probably more susceptible than other turtles to drowning in shrimp trawlers equipped with turtle extruder devices (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).

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, 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. Leatherback nests were recorded on Padre Island in the 1930's-40's. One leatherback nest was located at PINS in 2008. Since then, no leatherback nests have been located anywhere in Texas (NPS, 2013e).

No leatherbacks have been taken by dredging activities in Texas (USACE, 2013a). No leatherback strandings were reported from 2004 through 2007 in Zone 21, which extends from the mouth of the Rio Grande to the vicinity of Yarborough Pass (STSSN, 2013). This species is unlikely to occur in the study area.

2.13 SOUTH TEXAS AMBROSIA

South Texas ambrosia (*Ambrosia cheiranthifolia*), a member of the aster family, is a herbaceous, perennial plant with erect stems. It is grayish-green in color with yellow flowers, 4 to 12 inches in height. It is also known as South Texas Ragweed, Rio Grande Ragweed (TPWD, 2013b). This plant was listed as endangered in 1994 (59 FR 43648, August 24, 1994). No critical habitat has been designated.

Historically, South Texas ambrosia is known from northern Tamaulipas in Mexico, Cameron, Jim Wells, Kleberg and Nueces Counties in Texas and the state of Tamaulipas, Mexico (TPWD, 2013a). In 1994, populations had been verified in eight populations, four in Nueces County, three in Kleberg County, and one overlapping both counties. It occurs at low elevations in open clay-loam to sandy-loam prairies and savannas. Associated native grasses found at the existing sites include Texas grama, buffalograss, Texas wintergrass, and tobosa. Native woody species found scattered throughout the existing sites include mesquite, huisache, huisachillo, brasil, granjeno, and lotebush (TPWD, 2013a). Much of the original native habitat for South Texas ambrosia has been converted to agricultural fields, improved pastures, or urban areas (59 FR 43648, August 24, 1994).

Loss and fragmentation of habitat has led to the decline of this species (59 FR 43648, August 24, 1994; TPWD, 2013a). Conversion of habitat to agricultural fields and urban areas has limited the amount of habitat available for colonization. In addition, introduced species such as buffelgrass and King Ranch bluestem compete with this and other natives of the coastal prairie. Invasion of grasslands by shrub and tree species also contributes to loss of available habitat, although the species does occur among scattered woody plants. Disturbance associated with activities occurring along road right-of-ways where the species is found may also be detrimental.

Today, the species occurs at six locations in Nueces and Kleberg counties (TPWD, 2013a). The current status of any populations in Mexico is unknown. The number of occurrences is about 15-20 occurrences in South Texas and Tamaulipas Mexico. However, one report notes that the species is, or may be, extirpated in Cameron County, Texas (NatureServe, 2013e). It is not known to occur in the study area.

2.14 TEXAS AYENIA

Texas ayenia, a member of the cacao family, is a thornless, medium-sized shrub, two to five feet tall (TPWD, 2013b). This species occupies dense subtropical thorn woodland or tall shrubland on soils ranging from heavy clay to fine sandy clay loam and fine sandy loam. The current known population in Texas is within the Texas Ebony-Anacua plant community, a closed-canopy community of riparian terraces that once covered much of the Rio Grande delta, but is now reduced to remnant fragments surrounded by agricultural fields, pastures, and urban areas with less than 5 percent of the original acreage remaining (NatureServe 2013f). It was listed as endangered in 1994 (59 FR 43648, August 24, 1994). No critical habitat has been designated.

Habitat loss is thought to be the major threat to the continued existence of this species (59 FR 43648, August 24, 1994; TPWD, 2013b). Much of the native woodland and brush within the historical range of Texas Ayenia has been converted to agricultural or urban use. Flood control may be of particular importance to this species and the ecosystem upon which it depends. Introduction and spread of non-native species such as guinea grass (Panicum maximum) also poses a serious threat to the species. The small size of the existing U. S. population makes this species very vulnerable.

Historically, Texas ayenia once occurred in Cameron and Hidalgo counties in south Texas, and in the states of Coahuila and Tamaulipas in Mexico. Available information on recent occurrences is conflicting. USFWS reports there are known populations ranging from Soto la Marina in east-central Tamaulipas to Cameron, Hidalgo and Willacy Counties (USFWS, 2013d). TPWD reports that Texas ayenia exists in the U.S. in only one small population of about 20 individuals in Hidalgo County (TPWD, 2013c). NatureServe (2013f) reports there is an extremely limited amount of native habitat remaining, with six known extant populations (four in south Texas and two in Mexico). These Texas populations are limited to the Rio Grande Valley in Cameron County. It is not likely to occur in the study area.

2.15 CANDIDATE SPECIES

2.15.1 Red Knot

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, 2011a). The USFWS began proposing that this species be considered a Candidate for listing in 2008, and confirmed this finding in the most recent filing (77 FR 69993, November 21, 2012a). USFWS expected to publish a proposed listing rule within the next year.

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, December 10, 2008).

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).

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, 2013c). They have been reported to use the barrier island beaches, exposed tidal flats, washover passes, and mudflats associated with the Laguna Madre (Port Isabel Economic Development Corporation, 2013). 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 2011a).

2.15.2 Red-Crowned Parrot

The red-crowned parrot (*Amazona viridigenalis*) is native to Mexico and is currently found in northeastern Mexico, inhabiting lush areas in arid lowlands and foothills, particularly gallery forests, deciduous woodlands, and dry, open, pine-oak woodlands. In Mexico, the species' distribution is confined to the lowland plains (Atlantic coastal plain) and the low eastern slopes of the Sierra Madre Oriental. In addition, several introduced populations occur in urban areas of the United States, Puerto Rico, and Mexico. Evidence suggests populations in the LRGV consist, at least partly, of naturally occurring populations. Therefore, USFWS treats the Lower Rio Grande Valley populations as native populations (76 FR 62016, October 6, 2011b).

USFWS initiated a status review in response to a petition filed in 2009 (74 FR 33957, July 14, 2009d) which resulted in the red-crowned parrot being considered a Candidate for listing. In 2011, USFWS found that listing was warranted but precluded by higher priority listing actions (76 FR 62016, October 6, 2011b). This finding was confirmed in 2012 (77 FR 69994, November 21, 2012b).

In the LRGV, red-crowned parrots occur primarily in urban areas. Although little information on urban habitat use specific to the LRGV is available, in cities where the species is introduced it is reported to prefer areas with large trees that provide both food and nesting sites. Red-crowned parrots are nonmigratory, but are apparently nomadic during the winter (non-breeding) season when large flocks range widely to forage. The red-crowned parrot usually forages in the crowns of trees, but will occasionally feed on low-lying bushes. Foraging appears to be opportunistic. Its diet includes a variety of primarily seeds and fruits, but also buds and flowers (76 FR 62016, October 6, 2011b).

The primary threats to the red-crowned parrot at this time include habitat loss, illegal capture for the pet trade, and the inadequacy of regulatory mechanisms that address those threats. It is estimated that the global population of red-crowned parrots is fewer than 5,000 individuals and the recent population trend is a decrease greater than or equal to 50 percent over 30 years. Numbers and trend of the species within Texas portion are largely unknown, and speculative. USFWS has no information indicating whether future urban growth may positively or negatively affect the red-crowned parrot population in the region (76 FR 62016, October 6, 2011b) .

2.15.3 Sprague's Pipit

The Sprague's pipit (*Anthus spragueii*) is a small passerine endemic to the Northern Great Plains and is one of the few bird species endemic to the North American prairie (75 FR 56028, September 15, 2010b). Sprague's pipits are strongly tied to native prairie throughout their life cycle but will utilize nonnative planted grassland. These birds are sensitive to fragmentation and require relatively large grassland patches to form breeding territories.

USFWS initiated a status review in response to a petition filed in 2009 (74 FR 63337, December 3, 2009e) which resulted in the Sprague's pipit being considered a Candidate for listing. In 2010, USFWS found that listing was warranted but precluded by higher priority listing actions (75 FR 56028, September 15, 2010b).

The Sprague's pipit breeding range extends throughout North Dakota, except for the easternmost counties, northern and central Montana east of the Rocky Mountains, northern portions of South Dakota, northwestern Minnesota, southeastern Alberta, the southern half of Saskatchewan, and into southwest Manitoba. It's wintering range includes south-central and southeast Arizona, Texas, southern Oklahoma, southern Arkansas, northwest Mississippi, southern Louisiana, and northern Mexico. Migration and wintering ecology are poorly known, but migrating and wintering Sprague's pipits are found in both densely and sparsely vegetated grassland, and pastures; they are rarely found in fallow cropland. Sprague's pipits exhibit a strong preference for grassland habitat during the winter and an avoidance of areas with too much shrub encroachment. They eat a wide variety of insects during the breeding season and a very small percentage of seeds (74 FR 63337, December 3, 2009e). Recent sightings have been reported outside of the study area upstream in the LRGV (Bird Treks, 2013).

The primary threats to the Sprague's pipit are habitat fragmentation on the breeding grounds, energy development, roads, and inadequacy of existing regulatory mechanisms. Native prairie is one of the most imperiled habitats worldwide, with loss rates approximating 70 percent in the United States and Canada, and prairie loss is accelerating. There is less specific information available on the wintering grounds, but the data available indicate that large areas of the wintering grounds are being converted from grassland habitat. The 40–year trend in Christmas Bird County data shows an annual decline of 2.54 percent of this species in Texas. Adequate regulations are not in place at the local, State, or Federal level to adequately minimize the threat of habitat degradation and fragmentation.

2.15.4 Scalloped Hammerhead Shark

The scalloped hammerhead shark (*Sphyrnea lewini*) is a moderately large shark with a global distribution (NMFS, 2013g). The eight or so species of hammerhead sharks are characterized by the flat, extended head or "cephalofoil." The cephalofoil of a scalloped hammerhead shark is characterized by an indentation located centrally on the front margin of the broadly arched head. Two more indentations flank the main central indentation, giving this hammerhead a "scalloped" appearance.

In response to a petition submitted by WildEarth Guardians and Friends of Animals to list the species as threatened or endangered, the NMFS completed a comprehensive status review for the scalloped hammerhead shark which determined that the species is comprised of six DPSs that qualify as species under the ESA: Northwest Atlantic and Gulf of Mexico (NW Atlantic and GOM); Central and Southwest Atlantic (Central and SW Atlantic); Eastern Atlantic DPS; Indo-West Pacific DPS; Central Pacific DPS; and Eastern Pacific DPS (78 FR 20717, April 5, 2013h). The NMFS further determined that two DPSs warrant listing as endangered, the Eastern Atlantic and Eastern Pacific DPSs; two DPSs warrant listing as threatened, the Central & SW Atlantic and Indo-West Pacific DPSs; and two DPSs do not warrant listing at this time, the NW Atlantic and GOM DPS and the Central Pacific DPS. The study area is located in the NW Atlantic and GOM DPS.

The scalloped hammerhead shark is a coastal pelagic species that can also be found in ocean waters and occurs over continental and insular shelves and adjacent to deeper water. It has been observed close inshore and even entering estuarine habitats, as well as offshore. They feed on crustaceans, teleosts, cephalopods and rays (NMFS, 2013g).

This species is highly desired for the shark fin trade because of its fin size and high fin ray count. They are valuable in the international fin and are often used to make shark fin soup. A recent stock assessment found that the northwestern Atlantic population has decreased from about 155,500 in 1981 to about 26,500 in 2005 (NMFS, 2013g).

The scalloped hammerhead shark may be found within the study area. However, the study area is located in the NW Atlantic and GOM DPS, and did not warrant listing at this time.

2.15.5 Corals

On October 20, 2009, NMFS received a petition from the Center for Biological Diversity to list 83 species of coral as either threatened or endangered under the ESA. In response, NMFS issued a 90-day finding (75 FR 6616, February 10, 2010a), which determined that the petition contained substantial information indicating listing may be warranted for all of the petitioned species except *Oculina varicosa*. NMFS convened a Coral Biological Review Team to assess the biological status and threats to each of the 82 corals. In addition, the Pacific Islands Regional Office staff developed a report on management actions relevant to the species across their range, including existing regulatory mechanisms and conservation efforts (NMFS, 2012).

Of the 82 coral species included in the status review, seven are located in the Caribbean region which includes the reef tract of south Florida and the Florida Keys, Puerto Rico, the U.S. Virgin Islands and all the islands of the wider Caribbean region (NMFS, 2012). The seven coral species are boulder star coral (*Montastraea annularis*), boulder star coral (*Montastraea franksi*), elliptical star coral (*Dichocoenia stokesii)*, Lamarck's sheet coral (*Agaricia lamarcki*), mountainous star coral (*Montastraea faveolata*), pillar coral (*Dendrogyra cylindrus*), and rough cactus coral (*Mycetophyllia ferox*) (75 FR 6616, February 10, 2010a).

Relatively high human population densities and a long history of pervasive human impacts to coral reef systems exist across the Caribbean region (NMFS, 2012). Nearly two-thirds of Caribbean coral reefs are threatened by at least one form of human activity, with continuing threats of region-wide damage due to rising sea temperatures and disease. Additionally, none of the Caribbean's three keystone species indicative of reef health (the corals *Acropora palmata* and *A.cervicornis*, and the urchin *Diadema antillarum*) show significant recovery over decadal time scales. The region is also susceptible to strengthening storms and hurricanes, and suffers mass bleaching events, hampering ecosystem recovery.

The seven coral species current U.S. distribution is restricted to south Florida and the Florida Keys, Puerto Rico, the U.S. Virgin Islands. None are located within the study area.

2.16 SPECIES OF CONCERN

2.16.1 Dusty and Sand Tiger Sharks

NMFS identified two sharks as Species of Concern for the study area – the dusky shark (*Carcharhinus obscurus*) and the sand tiger shark (*Carcharias taurus*). Both dusky and sand tiger sharks could occur in the study area.

The dusky shark is also known as the bronze whaler or black whaler (NMFS, 2010b). It is a large, fairly slender shark with a low ridge between the dorsal fins. It occurs in both inshore and offshore waters at depths as low as 1300 feet. Adults of this species tend to avoid areas of low salinity and rarely enter estuaries. The young congregate in very shallow coastal water in estuaries and bays. Their diet includes bony fishes, cartilaginous fishes, and squid. In the western Atlantic, it occurs from southern Massachusetts and Georges Bank to Florida, Bahamas, and Cuba. It also occurs in the Northern Gulf of Mexico, and Nicaragua; Southern Brazil, Eastern Atlantic; and Southern California to the Gulf of California.

Today the dusky shark population in the northwestern Atlantic and Gulf of Mexico is probably at 15 to 20 percent of its mid-1970s abundance (NMFS, 2010b). Currently the principal threat to dusky sharks is from bycatch and illegal landings in commercial and recreational shark fisheries. Commercial and recreational possession was prohibited in 2000. However, despite being prohibited, dusky sharks are regularly caught in commercial longlines and incidentally caught on a variety of other gears. With life history traits such as slow growth, late maturity, and reproduction every three years, the dusky shark is susceptible to overfishing.

The sand tiger shark is a bulky, light brown shark with a maximum length of about 10.5 feet (NMFS, 2010c). It has a flattened conical snout and a long mouth. This shark occurs as solitary individuals, but aggregations of small to large schools may occur for feeding, courtship, mating and birth. They are present in all warm and temperate seas except the eastern Pacific. They range from the surf zone down to depths as great as 626 feet, preying on bony fishes, small sharks, rays, squid, crabs and lobsters.

Currently, the principal threat to sand tiger sharks is exploitation. It is highly regarded as a food fish in Japan and is also used for fishmeal, oil and the shark-fin trade. Increased exploitation along the U.S. east coast in the 1980s and 1990s resulted in declines of 90 percent. Their aggregating behavior, slow growth, late maturity and low productivity make them susceptible to population declines due to overexploitation.

2.16.2 Opossum Pipefish, Warwaw Grouper and Speckled Hind

NMFS identified three fishes as Species of Concern for the study area - Opossum pipefish (*Microphis brachyurus lineatus*), Warwaw grouper (*Epinenphelus nigritus*), and speckled hind (*Epinephelus drummondhayi*).

The oppossum pipefish is a relatively large pipefish, reaching a standard length of 7.6 inches (NMFS, 2009). It is carnivorous, preying on crustaceans and small fish as ambush predators in dense vegetation. It is a widespread species that spawns in brackish waters, with larvae moving quickly downstream to estuarine and marine environments. The smallest juveniles have only been captured in oceanic Sargassum rafts or coastal marine environments, while adults only occur in freshwater tributaries within 30 miles of the coast. This subspecies is known to range from New Jersey south through the Gulf of Mexico and Caribbean to Sao Paulo, Brazil, and also occurs on the Pacific Coast of Panama. The major threats to the opposum pipefish are habitat destruction, water control structures, declining water quality, and an increase in disease. The opposum pipefish occurs in the study area, having been reported in South Bay and tidal reaches the Rio Grande River (TPWD, no date).

The Warsaw grouper is a deepwater fish, inhabiting reefs or other growth-encrusted hard bottoms on the continental shelf break in waters 250 to 720 feet deep (IUCN, 2012a). Egg and larval phases occur offshore, but juveniles can be found in nearshore areas, occasionally seen on jetties and shallow water reefs. Adults are normally found on rough, rocky bottom in deep water. It is long-lived (up to 41 years) and has a slow growth rate, with a maximum size of about 440 pounds. The major threat to the Warsaw Grouper is mortality as a result of fishing or by-catch release mortality (due to barotraumas since it is deep-living). Landings have been reported in Alabama, Louisiana, North Carolina, South Carolina, Texas and Florida. The Florida west coast is the largest landing port; however, landings in Texas have been increasing. Warwaw grouper juveniles could be found in the study area.

The speckled hind is deepwater grouper which has its pelagic egg and larval stages offshore (IUCN, 2012b). Adults inhabit offshore rocky bottoms in depths of 82 to 600 feet. Juveniles are more commonly found in shallower portions of the depth range. Maximum weight is about 65 pounds. Prey include fishes, crabs, shrimp, lobster, and molluscs. The species occurs in the waters around Bermuda and along the U.S. coast from North Carolina to the Florida Keys, and in the northern and eastern Gulf of Mexico. The primary threat to the speckled hind is mortality as a result of fishing or bycatch. It is unlikely that speckled hinds would be found in the study area.

3.0 EFFECTS ON LISTED SPECIES

3.1 BROWN PELICAN

Foraging pelicans are common along the Texas Coast and may be found loafing or feeding in the project area. They would easily be able to avoid temporary construction sites. In addition, no nesting sites are located in the project area. Therefore, it is determined that the proposed project would have no effect on this species.

3.2 PIPING PLOVER

USACE PAs 2, 4A, and most of 4B are located within the piping plover's Critical Habitat Unit TX-01. These PAs are part of the environmental baseline, having been in use since before the first National Environmental Policy Act review of the BIH project in 1975 (USACE, 1975). PAs 4A and 4B contain sand and/or mud flats with sparse vegetation and little or no topographic relief which could be used by piping plovers for feeding, roosting and loafing. The sand and/or mud flats are the result of the periodic use of these areas for the placement of dredged material; after the water decants from the PAs, the sand and/or mudflats emerge after a few months and are again available as habitat. Without the disturbance of the periodic placement of material, vegetation would eventually grow in these areas, making the PAs unsuitable as habitat. Since the piping plovers naturally rely on a dynamic landscape in which habitats disappear, only to be replaced nearby, piping plovers would comfortably move to nearby sand or mud flats in the landscape mosaic while the PAs are in use. These flats are numerous in the study area. Therefore, it has been determined that the use of the PAs for the placement of dredged material would have no effect on piping plovers or their critical habitat.

Shoreline impact analyses of proposed channel improvements were conducted to determine the potential for wave field alterations to impact adjacent Gulf shorelines ten miles to the north and south of the BIH channel (HDR, 2011). The southern five miles of Critical Habitat Unit TX-3A are located within the ten-mile shoreline study area north of the channel. Proposed channel modifications were predicted to result in relatively minor alterations to the typical nearshore wave field. If the proposed channel modifications were constructed, net longshore sediment transport would continue to carry sand from the south towards the BIH channel along Brazos Island. This sand would continue to be primarily impounded by the south jetty and/or transported around the jetty and deposited within the ship channel. A significant decrease in net longshore sediment transport would be unlikely and the shoreline immediately south of the channel would be expected to remain stable to accretional.

North of the channel, shoreline change data and wave modeling indicate that interaction between the predominant southeast waves and the ship channel, jetties, and natural inlet at Brazos Santiago Pass influences the beaches along South Padre Island for several miles, with the most discernible changes historically occurring within about three miles of the ship channel (HDR, 2011). When waves are from the southeast, channel modifications would possibly cause a decrease in wave heights and angles along South Padre Island resulting in a slight decrease in net longshore transport to the north. This reduction would possibly provide some benefit in terms of shoreline stability. However, over the long term, positive impacts would likely be indistinguishable from background shoreline change because of the natural variability of coastal processes. Dredged material from maintenance of the channel would be regularly placed in the nearshore, submerged Feeder Berm, located from 1.5 to 2.5 miles north of the BIH channel in approximately 25 feet of water. Monitoring of dredged material placed in the Feeder Berm has shown that it moves toward the shoreline and is available for cross-shore transport and longshore sediment transport to the north (McLellan et al., 1997: USACE, 1989). Any sediment movement into the foreshore environment or onto the beach would be by natural processes. Overall, if the TSP were to be constructed, existing shoreline change trends would generally continue, with possible improvements in shoreline stability. Beaches adjacent to the BIH channel would not be expected to experience significant impacts from the proposed channel deepening. Therefore, it has been determined that deepening and extension of the BIH Entrance Channel would have no effect on piping plovers or their critical habitat. No other direct or indirect impacts on piping plover critical habitat are anticipated.

Studies were also conducted to determine the potential for improvements to the BIH channel to exacerbate the effects of future relative sea-level rise (RSLR) in the study area. USACE estimates that RSLR over the 50-year period of analysis could range between 0.6 feet and 2.4 feet. These studies have determined that construction of the TSP would not increase the effect of RSLR or storm surges on the study area (USACE, 2013d; Ratcliff and Massey, 2012).

All sediments from construction of the Main Channel would be placed in upland, confined PAs or in the existing New Work ODMDS site. Maintenance dredged material would be placed in the same areas as those used under existing conditions, i.e. in existing upland, confined PAs, the Feeder Berm, and if necessary, the existing Maintenance ODMDS site. The frequency and duration of maintenance dredging would be within the range occurring under existing maintenance dredging. Hydraulic pipelines may cross small, narrow stretches of sand flats along the BIH Main Channel shoreline in order to access PAs 4A and 4B, but these installations and their impacts would be temporary and affect a negligible portion of the habitat. The TSP does not include the direct placement of dredged materials on the beach or on critical habitat anywhere in the study area. No PAs or construction activities are planned in or adjacent to units TX-02, TX 3-A and 3-B.

While impacts of the disposal plan would generally be minor and temporary, hydraulic pipeline pumping of dredged material into upland PAs within designated piping plover critical habitat Unit TX-01 may affect but is not likely to adversely affect piping plovers in the following limited circumstances. Piping plovers may roost in these upland PAs to conserve energy and body reserves during combinations of certain adverse weather conditions, and disturbing the birds under these conditions could cause harm by stressing the birds. As identified in the CAR (USFWS 2013e), these conditions are cold temperatures (below 40º F), high winds (above 15-20 mph), and precipitation. If any two of these weather conditions occur in combination when the pumping of new work or maintenance material into PAs 2, 4A and 4B is ready to begin, Galveston District would survey unvegetated sand flats in these PAs for the presence of roosting piping plovers. If roosting piping plovers are identified, then pumping into affected PAs would be delayed until weather conditions ameliorate and two of these three weather conditions are no longer occurring in combination. With implementation of this conservation recommendation, it has been determined that the TSP may affect but is not likely to adversely affect piping plovers.

3.3 NORTHERN APLOMADO FALCON

While no northern aplomado falcon nests are known in the project area at this time, it is possible that aplomado falcons may use mesquite savannah and grassland areas south of the PAs for foraging and nesting. Nest structures that could be utilized by the aplomado falcon have been documented approximately 0.5 mile south of PAs 7 and 5A. All construction activities would occur within the footprint of existing PA levees, avoiding direct impacts to potential grassland and savannah habitat near the PAs. However, the activity and noise from construction activities on the PA levees or use of access roads south of the PAs may disturb birds in nests within 100 yards of these activities. Prior to commencing levee maintenance activities for new work and future maintenance during the months of March through June, areas within 100 yards of the PA levees and access roads would be examined from a distance of at least 100-300 yards for stick nests and signs of adult falcons incubating eggs or brooding chicks. If an actively utilized nest is found to exist within 100 yards of the levees or access roads, further surveys would be performed and USFWS would be contacted for a review of survey results and impact determinations. With implementation of this conservation recommendation (USFWS, 2013e), it has been determined that the TSP may affect but is not likely to adversely affect the Northern aplomado falcon.

3.4 GULF COAST JAGUARUNDI AND OCELOT

Although no recent sightings of the Gulf Coast Jaguarundi or ocelot have been reported in the study area, they are known to occur around the project area, and may use a variety of habitats for moving between preferred habitat sites. Lomas with dense brush cover in the study area have been known to facilitate the travel of endangered cats from Mexico to protected habitat in the LANWR north of the BIH channel (Reyes, 2012). Protection of habitat like that provided by these lomas is one goal of the USFWS recovery plans for each species (USFWS, 2010a and 2012b). None of these dense brush areas are located within upland PAs, but several lomas are located between the PAs. All impacts to these lomas would be avoided during construction to raise the levees for initial construction and to incrementally raise levees for maintenance dredging. A new levee would be constructed at least 30 feet from the edge of the loma in PA 4B to protect it from all construction impacts. Existing unpaved access roads pass through or adjacent to these lomas. These roads would be utilized for access during construction and maintenance of the PAs, as they are used under existing conditions. It is expected there would be no significant differences in the minor, temporary disturbances caused by these activities. To prevent possible harm to a jaguarundi or ocelot moving through the area during construction, USACE would require that construction activities for levee rehabilitation or construction be conducted during daylight hours only. This requirement would be incorporated into project construction and maintenance contract plans. With implementation of this conservation recommendation (USFWS, 2013e), it has been determined that the TSP may affect but is not likely to adversely affect the jaguarundi and ocelot.

3.5 WEST INDIAN MANATEE

Although sightings of West Indian manatees are rare along the Texas coast, they do occur. Manatees are slow moving animals and it is possible that dredges or their support vessels could adversely affect them. With implementation of this conservation recommendation (USFWS, 2013e), it has been determined that the TSP may affect but is not likely to adversely affect the manatee. To avoid potential impacts, USACE would incorporate the following education measures into construction and maintenance contracts for the TSP:

- Contractors and staff would be advised that manatees may be found in the Brazos Island Harbor Entrance Channel, the Brownsville Ship Channel, and adjacent areas of the Lower Laguna Madre and that boat operators should be cautious to avoid collisions with manatees.
- If a manatee is sighted, the Contractor would be instructed to contact the Texas Marine Mammal Stranding Network at 361-947-4313 or the group's hotline at (800) 962-6625.
- Training would be provided on avoiding potential impacts to the manatee for all personnel involved in construction and maintenance of in-water dredging activities.
- The training materials would include a poster to assist in identifying the mammal.
- The training materials would instruct personnel not to feed or water the animal.
- The training materials would include instructions to call the Corpus Christi Office of the Texas Coastal Ecological Services Field Office (TCESFO-CC) in the event a manatee is sighted in or near the project area.

3.6 WHALES

Whales occur in offshore waters and none of these species are likely to wander into shallow coastal estuaries. If a whale were to occur offshore in the project area during construction or maintenance dredging, it would be able to avoid from construction activities. Therefore, it is determined that the proposed project would have no effect on these species.

3.7 SEA TURTLES

3.7.1 Effects on Sea Turtles

Green, Kemp's ridley, loggerhead and hawsbill sea turtles are abundant in the study area throughout the year. Of the five species of sea turtle known to potentially occur in Texas waters, the leatherback is the least likely to occur due to its pelagic nature. The TSP would utilize both pipeline 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. To construct the TSP, one hopper dredge would be operated continuously for an estimated duration of seven months to remove approximately 2,066,300 cubic yards of new work material from the Entrance and Jetty Channels. Bed leveling may be performed at the conclusion of dredging by dragging a metal bar to smooth over high spots. All of the material would be placed at the existing New Work Ocean Dredged Material Disposal Site (ODMDS). It is estimated that five subsequent contracts would be awarded for cutterhead suction dredging of the Brownsville Main Channel through station 84+200 for a total length of 15.9 miles.. The remainder of the channel (the Turning Basin Extension and Turning Basin) would remain at existing depths. Two or three cutterhead dredges would be working simultaneously to remove approximately 12,079,700 cubic yards of new work material over an estimated 29 months. New work material from the Brownsville Main Channel (stations 0+000 through 84+200) would be pumped from the dredges through a combination of fully submerged and floating hydraulic pipelines into existing upland confined PAs managed by the Brownsville Navigation District (PAs 2, 4A, 4B, 5A, 5B, 7 and 8).

Between 1995 and 2012, a total of 31 turtles were taken as a result of hopper dredging of the BIH Entrance and Jetty Channels (Table 5). The takes were comprised of 23 green, 5 loggerhead, and 3 Kemp's ridley sea turtles. Hawksbills and leatherbacks are not known to have been caught in hopper dredges since monitoring began (USACE, 2013c). Sea turtles easily avoid pipeline cutterhead dredges due to the slow movement of the dredge. Restriction of hopper dredging activities to between December 1 and March 31, whenever possible, would reduce the likelihood of mortality. Any dredging activities outside of this window should be with hydraulic dredges, if possible, to reduce mortality.

It is generally accepted that hopper dredging impacts to sea turtles can also be reduced by having a trawler precede the dredges to capture turtles and relocate them away from the project. The history of the use of pre-dredge and relocation trawling for the BIH channel is also shown in Table 5. Relocation trawling was performed in the BIH Entrance and Jetty channels from 2003-

Table 5: Brownsville Island Harbor - History of Hopper Dredging and Sea Turtle Takes

Fiscal Year	**Dates of Dredging Events (calendar)**	**BIH Channel Reach**	**Quantity of Material Dredged (cubic yards)**	**No. of Takes**	**Species Taken**			**Seasonal Restriction Observed**	**Pre-Dredge Trawling Conducted**	**Relocation Trawling Conducted**	**No. of Relocation Trawls**	**Species Relocated During Trawling**			**Placement Location**
					Green	**Loggerhead**	**Kemp's ridley**					**Green**	**Loggerhead**	**Kemp's ridley**	
1995	Jan 24, 1995- Feb 26, 1995	Entrance Ch 0+000 to -13+000	755,301	5	4		1	yes							Feeder Berm (1A)
1997	Mar 30, 1997- Jun 14,1997	Entrance Ch -6+000 to -12+000	350,907	2		1	1								Maintenance ODMDS
1999	Jan 31, 1999- Mar 3, 1999	Entrance Ch -6+000 to -12+000	186,571	2	2			yes							Feeder Berm (1A)
2002	Mar 10, 2002- Mar 20, 2002	Entrance Ch -6+000 to -12+500	207,338	2	2			yes							Feeder Berm (1A)
2003	Dec 13, 2002- Dec 19, 2002	Con't Entrance Ch -6+000 to -12+500	121,549	2	2			yes	yes	yes 1 trawler	297	5	1		Feeder Berm (1A)
2004	Dec 1, 2003- Dec 18, 2003	Brownsville Ch 1+423 to 13+000	355,957	3	3			yes	yes	yes 1 trawler	437	13			Feeder Berm (1A)
2006	Feb 23, 2006- Mar 11, 2006	Entrance & Jetty -5+000 to 5+000	332,721	2	2			yes	yes	yes 2 trawlers	338	34			Feeder Berm (1A)
2007	Feb 20, 2007- Mar 15, 2007	Jetty Ch -0+600 to -4+600	443,000	6	5	1		yes	yes	yes 2 trawlers	961	64	1		Feeder Berm (1A)
2008	Jun 3, 2008- Jun 23, 2008	Jetty Ch -0+600 to -5+600	490,690	2	1	1			yes	yes 2 trawlers	1,304	1	11	2	Feeder Berms (1A&1B)
2008	Aug 30, 2008- Sept 5, 2008	Entrance Ch -6+400 to -13+000	130,933							yes 2 trawlers	411		2	1	Feeder Berm (1A)
2009	Oct 31, 2008- Nov 15, 2008	Con't Entrance Ch -6+400 to -13+000	237,772	4	1	2	1			yes 2 trawlers	820	1	1		Feeder Berm (1A)
2013	Oct 25, 2012- Dec 9, 2012	Jetty Ch -0+600 to -5+600	257,989	1	1										South Padre Island Beach
Total			**3,870,728**	**31**	**23**	**5**	**3**				**4,568**	**118**	**16**	**3**	

2009 in association with seven dredging events; no takes occurred in association with these trawling projects. Relocation trawling captured 137 turtles during 4,568 tows; catch per tow unit effort was 58 tows for each turtle relocated. With relocation trawling, this resulted in a total of 19 dredge takes over a total of 2,112,622 cubic yards (CYs) dredged. Restated as takes per CY, 9.0 takes per 1 million CYs occurred with relocation trawling. The five dredging events since 1995 in which no relocation trawling was conducted resulted in a total of 12 dredge takes over 1,758,106 CYs. Restated as takes per CY, 6.8 takes per 1 million CYs occurred without relocation trawling. This comparison indicates that relocation trawling in the BIH Entrance and Jetty Channels may not be as effective in reducing takes as commonly assumed. Rather than conducting relocation from the start of each dredging project, Galveston District proposes that trawling be initiated after the triggers outlined in the Terms and Conditions #12 are reached (see Section 3.7.2).

In addition to adverse impacts from hopper dredges, other impacts to sea turtles could result from project construction. The small increase in marine traffic predicted with the project could result in a higher incidence of collisions with sea turtles. Other potential impacts of the project include temporary affects by sedimentation and turbidity. However, these impacts have been determined to be insignificant.

The majority of takes in the BIH project area (23) since 1995 have been green sea turtles (USACE, 2013b). Similarly, relocations as a result of pre-dredging or relocation trawls are much higher for the green turtle than for both other species combined (118 compared to 19). Loggerheads, the most abundant sea turtle in the project area, have experienced five takes since 1995 with relocations totaling 16 over the same period. Three takes of Kemp's ridley turtles have occurred during dredging of the Entrance and Jetty channels (USACE, 2013). If dredging were to occur during the nesting season window (March 15–September 30), Kemp's ridley hatchlings, if present, could be adversely affected by disorientation from bright lights generated by hopper dredges or by temporarily elevated levels of total suspended solids (TSS) during Feeder Berm placement. Typically, hatchlings take the shortest route to water; however, bright lights can cause hatchlings to move toward the lights rather than the water, resulting in disorientation and increased danger from predators. Minor elevations of TSS would be temporary (lasting approximately two weeks) and similar to natural levels during periods of heavy wave action. No direct impacts to turtle nests on South Padre Island are expected since the TSP does not include typical beach nourishment which involves the placement of maintenance material directly onto the beach.

No direct impacts to turtle nests on South Padre Island are expected since the TSP does not include typical beach nourishment which involves the placement of new work or maintenance material directly onto the beach. While swimming sea turtles are abundant in the study area throughout the year, nesting turtles and nests of these species are not common but have been found sporadically in the study area. No impacts to the beaches where nests occur are expected with construction of the TSP. All dredging and placement activities associated with the Entrance and Jetty channels would be accomplished with hopper dredges, which would release material directly into open water at ODMDS. All placement activities along the Main Channel would be accomplished with hydraulic pipeline dredges pumping directly from the channel into adjacent upland PAs. No hydraulic pipelines or other construction equipment would be used along the Gulf shoreline in potential sea turtle nesting locations. Therefore, it has been determined that the BIH TSP would have no effect on nesting green, Kemp's ridley, loggerhead and hawsbill sea turtles in the project area.

Four sea turtle species (green, Kemp's ridley, loggerhead and hawksbill) could be adversely impacted by hopper dredging activities for the proposed TSP. Therefore, it has been determined that the TSP is likely to adversely affect these four sea turtle species. However, these impacts are not likely to jeopardize the continued existence or recovery of these species. The leatherback sea turtle is least likely to be affected by the proposed project because of its rare occurrence in the study area and pelagic nature. However, since the leatherback does occur within Texas waters, it has been determined that the TSP may affect but is not likely to adversely affect this species.

3.7.2 Reasonable and Prudent Measures to Minimize Sea Turtle Impacts

The NMFS Final Biological Opinion (BiOp) determined that the following reasonable and prudent measures (RPMs) are needed to minimize and monitor impacts of the incidental take of sea turtles during construction of the proposed project (NMFS F/SER/2013/11766, 2014).

RPM 1. The USACE shall implement best management measures, including use of temperature- and date-based dredging windows, sea turtle deflector dragheads, disengagement of dredging pumps when they are not on the bottom, limiting dredge lights seasonally, and relocation trawling to reduce the risk of injury or mortality of listed species and lessen the number of sea turtles killed by the proposed action.

RPM 2. The USACE shall have measures in place to detect and report all interactions with any protected species (ESA or Marine Mammal Protection Act) resulting from the proposed action. These measures include endangered species observers aboard the hopper dredge and relocation trawlers, screening of dredge material to allow discovery of any entrained turtles, and handling procedures for incidentally taken animals.

Compliance with the RPMs' implementing terms and conditions is mandatory in order for incidental takes not to be considered prohibited takings under the ESA. NMFS established that the incidental take for construction of the proposed project will consist of 13 sea turtle mortalities (2 loggerheads, 10 greens, or 1 Kemp's ridley). The Terms and Conditions under which hopper dredging will be conducted are:

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. Operational Procedures (RPM 1): During periods in which hopper dredges are operating and NMFS-approved protected species observers are *not* required, (December 1 through March 31, if water temperatures are under 11°C), the USACE 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 USACE if sea turtles or whales are seen in the vicinity.
   c. Notify NMFS immediately by e-mail (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) if a sea turtle or other threatened or endangered species is taken by the dredge, and reference this biological opinion.

4. Dredging Pumps (RPM 1): 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.

5. 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 nautical miles of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or Occupational Safety

and Health Administration 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.

6. Sea Turtle Deflecting Draghead (RPM 1): A state-of-the-art solid, plow-type rigid deflector dragheads must be used on all hopper dredges at all times. The use of alternative, experimental dragheads is not authorized without prior written approval from NMFS, in consultation with USACE ERDC. Slotted draghead deflectors or chain-type deflectors are currently not authorized.

7. Training – Personnel on Hopper Dredges (RPM 1): The USACE 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, USACE 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.

8. Observers (RPM 2): The USACE 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, or whenever surface water temperatures are 11°C or greater.

9. Screening (RPM 2): When sea turtle observers are required on hopper dredges, 100 % 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, 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 USACE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, other than in sand borrow areas the screens may be modified sequentially. Mesh size may be increased to 8-inch by 8-inch; if that fails to solve the clogging

problem, then 16-inch by 16-inch openings may be used. Clogging should be greatly reduced or eliminated with these options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow monitoring and screening is mandatory. The USACE shall notify NMFS beforehand if inflow screening is going to be reduced or eliminated, what attempts were made to reduce the clogging problem, and provide details of how effective overflow screening will be achieved.

b. Need or 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.

10. Dredge Take Reporting and Final Report (RPM 2): Observer reports of incidental take by hopper dredges must be emailed to the Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) by onboard NMFS-approved protected species observers, the dredging company, or the USACE 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 (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) within 60 working days of completion of the dredging project. The 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 USACE deems relevant.

11. Sea Turtle Strandings (RPM 2): The USACE Project Manager or designated representative shall notify the 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.

a. Information on any such strandings shall be reported in writing within 30 days of project end to NMFS' Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) with a report detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment. Because the deaths of these turtles, if hopper dredge related, have already been accounted for in NMFS' jeopardy analysis, these strandings will not be counted against the USACE's take limit if they do not exceed the take limits set forth in this consultation.

12. Conditions Requiring Relocation Trawling (RPM 1): The USACE shall require trawling to start as soon as possible within 72 hours of either:
    a. Two or more turtles are taken by hopper dredges in a 24-hour period, or
    b. Total dredge takes in the project approach 75% (rounded-down) of any of the incidental take limits; i.e., 2 loggerheads, 10 greens, or 1 Kemp's ridley taken.

13. Relocation Trawling (RPM 1): Any relocation trawling conducted or contracted by the USACE to temporarily reduce abundance of these listed species during hopper dredging in order to reduce the possibility of lethal hopper dredge interactions, is subject to the following conditions:
    a. Trawl Time: Trawl tow-time duration shall not exceed 42 minutes (measured from the time the trawl doors enter the water until the time the trawl doors are out of the water) and trawl speeds shall not exceed 3.5 knots.
    b. Protected Species Handling During Trawling: Handling of sea turtles captured during relocation trawling in association with the dredging project shall be conducted by NMFSapproved protected species observers. 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 provided in Appendix B of the Biological Opinion.
    c. Captured Sea Turtle Holding Conditions: Sea turtles may be held briefly for the collection of important biological information, 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. Biological Data Collection: 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.

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 nautical miles from the dredge site. Turtles to which satellite tags will be affixed may be held up to 24 hours before release. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than 5 nautical miles 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 USACE shall ensure that logistical arrangements and support to accomplish this are pre-planned and ready. The USACE shall bear the financial cost of all sea turtle transport, treatment, rehabilitation, and release.

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 Opinion's authority.

h. PIT-Tag: This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler to PIT-tag captured sea turtles. 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 tag the animal prior to release (in addition to the standard external tagging):

    (1) 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);

    (2) 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. 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. 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.

j. 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.

k. Additional Data Collection Allowed During the Handling of Sea Turtles and Other Incidentally-caught ESA-listed species: The USACE shall allow NMFS-approved protected species observers to conduct additional investigations that may include more invasive 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 research projects but only if 1) the additional work does not interfere with any project operations (dredging activities, relocation trawling, etc), 2) the observer holds a valid federal research permit (and any required state permits) authorizing the activities, either as the permit holder, or as designated agent of the permit holder, 3) the additional work does not incur any additional expenses to the USACE or the USACE approves of the expense, and 4) the observer has first coordinated with USACE Galveston District and notified NMFS’s Southeast Regional Office, Protected Resources Division (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766).

14. Relocation Trawling Report (RPM 2): The USACE shall provide NMFS' Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) 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.

15. 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 shall be tissue-sampled by a NMFS approved protected species observer prior to release.

Sea turtle tissue samples shall be taken in accordance with NMFS SEFSC's procedures for sea turtle genetic analyses (Appendix II of this opinion). The USACE shall ensure that tissue samples taken during the dredging project are collected, stored properly, and mailed no later than 60 days of 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.

Other conditions may also apply. A detailed outline of the conditions of the USACE's activities to minimize impacts of sea turtle takes during maintenance dredging project is included in the NMFS Biological Opinion for dredging of Gulf navigation channels and sand mining areas using hopper dredges (NMFS, 2003, as amended by Revisions Number 1 and 2 (USACE, 2006)).

3.8 SOUTH TEXAS AMBROSIA

This plant is not known to occur in the project area and may be extirpated in Cameron County. It is not known to occur in the study area. Therefore, it is determined that the proposed project would have no effect on this species.

3.9 TEXAS AYENIA

These Texas populations of the Texas ayenia are limited to specific vegetation communities along the Rio Grande in Cameron County. It is not likely to occur in the study area. Therefore, it is determined that the proposed project would have no effect on this species.

3.10 CANDIDATE SPECIES

Red knots have been reported to use the barrier island beaches, exposed tidal flats, washover passes, and mudflats associated with the Laguna Madre in the study area. Red-crowned parrots occur primarily in urban areas in the LRGV where there are large trees that provide both food and nesting sites. Wintering Sprague's pipits are found in both densely and sparsely vegetated grassland and pastures. They have been recently sighted in the LRGV outside the study area. None of three species are known to utilize the project area. Therefore, it is determined that the proposed project would have no effect on these species.

The scalloped hammerhead shark may be found within the study area. It has been observed close inshore and even entering estuarine habitats, as well as offshore in deep water. It is highly mobile, capable of moving away from any disturbance. Therefore, it is determined that the proposed project would have no effect on these species.

Known U.S. populations of the seven coral species (boulder star coral [two subspecies], elliptical star coral, Lamarck's sheet coral, mountainous star coral, pillar coral and rough cactus coral are all located in south Florida and the Florida Keys, Puerto Rico, the U.S. Virgin Islands. Therefore, it is determined that the proposed project would have no effect on these species.

3.11 SPECIES OF CONCERN

The dusky and sand tiger sharks may be found within the study area. Both are highly mobile, capable of moving away from any disturbance. Therefore, it is determined that the proposed project would have no effect on these species.

The opposum pipefish may occurs in the study area, having been reported in South Bay and tidal reaches the Rio Grande River. Juvenile Warsaw groupers can be found in the study area, nearshore and occasionally near the jetties. Dredging would create temporary, insignificant increases in turbidity, but would not cause any permanent changes in water quality or salinity. The speckled hind is deepwater grouper which spends all of its life phases in deep offshore waters; it is unlikely to occur in the study area. Therefore, it is determined that the proposed project would have no effect on these species.

4.0 SUMMARY OF EFFECT

This Biological Assessment has determined that the BIH TSP would have no effect on the following listed animal and plant species: blue whale, finback whale, humpback whale, sei whale, sperm whale, South Texas ambrosia, and Texas ayenia. Furthermore, it has been determined that the TSP would have no effect on designated piping plover critical habitat. The BIH TSP would also have no effect on the following Candidate species and Species of Concern: red knot, red-crowned parrot, Sprague's pipit, scalloped hammerhead shark, boulder star coral (subspecies *annularis* and *franksi*), elliptical star coral, Lamarck's sheet coral, mountainous star coral, pillar coral, rough cactus coral, dusky shark, sand tiger shark, opossum pipefish, warwaw grouper and speckled hind.

It has been determined that the construction of the TSP may affect, but is not likely to adversely affect the piping plover, Northern Aplomado falcon, Gulf Coast jaguarundi, ocelot, and West Indian manatee. Conservation recommendations from USFWS (USFWS, 2013e) that will minimize potential impacts to these species have been adopted as described in this document.

Five sea turtle species may be adversely affected by the proposed project. It is unlikely that leatherback sea turtles would be found in the study area but since they could potentially occur, it has been determined that the TSP may effect, but is not likely to adversely affect the leatherback sea turtle. Four sea turtle species (green, Kemp's ridley, loggerhead and hawksbill) could be adversely impacted by hopper dredging activities for the proposed BIH CIP. Therefore, it has been determined that the TSP is likely to adversely affect these four sea turtle species. However, these impacts are not likely to jeopardize the continued existence or recovery of these species. Reasonable and prudent measures, developed in consultation with NMFS will be be implemented to minimize impacts of incidental takes in accordance with the Terms and Conditions presented in the Final BiOp (NMFS, 2014).

5.0 LITERATURE CITED

Allard, M.W., M.M. Miyamoto, K.A. Bjorndal, A.B. Bolton, and B.W. Bowen. 1994. Support for natal homing in green turtles from mitochondrial DNA sequences. Copeia 1994:34–41.

American Ornithologists' Union (AOU). 1998. Check-list of North American birds. Seventh edition.

Armstrong, N., M. Brody, and N. Funicelli. 1987. The ecology of open-bay bottoms of Texas: a community profile. U.S. Department of the Interior Fish and Wildlife Service. Biological Report 85(7.12).

Balazs, G. 1980. Synopsis of biological data on the green turtle in the Hawaiian Islands. NOAA Technical Memorandum. NMFS-SWFC-7.

Barrett, S. 1996. Disease threatens green sea turtles. Endangered Species Bulletin 21(2):8–9.

Bartlett, R.D., and P.P Bartlett. 1999. A field guide to Texas reptiles and amphibians. Gulf Publishing Company. Houston.

Bird Treks. 2013. Previous Tours – South Texas, Lower Rio Grande Valley and the Extreme South Texas Gulf Coast. http://www.birdtreks.com/previous-bird-tours.php?tour=TXLRGV&title=SOUTH%20TEXAS,%20LOWER%20RIO%20GRANDE%20VALLEY%20and%20the%20extreme%20SOUTH%20TEXAS%20GULF%20COAST (accessed on June 6, 2013).

Blakenship, R. 2005. Texas Parks and Wildlife Department, Coastal Fisheries Division. Personal communication to Erik Huebner, PBS&J, 12 May.

Brongersma, L.D. 1972. European Atlantic turtles. Zool. Verhl. 121.

Brownsville Herald. 2010. Brown Pelicans Return to Bahia Grande at Critical Moment. Article by Laura Tillman posted June 27, 2010 (accessed on June 6, 2013).

Caillouet, C.W. Jr., C.T. Fontaine, S.A. Manzella-Tirpak, and D.J. Shaver. 1995. Survival of head-started Kemp's ridley sea turtles (*Lepidochelys kempii*) released into the Gulf of Mexico or adjacent bays. Chelonian Conservation and Biology 1(4):285–292.

Campbell, L. 1995. Endangered and threatened animals of Texas, their life history and management. Texas Parks and Wildlife Department, Resource Protection Division, Endangered Resources Branch, Austin.

Carr, A.F. 1952. Handbook of turtles: the turtles of the United States, Canada and Baja California. Comstock Publ. Assoc., Cornell Univ. Press, Ithaca, New York.

Echols, D. 2006. Padre Island National Seashore. Personal communication to Rob Hauch, USACE. Email dated August 1, 2006.

Eckert, S.A. 1992. Bound for deepwater. Natural History, March 1992, pp. 28–35.

Ernst, C.H., and R.W. Barbour. 1972. Turtles of the United States. University of Kentucky Press, Lexington.

Environmental Protection Agency (EPA). 1991. Final Environmental Impact Statement, Brazos Harbor 42-Foot Project, Texas, Ocean Dredged Material Disposal Site Designation. Dallas.

HDR. 2011. Shoreline Impact Analyses, Feasibility Study to Deepen and Widen the Brownsville Ship Channel. Prepared for Port of Brownsville by HDR, Corpus Christi.

Hector, Dean P. Keddy. 1990. Northern Aplomado Falcon Recovery Plan. Prepared for US Fish and Wildlife Service, Region 2, by Southwest Texas State University, San Marcos.

Hirth, H.F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). Biological Report 97 (1). U.S. Fish and Wildlife Service, Washington, D.C.

Hughes, G.R. 1974. The sea turtles of Southeast Africa. II. The biology of the Tongaland loggerhead turtle *Caretta caretta* L. with comments on the leatherback turtle *Dermochelys coriacea* L. and the green turtle *Chelonia mydas* L. in the study region. South African Association for Marine Biological Research, Oceanographic Research Institute, Investigational Report No. 36. Durban, South Africa.

IUCN. 2012a. "*Hyporthodus nigritus*" in the IUCN Red List of Threatened Species. Version 12.2 (accessed on June 6, 2013).

_____. 2012b. "*Epinephelus drummondhayi*" in the IUCN Red List of Threatened Species. Version 12.2 (accessed on June 6, 2013).

Jahrsdoerfer, S. and D. Leslie, Jr. 1998. Tamaulipan Brushland of the Lower Rio Grande Valley of South Texas: Description, Human Impacts, and Management Options. USFWS Southwest Regional Office, New Mexico. November 1988.

Iverson, J.B. 1986. A checklist with distribution maps of the turtles of the world. Paust Printing, Richmond, Indiana.

Leary, T. 1957. A schooling of leatherback turtles, *Dermochelys coriacea coriacea*, on the Texas coast. Copeia 3:232.

McLellan, T.N. et al. 1997. A Decade of Beneficial Use, Brazos Island Harbor, Dredging. Paper presented at the 21st Western Dredging Association Conference and 33rd Texas A&M dredging seminar Special Permanent International Association of Navigational Congress Session. Available on the internet at http://coastal.tamug.edu/am/a_decade_of_beneficia_use,_brazos_island_harbor,_dredging/

McMahan, C., R. Frye and K. Brown. 1984. Vegetation Types of Texas, including Cropland. Texas Parks and Wildlife Department report W-107-R.

Meylan, A. 1982. Sea turtle migration – evidence from tag returns. In: K. Bjorndal (editor), Biology and Conservation of Sea Turtles. Pp. 91–100. Smithsonian Institution Press, Washington, D.C. 583 pp.

Meylan, A.B., B.W. Bowen, and J.C. Avise. 1990. A genetic test of the natal homing versus social facilitation models for green turtle migration. Science 248:724–727.

Mortimer, J.A. 1982. Feeding ecology of sea turtles. In: Biology and conservation of sea Turtles (K. Bjorndal, ed.), 103–109. Smithsonian Institution Press, Washington, D.C.

Musick, J. 1979. The marine turtles of Virginia with notes on identification and natural history. Educational Series No. 24. Sea Grant Program, Virginia Institute of Marine Science, Gloucester Point.

National Fish and Wildlife Laboratory (NFWL). 1980. Selected vertebrate endangered species of the seacoast of the United States. U.S. Fish and Wildlife Service, Biological Services Program, Washington, D.C. FWS/OBS-80/01.

NMFS (National Marine Fisheries Service, National Oceanic and Atmospheric Administration) . 1979. Designated Critical Habitat; Determination of Critical Habitat for the Leatherback Sea Turtle (44 FR 17710, March 23, 1979).

_____. 2003. Endangered Species Act, Section 7 Consultation, Biological Opinion for Dredging of Gulf of Mexico Navigation Channels and Sand Mining (Borrow) Areas Using Hopper Dredges by COE Galveston. Issued November 19, 2003.

_____. 2009. Fact Sheet – Species of Concern, Opossum pipefish (*Microphis brachyurus lineatus*) http://www.nmfs.noaa.gov/pr/pdfs/species/opossumpipefish_detailed.pdf (accessed on June 6, 2013).

_____. 2010a. Endangered and Threatened Wildlife: Notice of 90Day Finding on a Petition to List 83 Species of Corals as Threatened or Endangered Under the Endangered Species Act (75 FR 6616, February 10, 2010).

_____. 2010b Fact Sheet – Species of Concern, Dusky shark (*Carcharhinus obscurus*). http://www.nmfs.noaa.gov/pr/pdfs/species/duskyshark_highlights.pdf (accessed on June 6, 2013).

_____. 2010c Fact Sheet – Species of Concern, Sand tiger shark (*Carcharius taurus*). http://www.nmfs.noaa.gov/pr/pdfs/species/sandtigershark_detailed.pdf (accessed on June 6, 2013).

_____. 2012. Management Report for 82 Corals Status Review under the Endangered Species Act: Existing Regulatory Mechanisms and Conservation Efforts. Pacific Islands Regional Office (Draft March 2012).

_____. 2013a. Office of Protected Species – Green Turtle (*Chelonia mydas*). http://www.nmfs.noaa.gov/pr/species/turtles/green.htm (accessed June 6, 2013).

_____. 2013b. Office of Protected Species – Kemp's Ridley Turtle (*Lepidochelys kempii*). http://www.nmfs.noaa.gov/pr/species/turtles/kempsridley.htm (accessed June 6, 2013).

_____. 2013c. Office of Protected Species – Loggerhead Turtle (*Caretta caretta*). http://www.nmfs.noaa.gov/pr/species/turtles/loggerhead.htm (accessed June 6, 2013).

_____. 2013d. Office of Protected Species – Hawksbill Turtle (*Eretmochelys imbricata*). http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm (accessed June 6, 2013).

_____. 2013e. Office of Protected Species – Leatherback Turtle (*Dermochelys coriacea*). http://www.nmfs.noaa.gov/pr/species/turtles/leatherback.htm (accessed June 6, 2013).

_____. 2013f. Office of Protected Species – Threats to Marine Turtles. http://www.nmfs.noaa.gov/pr/species/turtles/threats.htm (accessed June 6, 2013).

_____. 2013g. Office of Protected Species – Scalloped Hamerhead Shark (*Sphyrna lewini*) . http://www.nmfs.noaa.gov/pr/species/fish/scallopedhammerheadshark.htm (accessed on June 6, 2013).

_____. 2013h. Endangered and Threatened Wildlife and Plants; Proposed Endangered, Threatened, and Not Warranted Listing Determinations for Six Distinct Population Segments of Scalloped Hammerhead Sharks (78 FR 20717, April 5, 2013).

_____. 2013i. Office of Protected Species – Dusky shark (*Carcharhinus obscurus*). http://www.nmfs.noaa.gov/pr/species/fish/duskyshark.htm (accessed on June 6, 2013).

_____. 2014. Final Biological Opinion F/SER/2013/11766 for the Brazos Island Harbor Channel Improvement Project. National Marine Fisheries Service, St Petersburg, FL.

National Marine Fisheries Service and U.S. Fish and Wildlife Service (NMFS and USFWS). 1991a. Recovery plan for U.S. population of Atlantic green turtle. National Marine Fisheries Service, Washington, D.C.

———.1991b. Recovery plan for U.S. population of loggerhead turtle. National Marine Fisheries Service, Washington, D.C.

———.1992. Recovery plan for leatherback turtles in the U.S. Caribbean, Atlantic, and Gulf of Mexico. National Marine Fisheries Service, Washington, D.C.

______.1998. Designated Critical Habitat; Green and Hawksbill Sea Turtles (63 FR 46693, September 2, 1998).

_____. 2003. Endangered Species Act, Section 7 Consultation, Biological Opinion for Dredging of Gulf of Mexico Navigation Channels and Sand Mining (Borrow) Areas Using Hopper Dredges by COE Galveston. Issued November 19, 2003

_____. 2011. Endangered and Threatened Species; Determination of Nine Distinct Population

Segments of Loggerhead Sea Turtles as Endangered or Threatened, (76 FR 58858, September 22, 2011).

National Park Service (NPS). 2012. Sea Turtle Nesting Season 2012, Padre Island National Seashore, Texas. ttp://www.nps.gov/pais/naturescience/nesting2012.htm (accessed on June 6, 2013).

_____. 2013a. Sea Turtle Recovery Project. http://www.nps.gov/pais/naturescience/strp.htm (accessed June 6, 2013).

______. 2013b. The Kemp's Ridley Sea Turtle. http://www.nps.gov/pais/naturescience/kridley.htm (accessed June 6, 2013).

_____. 2013c. The Loggerhead Sea Turtle. http://www.nps.gov/pais/naturescience/loggerhead.htm. (accessed June 6, 2013).

_____. 2013d. The Hawsbill Sea Turtle. http://www.nps.gov/pais/naturescience/hawksbill.htm (accessed June 6, 2013).

_____. 2013e. The Leatherback Sea Turtle. http://www.nps.gov/pais/naturescience/leatherback.htm (accessed June 6, 2013).

National Research Council (NRC). 1990. Decline of the sea turtles: causes and prevention. National Academy Press, Washington, D.C.

NatureServe. 2013a. *Falco femoralis septentrionalis* (Northern Aplomado Falcon) in NatureServe Explorer: An online encyclopedia of life. Accessed on the internet on June 3, 3013 . http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Falco+femoralis+septentrionalis

_____. 2013b. *Trichechus manatus* (West Indian Manatee) in NatureServe Explorer: An online encyclopedia of life. Accessed on the internet on June 4, 3013. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Trichechus+manatus+

_____. 2013c. *Calidris canutus rufa* (Red Knot – rufa subspecies) in NatureServe Explorer: An online encyclopedia of life. Accessed on the internet on June 4, 3013. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Calidris+canutus

+rufa

______. 2013d. *Dermochelys coriacea* (Leatherback) in NatureServe Explorer: An online encyclopedia of life. Accessed on the internet on June 4, 3013. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Dermochelys+coriacea

______. 2013e. *Ambrosia cheiranthfolia* (South Texas Ragweed) in NatureServe Explorer: An online encyclopedia of life. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Ambrosia+cheiranthifolia (accessed on June 6, 3013).

______. 2013f. Ayenia limitaris (Texas Ayenia) in NatureServe Explorer: An online encyclopedia of life. http://www.natureserve.org/explorer/servlet/NatureServe?searchName=Ayenia+limitaris (accessed on June 6, 3013).

Port Isabel Economic Development Corporation. 2013. Community Profile – Environmental and Natural Resources. http://portisabel-texas.com/edc/community-profile/environmental-natural-resources/ (accessed on June 6, 2013).

Pritchard, P.C.H. 1971. The leatherback or leathery turtle *Dermochelys coriacea*. IUCN Monograph No. 1. International Union for Conservation of Nature and Natural Resources, Morges, Switzerland.

______. 1977. Marine turtles of Micronesia. Chelonia Press, San Francisco, California.

Pritchard, P.C.H. and R. Marquez. 1973. Kemp's ridley turtle or Atlantic ridley, *Lepidochelys kempi*. IUCN Monograph 2, Morges, Switzerland.

Rebel, T.P. 1974. Sea turtles and the turtle industry of the West Indies, Florida, and the Gulf of Mexico. Rev. Ed. University of Miami Press, Coral Gables, Florida.

Reyes, E. 2012. USFWS. Personal communication to Janelle Stokes, USACE. Field visit to study area, May 23, 2012.

Ross, J.P. 1982. Historical decline of loggerhead, ridley, and leatherback sea turtles. In: Biology and conservation of sea turtles (K. Bjorndal, ed.), 189–195. Smithsonian Institution Press, Washington, D.C.

Salmon, M., R. Reiners, C. Lavin, and J. Wyneken. 1995. Behavior of loggerhead sea turtles on an urban beach. 1. Correlates of nest placement. Journal of Herpetology 29:560–567.

Schmidley, D. J. 2004. The mammals of Texas, revised edition. University of Texas Press, Austin.

Schwartz, F. 1976. Status of sea turtles, Cheloniidae and Dermochelidae, in North Carolina. Abstr. in Proceedings and abstracts from the 73rd meeting of the North Carolina Academy of Science, Inc., April 2–3, 1976, at the Univ. N. Carolina, Wilmington, N. Carolina. J. Elisha Mitchell Sci. Soc. 92(2):76–77.

Sea Turtle, Inc. 2008. http://www.seaturtleinc.com/ (accessed February 11, 2008).

Sea Turtle Stranding and Salvage Network (STSSN). 2013. http://www.sefsc.noaa.gov/STSSN/STSSNReportDriver.jsp (accessed June 6, 2013).

Shaver, D.J. 1991. Feeding ecology of wild and head-started Kemp's ridley sea turtles in south Texas waters. Journal of Herpetology 25(3):327–334.

Shaver, D.J. and A. Amos. 1988. Sea Turtle Nesting on Texas Beaches in 1987. *Marine Turtle Newsletter* 42:7-9

Spotila, J.R., A.E. Dunham, A.J. Leslie, A.C. Steyermark, P.T. Plotkin, and F.V. Paladino. 1996. Worldwide population decline of *Dermochelys coriacea*: are leatherback turtles going extinct? Chelonian Conservation and Biology 2(2):209–222.

Texas Parks and Wildlife Department. 2013a. Eastern Brown Pelican (*Pelecanus occidentalis*). http://www.tpwd.state.tx.us/huntwild/wild/species/bpelican/ (accessed on June 6, 2013).

_____2013a. South Texas Ambrosia (*Ambrosia cheiranthifolia*). http://www.tpwd.state.tx.us/huntwild/wild/species/ambrosia/ (accessed on June 6, 2013).

_____. 2013b. Texas Ayenia (*Ayenia limitaris*). http://www.tpwd.state.tx.us/huntwild/wild/species/ayenia/ (accessed on June 6, 2013).

_____. no date. Rio Grande Tidal. http://www.tpwd.state.tx.us/publications/pwdpubs/pwd_rp_t3200_1059e/media/rio_tidal_m.pdf (accessed on June 6, 2013).

Tunnell Jr., J.W. and F.W. Judd. 2002. The Laguna Madre of Texas and Tamaulipas. Texas A&M University Press, College Station, Texas. 346 pp.

U.S. Army Corps of Engineers (USACE). 1975. Final Environmental Impact Statement – Maintenance Dredging, Brazos Island Harbor. U.S. Army Engineer District, Galveston, Texas.

_____.1988. Environmental Assessment, Brazos Island Harbor Underwater Feeder Berm Construction. U.S. Army Engineer District, Galveston, Texas.

_____.1989. Coastal Engineering Technical Note – Physical Monitoring of Nearshore Sand Berms. CETN-II-20, U.S. Army Engineer Waterways Experiment Station, Vicksburg.

_____.1990. Project Design Memorandum, Channel Improvements for Navigation, Brazos Island Harbor, Texas (Brownsville Channel). U.S. Army Engineer District, Galveston, Texas.

_____.1999. Preliminary Project Assessment, Brazos Island Harbor, Texas. U.S. Army Engineer District, Galveston, Texas.

_____.2006. U.S. Army Corps of Engineers Management Protocol for Effective Implementation of the National Marine Fisheries Service Regional Biological Opinion for Hopper Dredging, Gulf of Mexico, 29 December 2006.

_____. 2007. Draft Environmental Impact Statement For The Proposed Matagorda Ship Channel Improvement Project Calhoun and Matagorda Counties, Texas. April 2007.

_____. 2012. Brazos Island Harbor, Texas: Storm Surge Impacts. ERDC/CHL (July 2012), Vicksburg.

_____. 2013a. Sea Turtle Data Warehouse. http://el.erdc.usace.army.mil/seaturtles/list.cfm?Code=Project&Step=2&Type=SWG (accessed June 6, 2013).

_____. 2013b. Sea Turtle Data Warehouse. http://el.erdc.usace.army.mil/seaturtles/project.cfm?Id=713&Code=Project (accessed June 6, 2013).

_____. 2013c. Sea Turtle Data Warehouse. http://el.erdc.usace.army.mil/seaturtles/list.cfm?Code=Species&Step=1 (accessed June 6, 2013).

_____. 2013d. Draft Engineering Appendix, Brazos Island Harbor, Texas, Channel Improvement Project. Galveston District.

U.S. Fish and Wildlife Service (USFWS). 1967. Native Fish and Wildlife; Endangered Species (32 FR 4001, March 11, 1967).

_____.1970a. Conservation of Endangered Species and Other Fish or Wildlife; List of Endangered Foreign Fish or Wildlife (35 FR 18319, December 2, 1970).

_____.1970b. Conservation of Endangered Species and Other Fish or Wildlife. (35 FR 84952, June 2, 1970).

_____. 1972. Conservation of Endangered Species and Other Fish or Wildlife; List of Endangered Foreign Fish and Wildlife (37 FR 6476 , March 30, 1972).

_____.1975. Endangered and Threatened Wildlife; Proposed Endangered Status for 216 Species Appearing on Convention on International Trade (40 FR 44329, September, 26, 1975).

_____. 1976. Endangered and Threatened Wildlife and Plants; Endangered Status for 159 Taxa of Animals (41 FR 21062, June 14, 1976).

_____.1978a. Endangered and Threatened Wildlife and Plants; Listing and Protecting Loggerhead Sea Turtles as “Threatened Species” and Populations of Green and Olive Ridley Sea Turtles as Threatened Species or “Endangered Species.” (43 FR 32808, July 28, 1978).

_____.1978b. Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Leatherback Sea Turtle (43 FR 43688, September 26, 1978).

_____.1981 . Endangered species assessments and surveys in Hidalgo and Willacy counties, Texas. Final report to USACE, Galveston by USFWS, Denver Wildlife Research Center.

_____.1982. Endangered and Threatened Wildlife and Plants; Endangered Status for U.S. Population of the Ocelot. (47 FR 31670, July 21, 1982).

_____.1985. Determination of Endangered and Threatened Status for Piping Plover; 50 FR 50726 (December 11, 1985).

_____. 1994. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Plants *Ayenia limitaris* (Texas Ayenia) and Ambrosia cheiranthifolia (South Texas Ambrosia) (59 FR 43648, August 24, 1994.

_____. 1995. Threatened and Endangered Species of Texas. USFWS, Austin.

_____. 2001a. Endangered and Threatened Wildlife and Plants; Final Determination of Critical Habitat for Wintering Piping Plovers, 66 FR 36038 (July 10, 2001).

_____. 2001b. Florida manatee (*Trichechus manatus latirostris*), third revision. USFWS, Atlanta.

_____. 2006. Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Northern Aplomado Falcons in New Mexico and Arizona, Final Rule, 71 FR 42298, July 26, 2006.

______. 2008a. Confirmed Sea Turtle Nests on South Padre Island and Boca Chica Beaches, Texas, 1999-2007. Unpublished Data.

_____. 2008b. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions, Notice of Review, 73 FR 75176 (December 10, 2008).

_____. 2009a. "Endangered and Threatened Wildlife and Plants; Removal of the Brown Pelican (*Pelecanus occidentalis*) From the Federal List of Endangered and Threatened Wildlife," 74 Federal Register 59444 (November 17, 2009).

_____. 2009b. Piping Plover (*Charadrius melodus*): Spotlight Species Action Plan for the threatened Atlantic Coast and Northern Great Plains populations. Prepared by Endangered Species Program, Northeast Region.

_____. 2009c. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Wintering Population of the Piping Plover (*Charadrius melodus*), 74 FR 23476 (May 19, 2009).

_____. 2009d. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List 14 Parrot Species as Threatened or Endangered, 74 FR 33957 (July 14, 2009).

_____. 2009e. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition to List Sprague's Pipit as Threatened T or Endangered, 74 FR 63337, December 3, 2009.

_____. 2010a. Draft Ocelot (*Leopardus pardalis*) Recovery Plan –First Revision. Southwest Region, Albuquerque.

_____. 2010b. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Sprague's Pipit as Endangered or Threatened Throughout Its Range, 75 FR 56028 (September 15, 2010).

_____. 2011a. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form "*Calidris canutus ssp. rufa*". Accessed on the internet (6/4/2013) http://ecos.fws.gov/docs/candidate/assessments/2012/r5/B0DM_V01.pdf

_____. 2011b. Endangered and Threatened Wildlife and Plants; Red-Crowned Parrot. 76 FR 62016 (October 6, 2011).

_____. 2011c. Endangered and Threatened Wildlife and Plants; 90-Day Finding and 12-Month Determination on a Petition to Revise Critical Habitat for the Leatherback Sea Turtle (76 FR 47133, August 4, 2011).

_____. 2012a. National Wetland Inventory (NWI). Wetland spatial data derived for the Brazos Island Harbor Channel Improvement Project. http://www.fws.gov/wetlands/Data/Mapper.html accessed 7 January 2012.

_____. 2012b. Endangered and Threatened Wildlife and Plants; Review of Native Species That Are Candidates for Listing as Endangered or Threatened; Annual Notice of Findings on Resubmitted Petitions; Annual Description of Progress on Listing Actions, Notice of Review, 77 FR 69994 (November 12, 2012).

_____. 2012c. Draft Gulf Coast jaguarundi (*Puma yagouaroundi cacomitli*) Recovery Plan, First Revision. Southwest Region, Albuquerque.

_____. 2013a. Species Profile – Brown Pelican (*Pelecanus occidentalis*). Accessed on the internet on May 15, 2013. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B02L

_____. 2013b. Species Profile – Northern Aplomado Falcon (*Falco femoralis ssp. septentrionalis*). Accessed on the internet on June 3, 2013. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06V

_____. 2013c. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northwest Atlantic Ocean Distinct Population Segments of the Loggerhead Sea Turtle (*Caretta caretta*); Proposed Rule (78 FR 17999, March 25, 2013).

_____. 2013d. Species Profile – Texas ayenia (*Ayenia limitaris*). http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2XW (accessed on June 6, 2013).

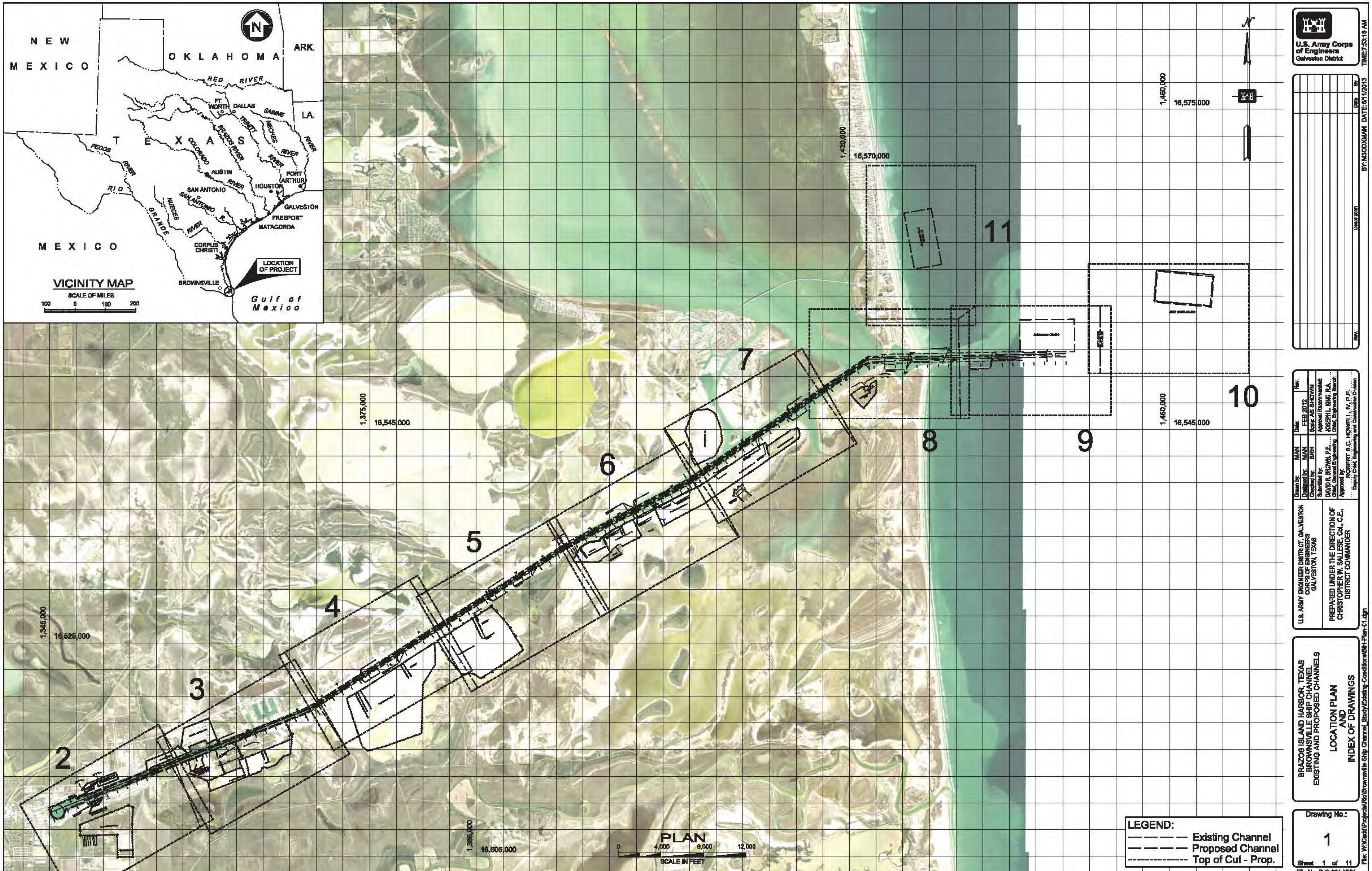
_____.2013e. Fish and Wildlife Coordination Act Report, Brazos Island Harbor Channel Improvement Project for the 52 X 250 feet Alternative, Cameron County, Texas. U.S. Fish and Wildlife Service, Texas Coastal Ecological Services Field Office, Corpus Christi Field Office, Corpus Christi, Texas.

U.S. Fish and Wildlife Service and National Marine Fisheries Service (USFWS and NMFS). 1992. Recovery plan for the Kemp's ridley sea turtle (*Lepidochelys kempii*). National Marine Fisheries Service, St. Petersburg, Florida.

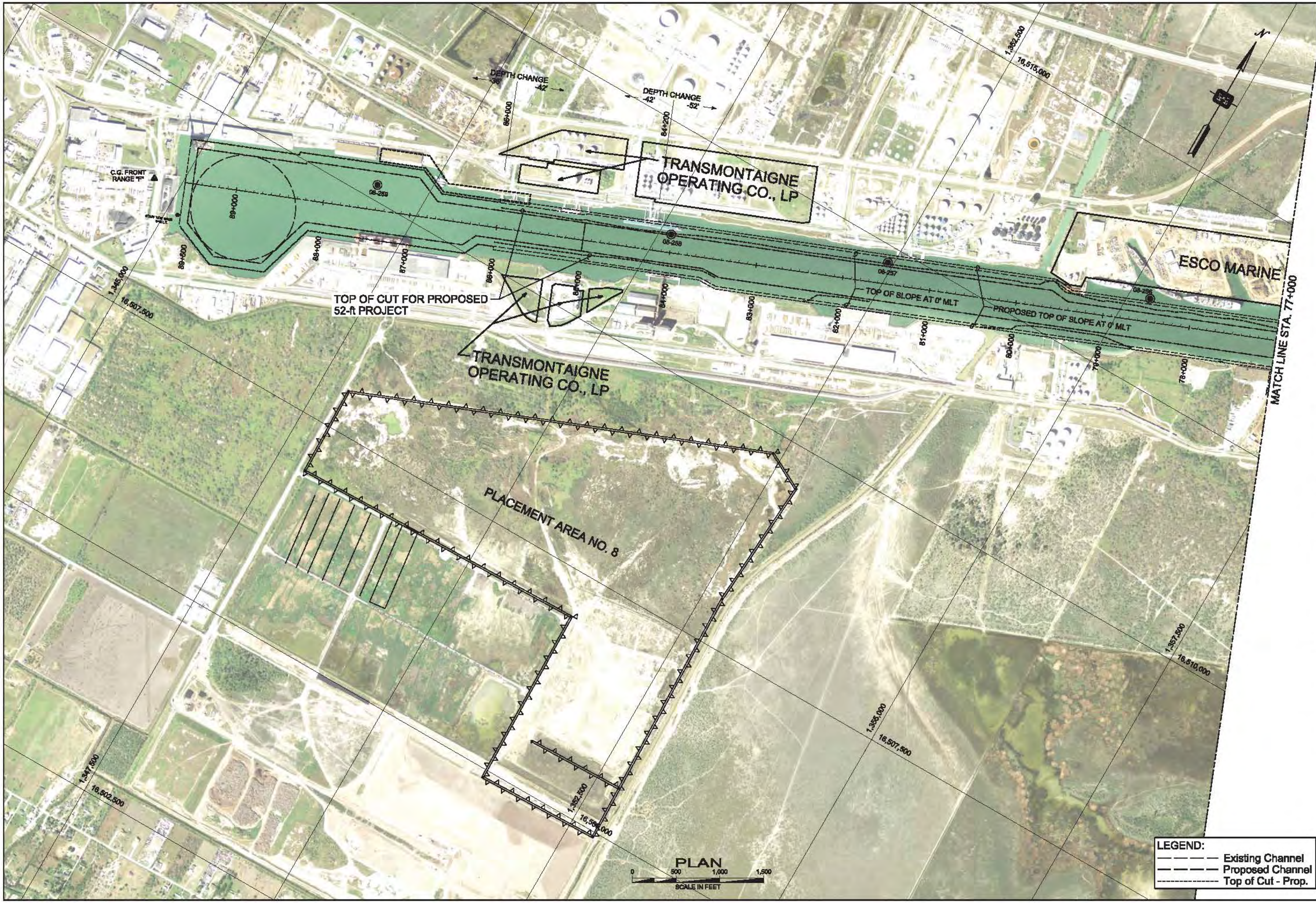
White, W. et al. 1986. Submerged lands of Texas, Brownsville-Harlingen area: sediments, geochemistry, benthic macroinvertebrates, and associated wetlands. Geology Special Publication, Bureau of Economic Geology, The University of Texas at Austin.

Witzell, W.N. 1983. Synopsis of biological data on the hawksbill turtle *Eretmochelys imbricata* (Linnaeus, 1766). FAO Fisheries Synopsis No. 137. FIR/S137, SAST – Hawksbill Turtle – 5.31 (07) 017.01. Food and Agriculture Organization (FAO) of the United Nations, Rome, Italy.

APPENDIX A
DRAFT ENGINEERING DRAWINGS FOR BIH TSP (52 X 250-FOOT PROJECT)



NEW MEXICO
OKLAHOMA
ARK.
LA.
TEXAS
MEXICO
RED RIVER
FT. WORTH
DALLAS
AUSTIN
SAN ANTONIO
HOUSTON
PORT ARTHUR
GALVESTON
FREEPORT
MATAGORDA
CORPUS CHRISTI
BROWNSVILLE
LOCATION OF PROJECT
Gulf of Mexico
VICINITY MAP
SCALE OF MILES
100 0 100 200
1,345,000
16,525,000
1,375,000
16,545,000
1,385,000
16,505,000
1,420,000
16,570,000
1,450,000
16,575,000
1,450,000
16,545,000
2
3
4
5
6
7
8
9
10
11
PLAN
0 4,000 8,000 12,000
SCALE IN FEET
LEGEND:
Existing Channel
Proposed Channel
Top of Cut - Prop.
U.S. Army Corps of Engineers
Galveston District
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER
Drawn by: MAN
Designed by: MAN
Checked by: BRH
Date: FEB 2012
Scale: AS SHOWN
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS
LOCATION PLAN
AND
INDEX OF DRAWINGS
Drawing No.:
1
Sheet 1 of 11
File No. RIO 901-XXX



U.S. Army Corps of Engineers
Galveston District

TIME:7:41:06 AM
BY: M3CDXMAN DATE: 6/11/2013

Rev.	Description	Date	By

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

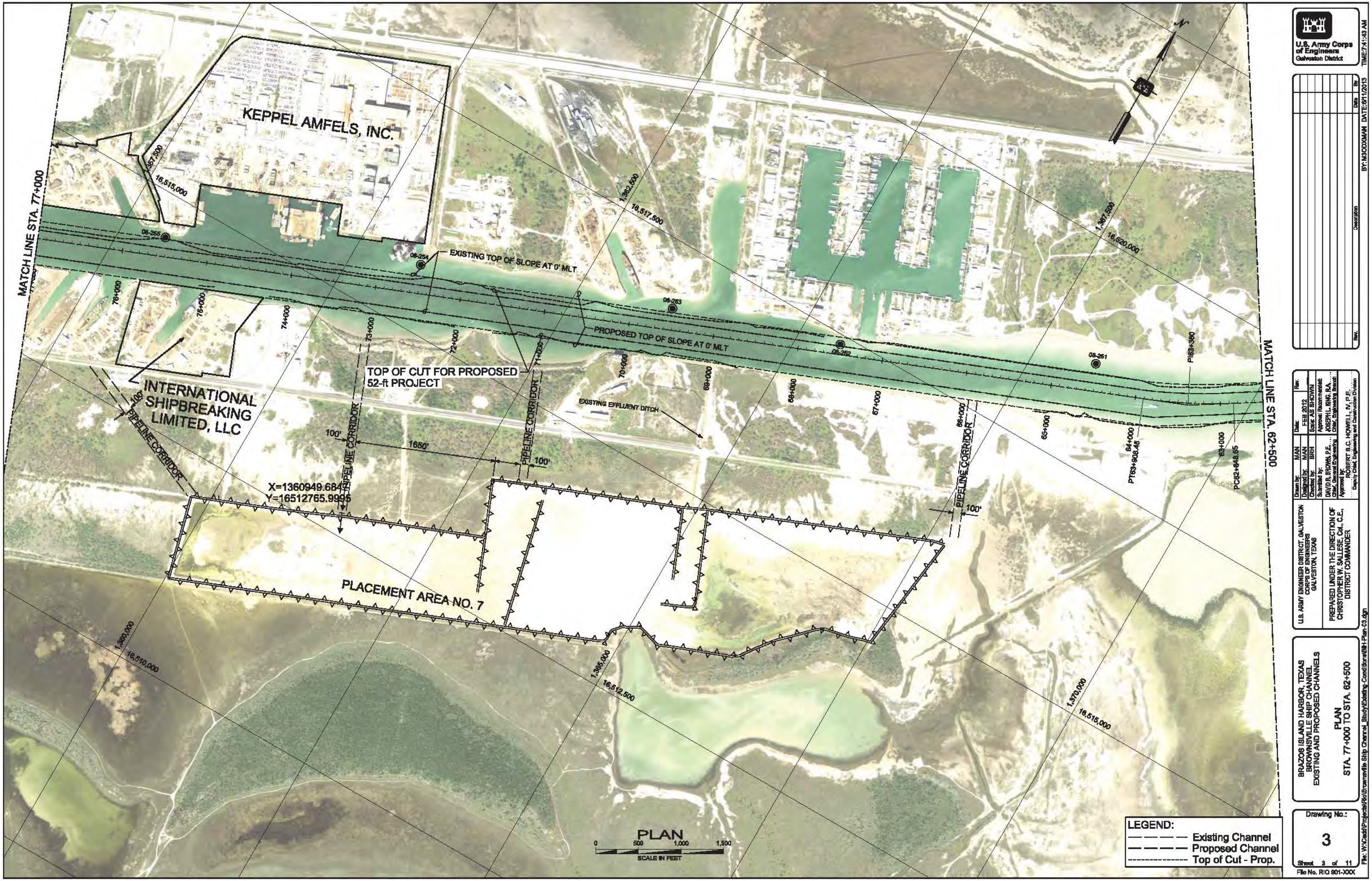
Drawn by:	MAN	Date: FEB 2012	Rev.
Designed by:	MAN		
Checked by:	BRH	Scale: AS SHOWN	
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering		Approval Recommended: JOSEPH L. KING, P.A., Chief, Engineering Branch	
Approved by: ROBERT B.C. HOWELL, IV, P.E., Deputy Chief, Engineering and Construction Division			

BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

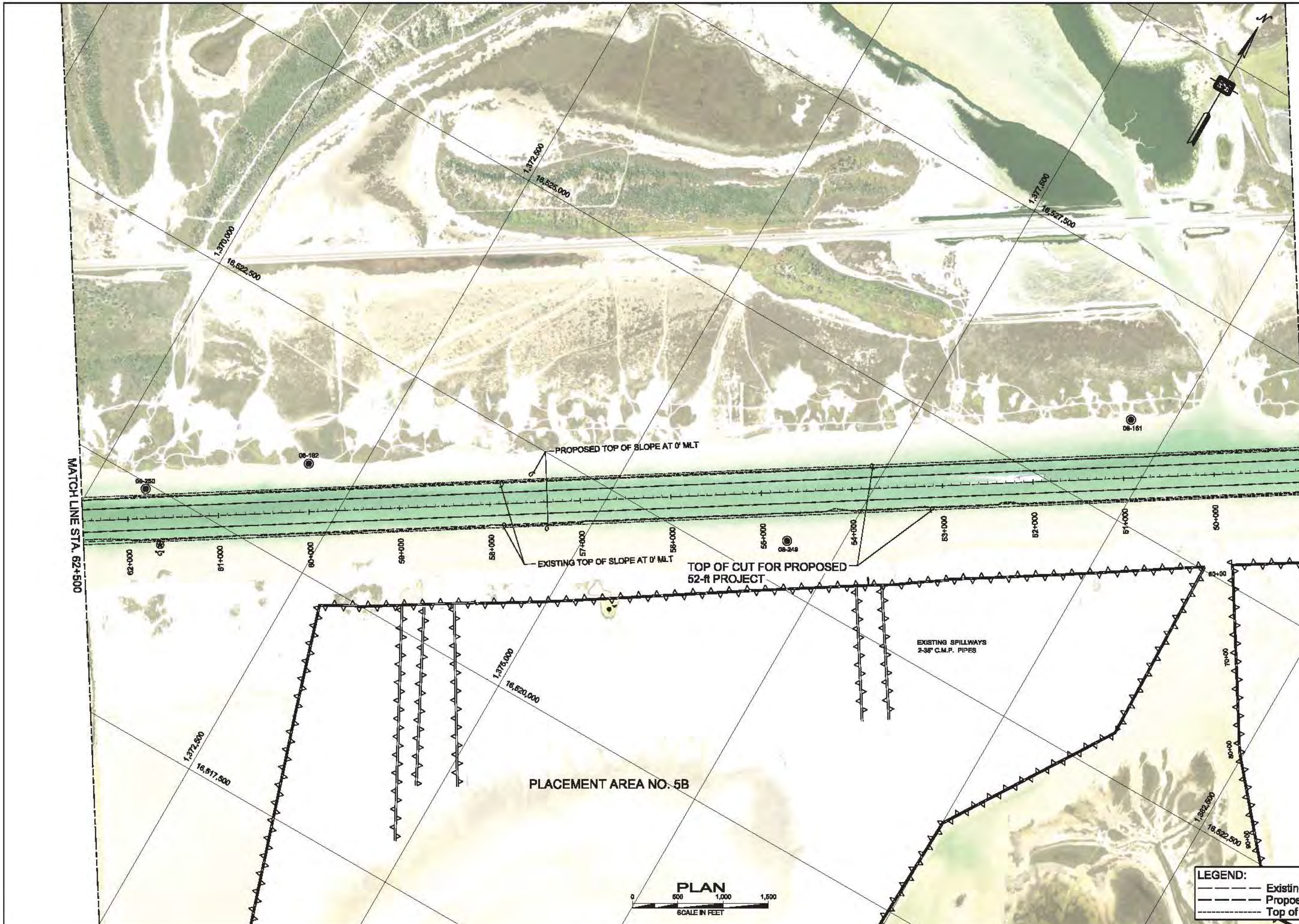
PLAN
STA. 89+500 TO STA. 77+000

Drawing No.: 2
Sheet 2 of 11
File No. RIO 901-XXX

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BH-Plan-02.dgn



KEPPEL AMFELS, INC.
INTERNATIONAL SHIPBREAKING LIMITED, LLC
MATCH LINE STA. 77+000
MATCH LINE STA. 62+500
EXISTING TOP OF SLOPE AT 0' MLT
PROPOSED TOP OF SLOPE AT 0' MLT
TOP OF CUT FOR PROPOSED 52-ft PROJECT
EXISTING EFFLUENT DITCH
PIPELINE CORRIDOR
100'
1650'
X=1360949.6847
Y=16512765.9995
PLACEMENT AREA NO. 7
PLAN
SCALE IN FEET
LEGEND:
Existing Channel
Proposed Channel
Top of Cut - Prop.
U.S. Army Corps of Engineers
Galveston District
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS
PLAN
STA. 77+000 TO STA. 62+500
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER
Drawn by: MAN
Designed by: MAN
Checked by: BRH
Date: FEB 2012
Scale: AS SHOWN
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering
Approval Recommended: JOSEPH L. KING, R.A., Chief, Engineering Branch
Approved by: ROBERT B.C. HOWELL, IV, P.E., Deputy Chief, Engineering and Construction Division
Drawing No.: 3
Sheet 3 of 11
File No. RIO 801-XXX
BY: M3CDXMAN DATE: 8/11/2013 TIME: 7:41:43 AM



U.S. Army Corps of Engineers
Galveston District

Drawn by: MAN
Designed by: MAN
Checked by: BRH
Date: FEB 2012
Scale: AS SHOWN

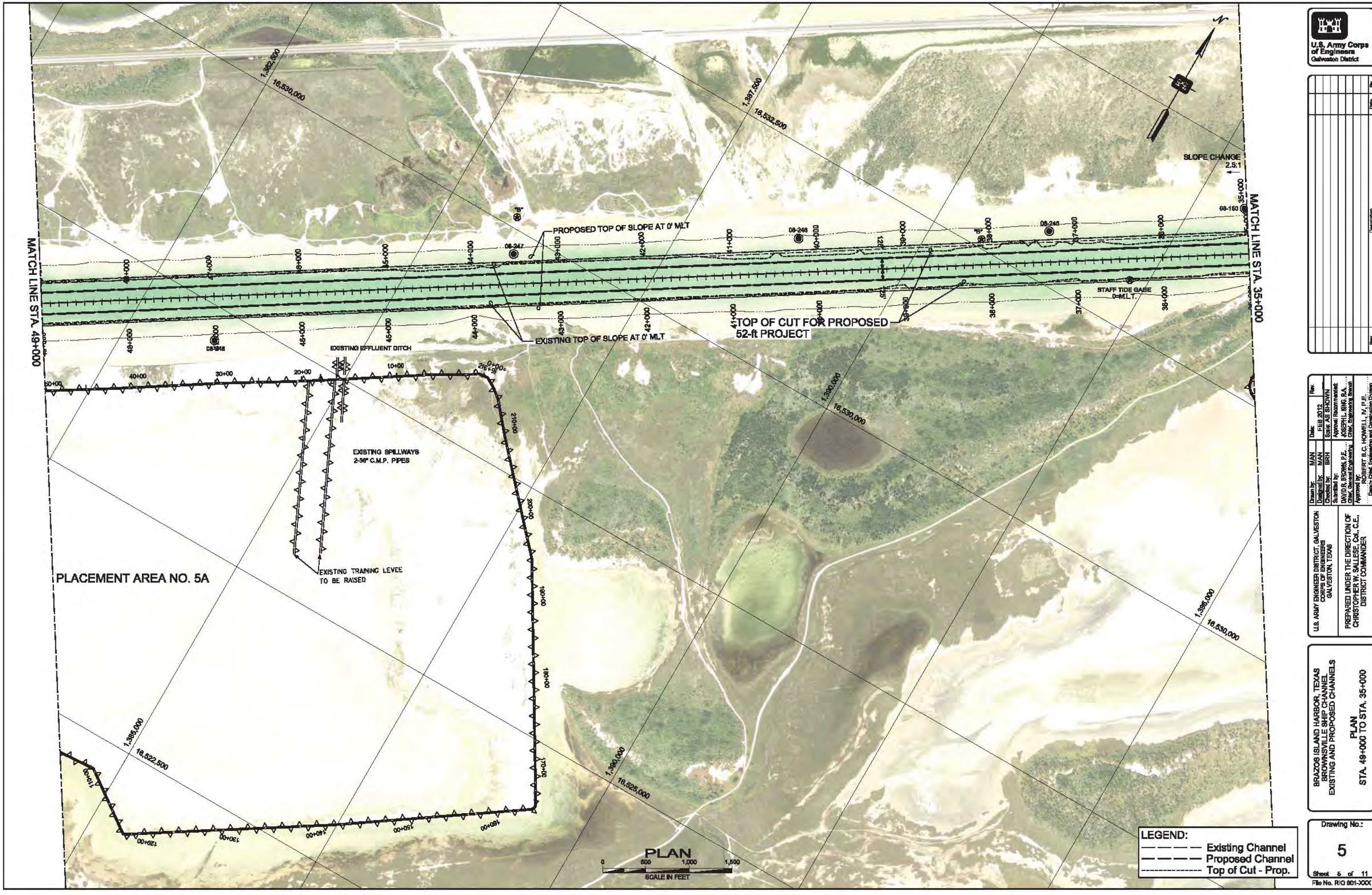
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

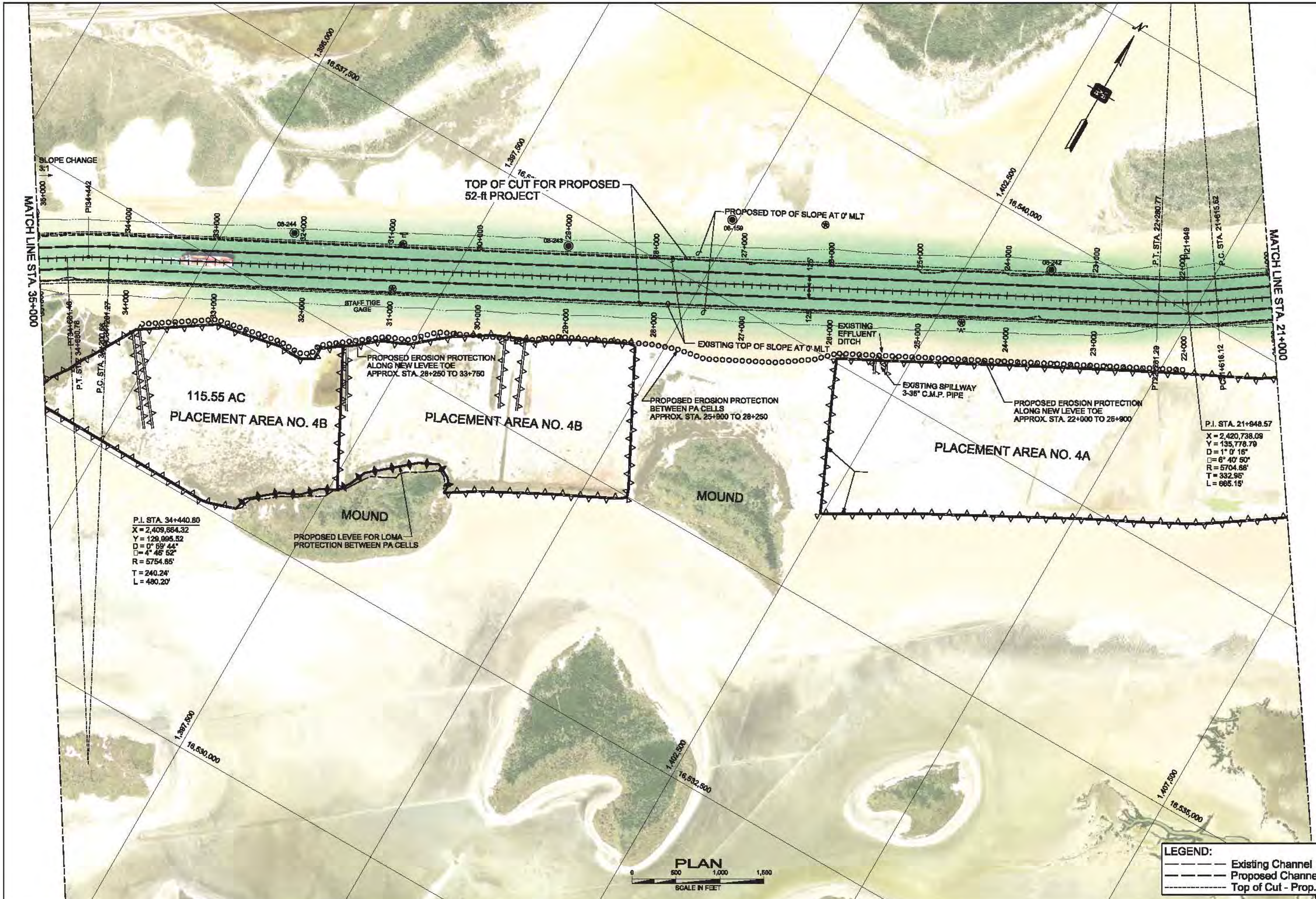
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

PLAN
STA. 62+500 TO STA. 49+000

Drawing No.:
4
Sheet 4 of 11
File No. RIO 901-XXX



MATCH LINE STA. 49+000
MATCH LINE STA. 35+000
PROPOSED TOP OF SLOPE AT 0' MLT
EXISTING TOP OF SLOPE AT 0' MLT
TOP OF CUT FOR PROPOSED
52-ft PROJECT
SLOPE CHANGE
2.5:1
STAFF TIDE GAGE
0=M.L.T.
EXISTING EFFLUENT DITCH
EXISTING SPILLWAYS
2-36" C.M.P. PIPES
EXISTING TRAINING LEVEE
TO BE RAISED
PLACEMENT AREA NO. 5A
PLAN
SCALE IN FEET
LEGEND:
Existing Channel
Proposed Channel
Top of Cut - Prop.
U.S. Army Corps of Engineers
Galveston District
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS
PLAN
STA. 49+000 TO STA. 35+000
Drawing No.:
5
Sheet 5 of 11
File No. RIO 901-XXX



U.S. Army Corps of Engineers
Galveston District

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

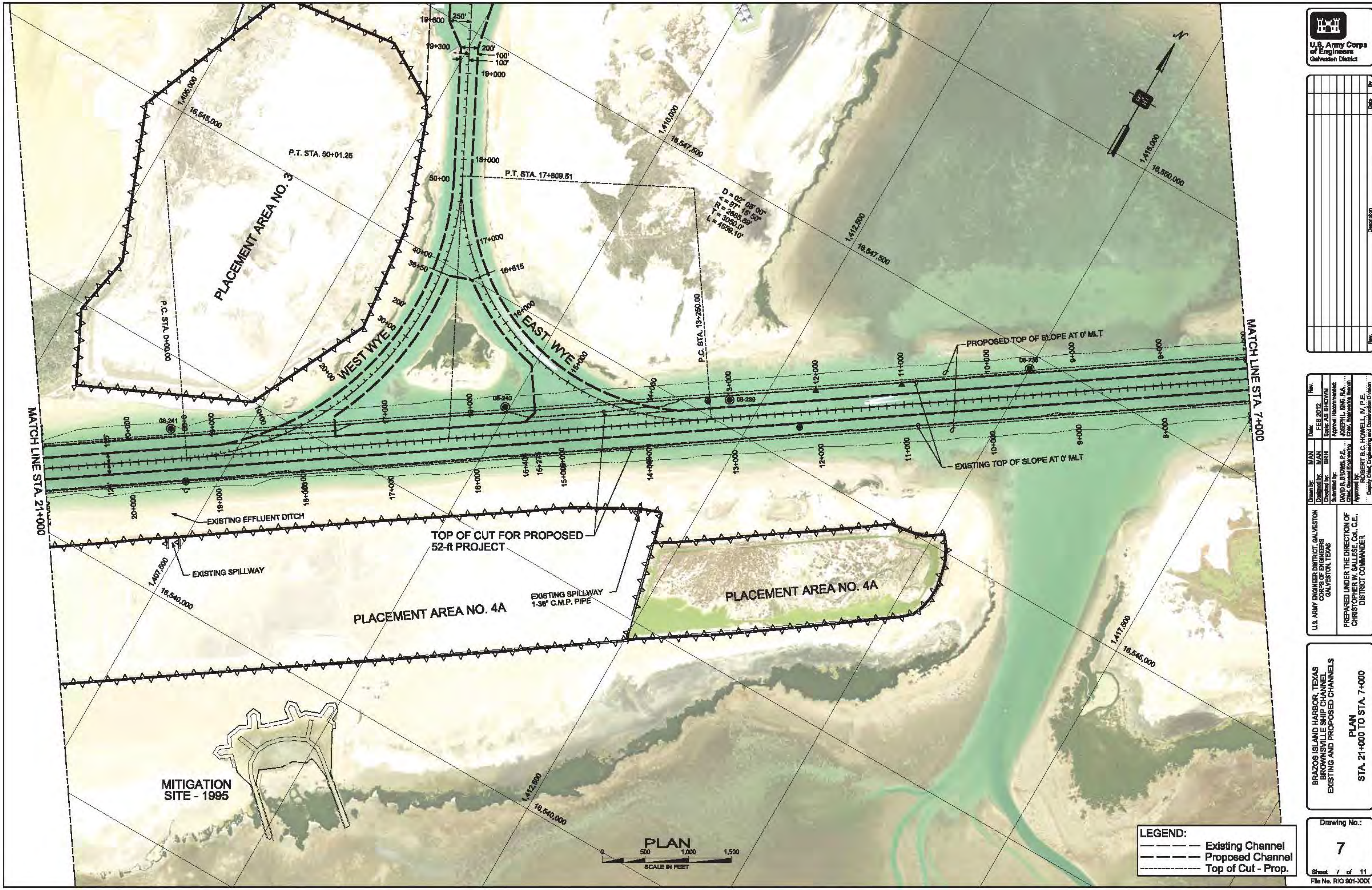
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

Date: FEB 2012
Scale: AS SHOWN

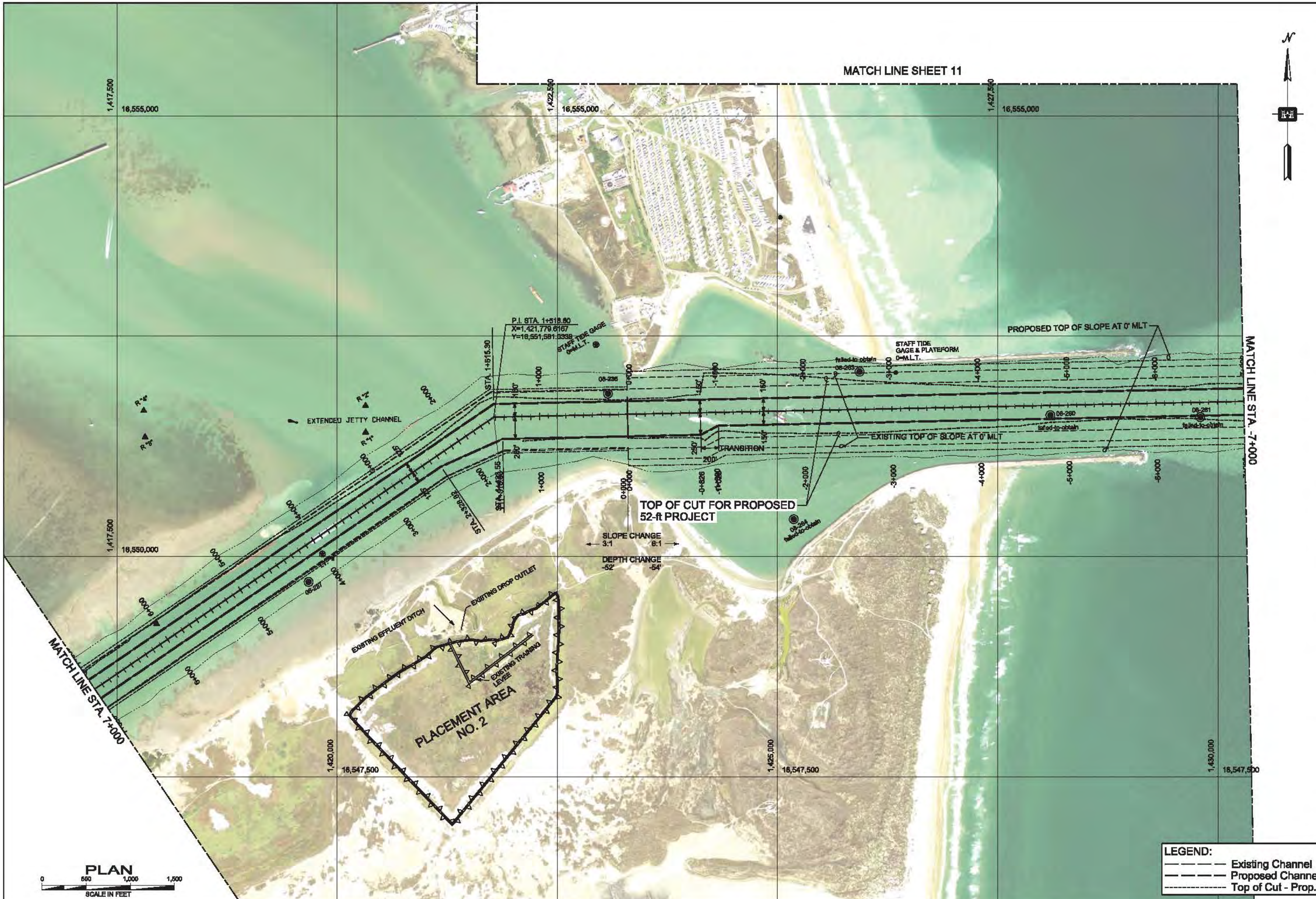
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

PLAN
STA. 35+000 TO STA. 21+000

Drawing No.: 6
Sheet 6 of 11
File No. RIO 901-XXX



PLACEMENT AREA NO. 3
P.T. STA. 50+01.25
P.T. STA. 17+809.51
P.C. STA. 0+00.00
P.C. STA. 13+250.00
D = 02° 08' 00"
R = 2685.59'
T = 3050.0'
L = 4559.10'
WEST WYE
EAST WYE
MATCH LINE STA. 21+000
MATCH LINE STA. 7+000
PROPOSED TOP OF SLOPE AT 0' MLT
EXISTING TOP OF SLOPE AT 0' MLT
EXISTING EFFLUENT DITCH
TOP OF CUT FOR PROPOSED 52-ft PROJECT
EXISTING SPILLWAY
EXISTING SPILLWAY 1-36" C.M.P. PIPE
PLACEMENT AREA NO. 4A
PLACEMENT AREA NO. 4A
MITIGATION SITE - 1995
PLAN
SCALE IN FEET
LEGEND:
Existing Channel
Proposed Channel
Top of Cut - Prop.
U.S. Army Corps of Engineers Galveston District
U.S. ARMY ENGINEER DISTRICT, GALVESTON CORPS OF ENGINEERS GALVESTON, TEXAS
PREPARED UNDER THE DIRECTION OF CHRISTOPHER W. SALLESE, Col., C.E., DISTRICT COMMANDER
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS
PLAN
STA. 21+000 TO STA. 7+000
Drawing No.:
7
Sheet 7 of 11



U.S. Army Corps of Engineers
Galveston District

TIME:7:43:51 AM DATE:6/11/2013 BY: M3ODXMAN

Rev.	Description	Date	By

BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

PLAN
STA. 7+000 TO STA. -7+000

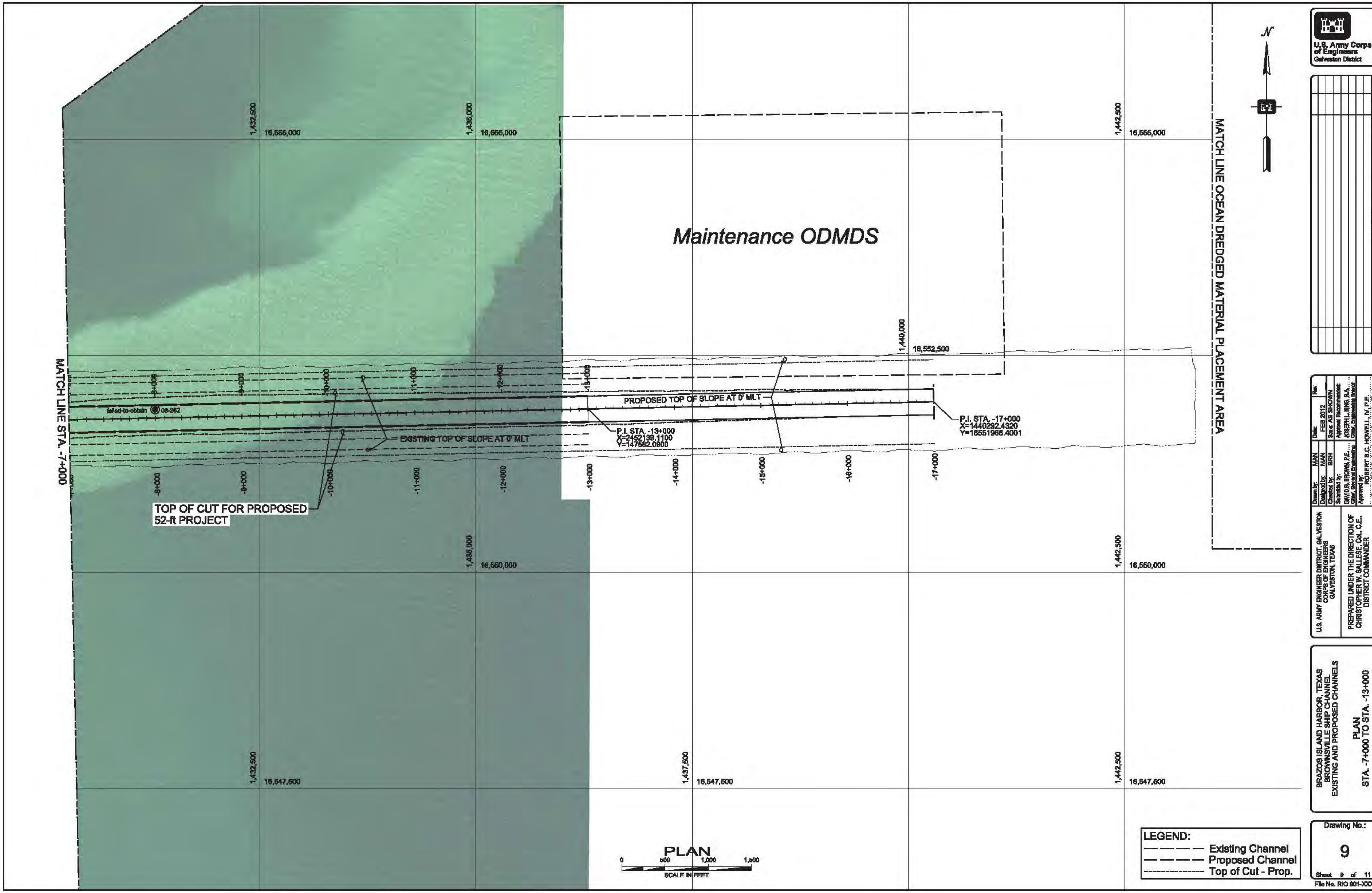
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

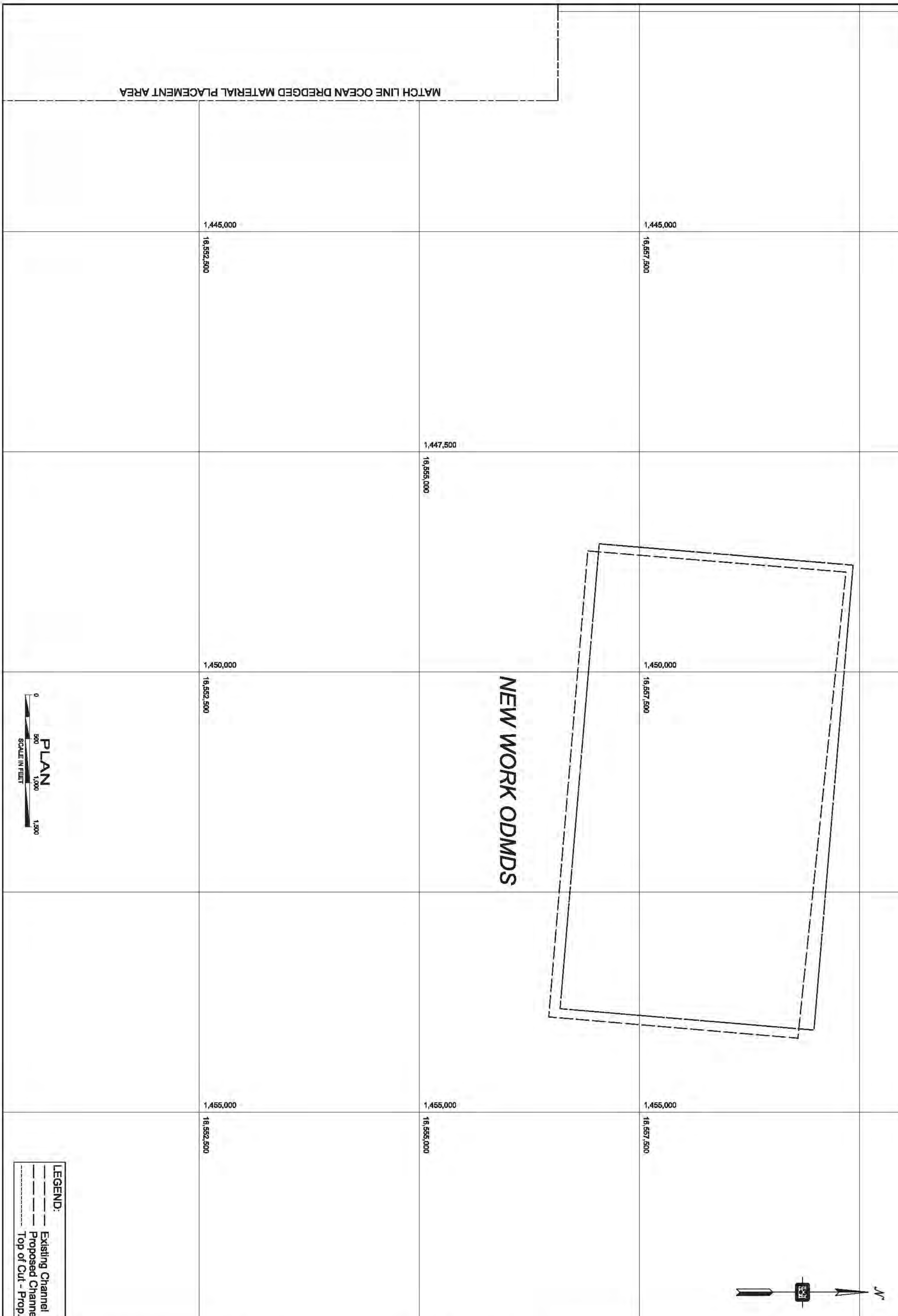
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

Drawn by: MAN
Designed by: MAN
Checked by: BRH
Date: FEB 2012
Scale: AS SHOWN
Rev.
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering
Approval Recommended: JOSEPH L. KING, P.A., Chief, Engineering Branch
Approved by: ROBERT B.C. HOWELL, IV, P.E., Deputy Chief, Engineering and Construction Division

Drawing No.: 8
Sheet 8 of 11
File No. RIO 801-XXX

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-08.dgn


Maintenance ODMDS
MATCH LINE OCEAN DREDGED MATERIAL PLACEMENT AREA
MATCH LINE STA. -7+000
PROPOSED TOP OF SLOPE AT 0' MLT
EXISTING TOP OF SLOPE AT 0' MLT
TOP OF CUT FOR PROPOSED
52-ft PROJECT
P.I. STA. -13+000
X=2452139.1100
Y=147582.0900
P.I. STA. -17+000
X=1440292.4320
Y=16551966.4001
failed-to-obtain
03-262
-8+000
-9+000
-10+000
-11+000
-12+000
-13+000
-14+000
-15+000
-16+000
-17+000
1,432,500
1,435,000
1,437,500
1,440,000
1,442,500
16,555,000
16,552,500
16,550,000
16,547,500
PLAN
0
500
1,000
1,500
SCALE IN FEET
LEGEND:
Existing Channel
Proposed Channel
Top of Cut - Prop.
N
U.S. Army Corps of Engineers
Galveston District
U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS
PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER
BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS
PLAN
STA. -7+000 TO STA. -13+000
Drawing No.:
9
Sheet 9 of 11
File No. RIO 901-XXX
Date: FEB 2012
Scale: AS SHOWN
Drawn by: MAN
Designed by: MAN
Checked by: BRH
DATE: 6/11/2013



Drawing No.: 10

Sheet 10 of 11

File No. RIO 901-XXX

BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

PLAN
OCEAN DREDGED MATERIAL
PLACEMENT AREA (ODMPA)

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

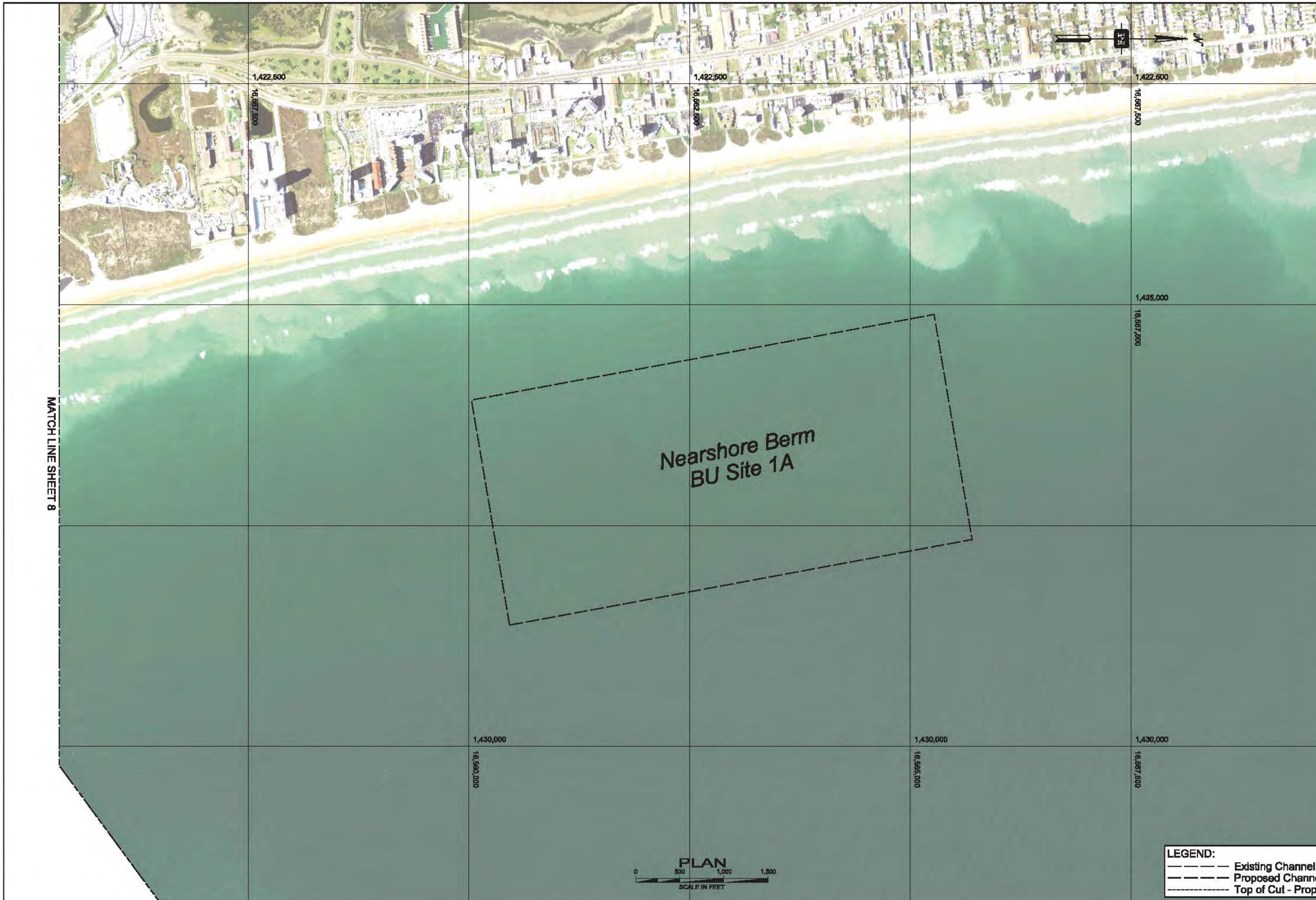
Drawn by: MAN
Designed by: MAN
Checked by: BRH
Date: FEB 2012
Rev.
Scale: AS SHOWN
Submitted by: DAVID R. BROWN, P.E., Chief, General Engineering
Approval Recommended: JOSEPH L. KING, P.A., Chief, Engineering Branch
Approved by: ROBERT B.C. HOWELL, IV, P.E., Deputy Chief, Engineering and Construction Division

Rev.	Description	Date	By

U.S. Army Corps of Engineers
Galveston District

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-10.dgn

BY: M3ODXMAN DATE: 6/11/2013 TIME: 7:44:23 AM



U.S. Army Corps of Engineers
Galveston District

Rev.	Description	Date	By

BY: M3ODXMAN DATE: 6/11/2013 TIME: 7:44:23 AM

U.S. ARMY ENGINEER DISTRICT, GALVESTON
CORPS OF ENGINEERS
GALVESTON, TEXAS

PREPARED UNDER THE DIRECTION OF
CHRISTOPHER W. SALLESE, Col., C.E.,
DISTRICT COMMANDER

Drawn by:	MAN	Date:	Rev.
Designed by:	MAN	FEB 2012	
Checked by:	BRH	Scale: AS SHOWN	
Submitted by: DAVID R. BROWN, P.E. Chief, General Engineering		Approval Recommended: JOSEPH L. KING, R.A. Chief, Engineering Branch	
Approved by: ROBERT B.C. HOWELL, IV, P.E. Deputy Chief, Engineering and Construction Division			

BRAZOS ISLAND HARBOR, TEXAS
BROWNSVILLE SHIP CHANNEL
EXISTING AND PROPOSED CHANNELS

PLAN
NEARSHORE BERM BU SITES
AND BEACH PLACEMENT LIMITS

Drawing No.: 11
Sheet 11 of 11
File No. RIO 901-XXX

File: W:\Cadd\Projects\Rio\Brownsville Ship Channel_Study\Existing-Conditions\BIH-Plan-11.dgn

APPENDIX B
NMFS AND USFWS COORDINATION

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF

March 18, 2013

Environmental Section

David M. Bernhart
Assistant RA for Protected Resources
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

This letter is in regard to proposed modification of the Brazos Island Harbor Navigation Project in Cameron County, Texas. The existing project is shown on the enclosed figure. The project is expected to include deepening and possibly widening of the Entrance Channel and Brownsville Ship Channel, to allow larger vessels and offshore oil rigs to more efficiently navigate to the Turning Basin located near Brownsville, Texas.

To facilitate compliance with the requirements of Section 7, subsection (a)(2) of the Endangered Species Act Amendments of 1978, a list of any species which is listed or proposed to be listed, that may be present in the area of the proposed action is requested.

If you or your staff have any questions regarding this activity, please contact Janelle Stokes at (409) 766-3039 or by email at Janelle.S.Stokes@usace.army.mil.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

Enclosure

CF:

Mr. Rusty Swafford
National Marine Fisheries Service
Habitat Conservation Division
4700 Avenue U
Galveston, Texas 77551

From:	Teletha Mincey - NOAA Federal
To:	Stokes, Janelle S SWG
Cc:	Hawk, Eric
Subject:	Brazos Island Harbor Navigation Project in Cameron County, TX
Date:	Friday, March 22, 2013 9:16:11 AM
Attachments:	Texas.pdf

Good Morning Ms. Stokes:

This is in response to the COE's letter, dated March 18, 2013, referencing the above-mentioned subject. Attached is a listing of species under the jurisdiction of the National Marine Fisheries Service, for the state of Texas, which may be present in the proposed action area.

Thank you.

--

Teletha Mincey
Program Analyst
NOAA Fisheries
Southeast Region
263 13th Ave S
St. Petersburg, FL 33701-5505
(727) 824-5312 - Main Line
(727) 551-5772 - Direct Line
(727) 824-5309 - Fax
http://sero.nmfs.noaa.gov/pr/pr.htm

Endangered and Threatened Species and Critical Habitats
under the Jurisdiction of the NOAA Fisheries Service

Texas

Listed Species	Scientific Name	Status	Date Listed
Marine Mammals			
blue whale	*Balaenoptera musculus*	Endangered	12/02/70
finback whale	*Balaenoptera physalus*	Endangered	12/02/70
humpback whale	*Megaptera novaeangliae*	Endangered	12/02/70
sei whale	*Balaenoptera borealis*	Endangered	12/02/70
sperm whale	*Physeter macrocephalus*	Endangered	12/02/70
Turtles			
green sea turtle	*Chelonia mydas*	Threatened[1]	07/28/78
hawksbill sea turtle	*Eretmochelys imbricata*	Endangered	06/02/70
Kemp's ridley sea turtle	*Lepidochelys kempii*	Endangered	12/02/70
leatherback sea turtle	*Dermochelys coriacea*	Endangered	06/02/70
loggerhead sea turtle	*Caretta caretta*	Threatened[2]	09/22/11
Fish			
None			

[1] Green turtles are listed as threatened, except for breeding populations of green turtles in Florida and on the Pacific Coast of Mexico, which are listed as endangered

[2] Northwest Atlantic Ocean (NWA) DPS. On September 22, 2011, NMFS and USFWS issued a final rule changing the listing of loggerhead sea turtles from a single, threatened species to nine distinct population segments (DPSs) listed as either threatened or endangered (FR 76 58868). The NWA DPS was listed as threatened.

Texas

Candidate Species[3]	Scientific Name
Fish	
scalloped hammerhead shark	*Sphyrna lewini*
Invertebrates	
boulder star coral	*Montastraea annularis*
boulder star coral	*Montastraea franksi*
elliptical star coral	*Dichocoenia stokesii*
Lamarck's sheet coral	*Agaricia lamarcki*
mountainous star coral	*Montastraea faveolata*
pillar coral	*Dendrogyra cylindrus*
rough cactus coral	*Mycetophyllia ferox*

Species of Concern[4]	Scientific Name
Fish	
dusky shark	*Carcharhinus obscurus*
opossum pipefish	*Microphis brachyurus lineatus*
sand tiger shark	*Carcharias taurus*
speckled hind	*Epinephelus drummondhayi*
warsaw grouper	*Epinephelus nigritus*

[3] Candidate species are those petitioned species that are actively being considered for listing as endangered or threatened under the Endangered Species Act (ESA), as well as those species which NMFS has initiated an ESA status review.
[4] Species of Concern are not protected under the Endangered Species Act, but concerns about their status indicate that they may warrant listing in the future. Federal agencies and the public are encouraged to consider these species during project planning so that future listings may be avoided. For more information please visit: http://sero.nmfs.noaa.gov/pr/SOC.htm

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF

March 18, 2013

Environmental Section

Allan M. Strand
Field Supervisor
U.S. Fish and Wildlife Ecological Services
6300 Ocean Drive
Corpus Christi, Texas 78412

Dear Mr. Strand:

This letter is in regard to proposed modification of the Brazos Island Harbor Navigation Project in Cameron County, Texas. The existing project is shown on the enclosed figure. The project is expected to include deepening and possibly widening of the Entrance Channel and Brownsville Ship Channel, to allow larger vessels and offshore oil rigs to more efficiently navigate to the Turning Basin located near Brownsville, Texas.

To facilitate compliance with the requirements of Section 7, subsection (a)(2) of the Endangered Species Act Amendments of 1978, a list of any species which is listed or proposed to be listed, that may be present in the area of the proposed action is requested.

If you or your staff have any questions regarding this activity, please contact Janelle Stokes at (409) 766-3039 or by email at Janelle.S.Stokes@usace.army.mil.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

Enclosure

From:	Pat Clements
To:	Stokes, Janelle S SWG
Subject:	RE: Endangered species list for Cameron Co - BIH project (UNCLASSIFIED)
Date:	Friday, March 22, 2013 2:16:35 PM

That list looks good. It does not note, however, that the piping plover also has critical habitat designated.

Pat

-----Original Message-----
From: Stokes, Janelle S SWG [mailto:janelle.s.stokes@usace.army.mil]
Sent: Friday, March 15, 2013 4:04 PM
To: Pat Clements
Subject: Endangered species list for Cameron Co - BIH project (UNCLASSIFIED)

Classification: UNCLASSIFIED
Caveats: NONE

Pat,

I pulled down the attached ESA list for Cameron County from the Region 2 website. Should I use this for the BIH BA, or do you recommend that we send you a letter requesting a species list?

Jan

Classification: UNCLASSIFIED
Caveats: NONE

Southwest Region

Ecological Services

Learn more about us...

USFWS Social Media Hub

Ecological Services
Endangered Species
Electronic Library
Environmental Contaminants
Energy
Partners Program
Texas Coastal Program
National Wetlands Inventory
Field Offices

Back to Start

List of species by county for Texas:

Counties Selected: Cameron

Select one or more counties from the following list to view a county list:

Anderson
Andrews
Angelina
Aransas
Archer

View County List

Cameron County

Common Name	Scientific Name	Species Group	Listing Status	Species Image	Species Distribution Map	Critical Habitat	More Info
brown pelican	*Pelecanus occidentalis*	Birds	DM				P
green sea turtle	*Chelonia mydas*	Reptiles	E, T				P
Gulf Coast jaguarundi	*Herpailurus (=Felis) yagouaroundi cacomitli*	Mammals	E				P
hawksbill sea turtle	*Eretmochelys imbricata*	Reptiles	E				P
Kemp's ridley sea turtle	*Lepidochelys kempii*	Reptiles	E				P
leatherback sea turtle	*Dermochelys coriacea*	Reptiles	E				P
loggerhead sea turtle	*Caretta caretta*	Reptiles	T				P
northern aplomado falcon	*Falco femoralis septentrionalis*	Birds	E, EXPN				P
ocelot	*Leopardus (=Felis) pardalis*	Mammals	E				P
piping Plover	*Charadrius melodus*	Birds	E, T			Final	P
red knot	*Calidris canutus rufa*	Birds	C	No Image			P
red-crowned parrot	*Amazona viridigenalis*	Birds	C	No Image	No Map		P
south Texas ambrosia	*Ambrosia cheiranthifolia*	Flowering Plants	E				P
Sprague's pipit	*Anthus spragueii*	Birds	C	No Image			P
Texas ayenia	*Ayenia limitaris*	Flowering Plants	E				P
West Indian Manatee	*Trichechus manatus*	Mammals	E				P

Last updated: December 17, 2012

U.S. Fish and Wildlife Service Home Page
About the U.S. Fish & Wildlife Service
Department of the Interior
USA.gov
Accessibility
Privacy
Notices

The mission of the U.S. Fish and Wildlife Service is working with others to conserve, protect, and enhance fish, wildlife, plants and their habitats for the continuing benefit of the American people.

DOI Children's Privacy Statement
Southwest Home
R2 Photo Credits
Contact Us
Disclaimer
FOIA

HOME: About the Region, RD's Corner
SCIENCE: Climate Change, Landscape Conservation
WILDLIFE REFUGES: Find a Refuge, Biology
ECOLOGICAL SERVICES: Endangered Species, Electronic Library
FISHERIES: About Us, Aquatic Invasive Species
MIGRATORY BIRDS: Migratory Birds, Staff & Functions
LAW ENFORCEMENT: Contacts by State, State Agencies
NEWSROOM: News Releases, FWS Field Notes
GET INVOLVED: Permits, Working w/ Tribes

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF

June 17, 2013

Environmental Section

David M. Bernhart
Assistant RA for Protected Resources
Southeast Regional Office
National Marine Fisheries Service
263 13th Avenue South
St. Petersburg, FL 33701

Dear Mr. Bernhart:

This letter is in regard to a proposed Federal project for improvements to the Brazos Island Harbor Project in Cameron County, Texas. The Galveston District is currently preparing a draft integrated feasibility report and environmental assessment which recommends deepening the existing navigation channel from 42 to 52 feet. A description of the proposed project, the Tentatively Selected Plan (52 by 250-foot project), is provided in the attached Biological Assessment (BA).

We have prepared a BA for the proposed project as both listed species and critical habitat are located within the affected area. We have concluded that the proposed project is likely to adversely affect the federally-listed endangered Kemp's ridley and hawksbill sea turtles, and the threatened green and loggerhead sea turtles. We have also concluded that the project may affect, but is not likely to adversely affect the endangered leatherback sea turtle. The proposed project will have no effect on the federally-listed piping plover, Northern Aplomado falcon, Gulf Coast jaguarundi, ocelot, West Indian manatee, blue whale, finback whale, humpback whale, sei whale, sperm whale, South Texas ambrosia, and Texas ayenia, and will have no effect on designated piping plover critical habitat.

Since the proposed project may affect federally-listed species, we request initiation of formal consultation pursuant to 50 CFR 402.14, to evaluate the effects of the proposed project on threatened and endangered sea turtles. Please notify us within 30 days of receipt of the letter if additional information beyond that provided in the Biological Assessment is required, and notify us when the 90-day preparation period for the draft Biological Opinion has begun. In accordance with Section 402.14(g)(5), we also request that a draft copy of the biological opinion be furnished for our review at the end of the 90-day preparation period.

We appreciate your continued cooperation in allowing us to fulfill our responsibilities under the Endangered Species Act. Should you require any additional information during review of the enclosed BA, please call Ms. Janelle Stokes at 409/766-3039.

Sincerely,

Carolyn Murphy

Carolyn Murphy
Chief, Environmental Section

Enclosure

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

REPLY TO
ATTENTION OF

June 17, 2013

Environmental Section

Edith Erfling
Field Supervisor
U.S. Fish and Wildlife Service
Clear Lake Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058

Dear Ms. Erfling:

This letter is in regard to a proposed Federal project for improvements to the Brazos Island Harbor Project in Cameron County, Texas. The Galveston District is currently preparing a draft integrated feasibility report and environmental assessment which recommends deepening the existing navigation channel from 42 to 52 feet. A description of the proposed project, the Tentatively Selected Plan (52 by 250-foot project), is provided in the attached Biological Assessment (BA).

We have prepared a BA for the proposed project as both listed species and critical habitat are located within the affected area. We have concluded that hopper dredging to construct the proposed project is likely to adversely affect federally-listed endangered, swimming Kemp's ridley and hawksbill sea turtles, and the threatened swimming green and loggerhead sea turtles. We have also concluded that the project may affect, but is not likely to adversely affect the endangered swimming leatherback sea turtle. The proposed project will have no effect on the federally-listed piping plover, Northern Aplomado falcon, Gulf Coast jaguarundi, ocelot, West Indian manatee, blue whale, finback whale, humpback whale, sei whale, sperm whale, South Texas ambrosia, and Texas ayenia, and will have no effect on designated piping plover critical habitat.

We are hereby requesting your written concurrence, pursuant to the informal consultation procedures prescribed in 50 CFR 402.13, that the proposed action will have no effect on federally-listed species or designated critical habitat under your agencies jurisdiction. We appreciate your continued cooperation in allowing us to fulfill our responsibilities under the Endangered Species Act. Should you require any additional information during review of the enclosed BA, please call Ms. Janelle Stokes at 409/766-3039.

Sincerely,

Carolyn Murphy

Carolyn Murphy
Chief, Environmental Section

Enclosure

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Texas Coastal Ecological Services Field Office
c/o TAMU-CC, Unit 5837
6300 Ocean Drive
Corpus Christi, Texas 78412-5837

July 25, 2013

Carolyn Murphy
Chief, Environmental Section
U. S. Army Corps of Engineers
Galveston District
P.O. Box 1229
Galveston, Texas 77553

Dear Ms. Murphy:

Enclosed is the U.S. Fish and Wildlife Service's (Service) Fish and Wildlife Coordination Act Report, Brazos Island Harbor Project, Texas July 2013. Both a printed and an electronic version have been provided with this letter.

The Service has been coordinating with the U. S. Army Corps of Engineers (USACE) as well as with the Port of Brownsville (POB) and other state and federal agency representatives on proposals to deepen the Brazos Island Harbor Entrance Channel, Brownsville Ship Channel and Turning Basin since 2007. Although driven, in part, by current federal economic restraints, the Service appreciates the considerable efforts of the USACE to avoid significant impacts to fish and wildlife resources, including federally listed, threatened and endangered species with the tentatively selected plan.

The Service looks forward to working with the USACE and the POB in the future as funding becomes available to proceed with final design and implementation of the BIH Project and, subsequent to project construction, coordination as needed for implementation of maintenance activities over the 50-year project life.

If you have any additional questions, or comments regarding this document, please contact Pat Clements at 361-994-9005 ext 225, or by email at pat_clements@fws.gov.

Sincerely,

E. Dawn Whitehead

for Edith Erfling
Field Supervisor

Enclosure

See Appendix J for full text of USFWS CAR Report (7-25-2013)

DEPARTMENT OF THE ARMY
GALVESTON DISTRICT, CORPS OF ENGINEERS
P. O. BOX 1229
GALVESTON, TEXAS 77553-1229

October 30, 2013

Environmental Section

Edith Erfling
Field Supervisor
U.S. Fish and Wildlife Service
Clear Lake Ecological Services Field Office
17629 El Camino Real, Suite 211
Houston, Texas 77058

Dear Ms. Erfling:

Based upon recommendations in the US Fish and Wildlife Service's (USFWS) July 25, 2013 Coordination Act Report (CAR) for the Brazos Island Harbor Channel Improvement Project 52 x 250-Foot Alternative, Cameron County, Texas, Galveston District would like to clarify or modify our assessment of effects for several protected species under USFWS jurisdiction in the project area. The Tentatively Selected Plan (TSP) improvements to the channel would consist of extending the Entrance Channel 4,000 feet farther into the Gulf of Mexico, deepening the Jetty and Entrance Channels to 54 feet mean lower low water (MLLW), and deepening the Main Channel to 52 feet MLLW. Material from construction of the TSP would be placed in the existing New Work Ocean Dredged Material Disposal Site (ODMDS), and in upland, confined PAs 2, 4A, 4B, 5A, 5B, 7 and 8. Dredged material from maintaining the channel would be placed in the same upland PAs, the existing Maintenance ODMDS, and an existing Feeder Berm.

The CAR states that the Galveston District's Biological Assessment (BA) did not provide a specific assessment of potential project effects to nesting sea turtles. The BA did describe project impacts to the Gulf beaches and included the following statement "No direct impacts to turtle nests on South Padre Island are expected since the TSP does not include typical beach nourishment which involves the placement of maintenance material directly onto the beach." Additional information is provided here to clarify anticipated project effects to green (*Chelonia mydas*), Kemp's ridley (*Lepidochelys kempii*), loggerhead (*Caretta caretta*) and hawsbill (*Eretmochelys imbricata*) nesting sea turtles. While swimming sea turtles are abundant in the study area throughout the year, nesting turtles and nests of these species are not common but have been found sporadically in the study area. No impacts to the beaches where nests occur are expected with construction of the TSP. All dredging and placement activities associated with the Entrance and Jetty channels would be accomplished with hopper dredges, which would release material directly into the open water the Feeder Berm or ODMDS. All placement activities along the Main Channel would be accomplished with hydraulic pipeline dredges pumping directly from the channel into adjacent upland PAs. No hydraulic pipelines or other construction equipment would be used along the Gulf shoreline in potential sea turtle nesting locations.

While the Maintenance ODMDS would be available for use if needed, maintenance material from the first 11,000 feet of the Main Channel, and the entire Jetty and Entrance Channels would be regularly placed in the Feeder Berm located between 1.5 and 2.5 miles from the north jetty and from 0.4 to 0.9 miles from shore. Sediment removed by maintenance dredging would therefore be regularly placed back into the littoral system, available for natural cross-shore and longshore sediment transport to the beaches of South Padre Island. Gulf beaches would not be expected to experience significant impacts from the proposed channel deepening. Existing shoreline change trends would generally continue, with possible improvements in shoreline stability. Therefore, it has been determined that the BIH TSP would have no effect on nesting green, Kemp's ridley, loggerhead and hawsbill sea turtles in the project area.

The CAR also provided information regarding the potential for the TSP to impact federally-listed threatened and endangered species, and specific conservation recommendations for the following species - piping plover (*Charadrius melodus*), northern aplomado falcon (*Falco femoralis septentrionalis*), ocelot (*Leopardus pardalis*), jaguarundi (*Herpailurus yagouaroundi cacomitli*), and West Indian manatee (*Trichechus manatus*). Based on this new information and on a subsequent telephone consultation, Galveston District has reevaluated its effects determinations for these species and the conservation recommendations, as follows:

Piping plover. Hydraulic pipeline pumping of dredged material into upland PAs within designated piping plover critical habitat Unit TX-01 may affect but is not likely to adversely affect piping plovers in the following limited circumstances. Piping plovers may roost in these upland PAs to conserve energy and body reserves during combinations of certain adverse weather conditions, and disturbing the birds under these conditions could cause harm by stressing the birds. As identified in the CAR, these conditions are cold temperatures (below 40° F), high winds (above 15-20 mph), and precipitation. If any two of these weather conditions occur in combination when the pumping of new work or maintenance material into PAs 2, 4A and 4B is ready to begin, Galveston District would survey unvegetated sand flats in these PAs for the presence of roosting piping plovers. If roosting piping plovers are identified, then pumping into affected PAs would be delayed until weather conditions ameliorate and two of these three weather conditions are no longer occurring in combination. With implementation of this conservation recommendation, it has been determined that the TSP may affect but is not likely to adversely affect piping plovers.

Northern aplomado falcon. While no nests are known in the project area at this time, it is possible that aplomado falcons may use mesquite savannah and grassland areas south of the PAs for foraging and nesting. Nest structures that could be utilized by the aplomado falcon have been documented approximately 0.5 mile south of PAs 7 and 5A. All construction activities would occur within the footprint of existing PA levees, avoiding direct impacts to potential grassland and savannah habitat near the PAs. However, the activity and noise from construction activities on the PA levees or use of access roads south of the PAs may disturb birds in nests within 100 yards of these activities. Prior to commencing levee maintenance activities for new work and future maintenance during the months of March through June, areas within 100 yards of the PA levees and access roads would be examined from a distance of at least 100-300 yards for stick nests and signs of adult falcons incubating eggs or brooding chicks. If an actively utilized nest is found to exist within 100 yards of the levees or access roads, further surveys would be performed and USFWS would be contacted for a review of survey results and impact determinations. With implementation of this conservation recommendation, it has been determined that the TSP may affect but is not likely to adversely affect the Northern aplomado falcon.

Gulf Coast jaguarundi and ocelot. While rare, these cats are known to occur around the project area, and may use a variety of habitats for moving between preferred habitat sites. All TSP construction activities would occur within the footprint of existing PA levees, avoiding direct impacts to lomas and brush habitat adjacent to PAs 4A and 4B. A new levee would be constructed at least 30 feet from the outer edge of the loma on the south side of PA 4B to protect that landform and its brush habitat. To prevent possible harm to a jaguarundi or ocelot moving through the area during construction, USACE would require that construction activities for levee rehabilitation or construction be conducted during daylight hours only. This requirement would be incorporated into project construction and maintenance contract plans. With implementation of this conservation recommendation, it has been determined that the TSP may affect but is not likely to adversely affect the jaguarundi and ocelot.

West Indian Manatee. Although sightings of West Indian manatees are rare along the Texas coast, they do occur. To avoid potential impacts to the West Indian manatee, USACE would incorporate the following education measures into construction and maintenance contracts for the TSP:

- Contractors and staff would be advised that manatees may be found in the Brazos Island Harbor Entrance Channel, the Brownsville Ship Channel, and adjacent areas of the Lower Laguna Madre and that boat operators should be cautious to avoid collisions with manatees.
- If a manatee is sighted, the Contractor would be instructed to contact the Texas Marine Mammal Stranding Network at 361-947-4313 or the group's hotline at (800) 962-6625.
- Training would be provided on avoiding potential impacts to the manatee for all personnel involved in construction and maintenance of in-water dredging activities.
- The training materials would include a poster to assist in identifying the mammal.
- The training materials would instruct personnel not to feed or water the animal.
- The training materials would include instructions to call the Corpus Christi Office of the Texas Coastal Ecological Services Field Office (TCESFO-CC) in the event a manatee is sighted in or near the project area.

We appreciate the time and expertise your staff have provided to assist our efforts to avoid significant impacts to federally-listed threatened and endangered species by the Brazos Island Harbor TSP. If you or your staff have any further questions, please contact Ms. Janelle Stokes at 409/766-3039 or janelle.s.stokes@usace.army.mil.

Sincerely,

Carolyn Murphy
Chief, Environmental Section

CF: E. Dawn Whitehead
Texas Coastal Ecological Services Field Office
c/o TAMU-CC, Unit 5837
6300 Ocean Drive
Corpus Christi, Texas 78412-5837

In Reply Refer To:
FWS/R2/CCES/

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Coastal Ecological Services Field Office
TAMU-CC, Unit 5837, 6300 Ocean Drive
Corpus Christi, Texas 78412
361/994-9005/ (Fax) 361/994-8262

December 4, 2013

Carolyn Murphy
Chief, Environmental Section
U. S. Army Corps of Engineers
P.O. Box 1229
Galveston, TX 77553-1229

Consultation No. 02ETCC00-2013-I-0211

Dear Ms. Murphy:

Thank you for your October 30, 2013, letter to clarify or modify the U.S. Army Corps of Enginners's (Corps) assessment of effects for nine species under U.S. Fish and Wildlife Service (Service) jurisdiction in the project area for the Brazos Island Harbor Channel Improviement 52 X 250-foot Alternative, Cameron County, Texas.

Your letter provides additional information regarding the potential for affects of the proposed project to the green sea turtle *Chelonia mydas*, Kemp's ridley sea turtle *Lepidochelys kepii*, loggerhead sea turtle *Caretta caretta*, and hawksbill sea turtle *Eretmocheleys imbricata*, which could nest on the Gulf of Mexico beaches in the project area. The Corps clarified that material dredged from the entrance and jetty channels of the project, during construction and maintenance phases, would be removed by hopper dredge and discharged into the project's open water feeder berm, located 0.4 to 0.9 mile from shore, or into the ocean dredged material placement site located 4 miles from shore. Material dredged from the main channel would be accomplished using hydraulic dredges and discharged into adjacent upland placement areas (PAs). No construction or dredging equipment is proposed to be used along Gulf beaches. The Corps determined that because dredged material would not significantly impact Gulf beaches during dredging operations the project, as proposed, would not affect nesting green, Kemp's ridley, loggerhead, or hawksbill sea turtles.

The Service does not provide concurrence on no effect calls; however, we believe your agency has complied with section 7(a)(2) of the Endangered Species Act by making a determination on these 4 species of sea turtles. Should project plans change, or if additional information on the distribution of listed or proposed species becomes available, this determination should be reconsidered.

With regard to effects of the project on the piping plover *Charadrius melodus* which could potential occur in the upland PAs, the Corps will institute conservation measures. Piping plovers may roost during adverse weather conditions, and disturbance of roosting piping plovers during inclement weather could result in harm to the birds. Adverse weather conditions include temperatures below 40 degrees fahrenheit, winds above 15 to 20 miles per hour, and precipitation. If two or more of these weather conditions occur together when placement of dredge material is planned, the Corps will survey the affected PAs for roosting piping plovers. If piping plovers are identified, pumping of dredge material would be delayed until weather conditions ameleorate and two of the 3 weather conditions are no longer occurring together. With the implementation of these conservation measures, the Corps has determined that the project may affect, but is not likely to adversely affect the piping plover.

The northern aplomado falcon *Falco femoralis septentrionalis* has, to date, not documented nesting in the project area. Nest structures suitable for the aplomado falcon have geen documented approximately 0.5 mile sout the PA 7 and PA 5. All construction and dredge material placement activites will be contained with the the footprint of the existing PA levees. Since activity and noise from construction activities could disturb nesting falcons, prior to commencing levee maintenance activities from March through June, areas within 100 yards of the PA levees and access roads would be examing from a distance of at least 100-300 yards for the presence of stick nests and signs of adult falcons. If an activiely utilized nest is documented within 100 yards of a levee or access road additional surveys would be conducted and the Service would be contacted for review of survey results and impact determination prior to proceeding with work. With the implementation of these conservation measures, the Corps has determined that the project may affect, but is not likely to adversely affect the northern aplomado falcon.

The ocelot *Leopardus pardalis* and the Gulf Coast jaguarundi *Herpailurus yagouaroundi cacomitli* have been documented around the project area and use a variety of habitats, particularly for traveling among preferred habitat sites. All construction activites would be containted within existing levees and avoid direct impacts to lomas and brush habitat adjacent to PA 4A and PA 4B. A new levee segment to be constructed on the south side of PA 4B would be at least 30 feet from the outer edge of the nearby loma. All levee rehabilitation and contruction work would be conducted during daylight hours only. With the implementation of these conservation measures, the Corps has determined that the project may affect, but is not likely to adversely affect the ocelot and the Gulf Coast jaguarundi.

The West Indian manatee *Trichechus manatus* occurs rarely along the Texas coast. To avoid and minimize impacts to manatees during construction and maintenance, the Corps will establish education measures which would prepare contractors and other personnel for responding to the appearance of a manatee. These include identification materials, boat operation guidance, response measures such as avoiding feeding, watering, or other physical contact with a manatee, and contact instructions in the event of a sighting. With the implementation of these conservation measures, the Corps has determined that the project may affect, but is not likely to adversely affect the manatee.

The Service agrees that with the implementation of the conservation, avoidance and minimization measures noted above, the likelihood of an impact occurring to the piping plover, northern aplomado falcon, ocelot, Gulf Coast jaguarundi, or West Indian manatee is insignificant and discountable. The Service, therefore, concurs with the Corps's determination that the project may affect, but is not likely to adversely affect these 5 species.

Should project plans change, or if additional information on the distribtution of listed or proposed species becomes available, this determination can be reconsidered. If you have any questions or need further assistance, please contact Pat Clements at (361) 994-9005, ext. 225 or by email at pat_clements@fws.gov, or Mary Orms at (361) 994-9005, ext. 246 or by email at mary_orms@fws.gov.

Sincerely,

Edith Erfling

Edith Erfling
Field Supervisor

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31:KR
SER-2013-11766

MAY 13 2014

Mrs. Carolyn Murphy
Chief, Environmental Section
Department of the Army
Galveston District, Corps of Engineers
P.O. Box 1229
Galveston, Texas 77553-1229

Ref.: U.S. Army Corps of Engineers Brazos Island Harbor Channel Improvement Project, Cameron County, Texas

Dear Mrs. Murphy:

NOAA's National Marine Fisheries Service (NMFS) provides the attached Biological Opinion ("Opinion") on species listed under the Endangered Species Act (ESA) of 1973. NMFS is providing the U.S. Army Corps of Engineers (USACE) with this Opinion pursuant to 50 CFR 402.14(h). This document is based on our review of impacts associated with the proposed federal navigational channel dredging activities for the Brazos Island Harbor Channel Improvement Project (BIH) to be conducted by the Galveston District USACE.

Information concerning the proposed action was obtained by our review of the Biological Assessment for the BIH in Cameron County, Texas. This Opinion concludes that the proposed action is likely to adversely affect, but is not likely to jeopardize, loggerhead, green, or Kemp's ridley sea turtles listed under the ESA under NMFS's purview and provides reasonable and prudent measures, along with their implementing terms and conditions.

We appreciate the USACE's efforts in working together with NMFS to identify methods and measures to address complex conservation issues that when implemented will provide protection for endangered species under NMFS's authority.

Our primary contact for endangered species issues is Karla Reece. She may be reached by phone at (727) 824-5312 or by email at Karla.Reece@noaa.gov.

Sincerely,

Miles M. Croom

for Roy E. Crabtree, Ph.D.
Regional Administrator

Endangered Species Act – Section 7 Consultation
Final Biological Opinion

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

Activity: Brazos Island Harbor Channel Improvement Project

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

NMFS Consultation No. SER-2013-11766

Approved By: Miles M. Croom

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

Date Issued: MAY 13 2014

TABLE OF CONTENTS

Acronyms

BA	Biological Assessment
BIH	Brazos Island Harbor Chanel Improvement Project
BND	Brownsville Navigation District
CCL	Curved Carapace Length
CPUE	Catch Per Unit Effort
cy	Cubic yards
DPS	Distinct Population Segment
DTRU	Dry Tortugas Recovery Unit
DWH	Deepwater Horizon
EPA	Environmental Protection Agency
ESA	Endangered Species Act of 1973
EWS	Early Warning System
F/SER3	Southeast Regional Office Protected Resources Division
FP	Fibropapillomatosis
GCRU	Greater Caribbean Recovery Unit
GRBO	Gulf of Mexico Regional Biological Opinion
HMS	Highly Migratory Species
ITS	Incidental Take Statement
mcy	million cubic yards
MMPA	Marine Mammal Protection Act of 1972
MRFSS	Marine Recreational Fishing Statistical Survey
NARW	North Atlantic right whale
NCWRC	North Carolina Wildlife Resources Commission
NGMRU	Northern Gulf of Mexico Recovery Unit
nm	nautical mi
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRU	Northern Recovery Unit
NWA	Northwest Atlantic
ODMDS	Ocean Dredged Material Disposal Site
PA	Placement Area
PFRU	Peninsular Florida Recovery Unit
POB	Port of Brownsville
RBO	Regional Biological Opinion
RPAs	Reasonable and Prudent Alternatives
RPMs	Reasonable and Prudent Measures
SAD	South Atlantic Division
SARBO	South Atlantic Regional Biological Opinion
SCDNR	South Carolina Department of Natural Resources
SCL	Straight Carapace Length
SEFSC	Southeast Fisheries Science Center
SERO	Southeast Regional Office
STDW	Sea Turtle Data Warehouse
STSSN	Sea Turtle Stranding and Salvage Network
TEDs	Turtle Excluder Devices
TSP	tentatively selected plan
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service

Introduction

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 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. To fulfill this obligation, Section 7(a)(2) requires federal agencies to consult with the appropriate Secretary on any action that "may affect" listed species or designated critical habitat. The National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) share responsibilities for administering the ESA. Consultations on most listed marine species and their designated critical habitat are conducted between the action agency and NMFS.

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. If either of those circumstances is expected, the Opinion identifies reasonable and prudent alternatives (RPAs) to the action as proposed that can avoid jeopardizing listed species or resulting in the destruction/adverse modification of critical habitat. The Opinion states the amount or extent of incidental take of the listed species that may occur, develops reasonable and prudent measures (RPMs) to reduce the effect of take and monitoring to validate the expected effects of the action, and recommends conservation measures to further conserve the species.

This document represents NMFS's Opinion based on our review of impacts associated with the proposed Brazos Island Harbor Chanel Improvement Project (BIH) to be conducted by the Galveston USACE. The Opinion analyzes project effects on sea turtles (Northwest Atlantic loggerhead distinct population segment [DPS], Kemp's ridley, leatherback, hawksbill, and green) and whales (blue, fin, humpback, sei, and sperm).

Information for this Opinion was provided by the USACE, or was obtained from a variety of sources including published and unpublished literature cited herein.

1 CONSULTATION HISTORY

June 17, 2013: NMFS received the Galveston USACE request for ESA consultation and Biological Assessment (BA) (USACE 2013) for the BIH. The USACE determined that the proposed action was likely to adversely affect all five ESA-listed sea turtle species, and would have no effects on ESA-listed whales. The incoming request for consultation was considered complete so consultation was initiated.

February 20, 2014: NMFS requested confirmation about the Sea Turtle Impact Avoidance Plan. The USACE proposed using outdated conditions from a previous consultation (No. F/SER/2000-01287) as their Sea Turtle Impact Avoidance Plan. The USACE subsequently established a protocol (2006) for hopper dredging in the Gulf of Mexico (Appendix A), but did not mention in the project description of this project if they would comply with the 2006 protocol. The USACE confirmed they will use the 2006 protocol the same day.

2 DESCRIPTION OF THE PROPOSED ACTION AND ACTION AREA

2.1 Proposed Action

The existing BIH navigation project services the Port of Brownsville (POB), which is situated at the western end of the man-made BIH navigation channel in Cameron County, Texas (Figure 1). The non-federal sponsor for the study is the Brownsville Navigation District (BND). The existing project includes the BIH Entrance-Jetty Channel which extends about 2.5 mi (mi) into the Gulf of Mexico, and the Brownsville Main Channel which terminates at a turning basin about 17 mi inland from the Gulf of Mexico (Table 1). The POB is located at the turning basin, about 3 mi north of the Rio Grande (the international border with Mexico) and 5 mi east of the city of Brownsville.

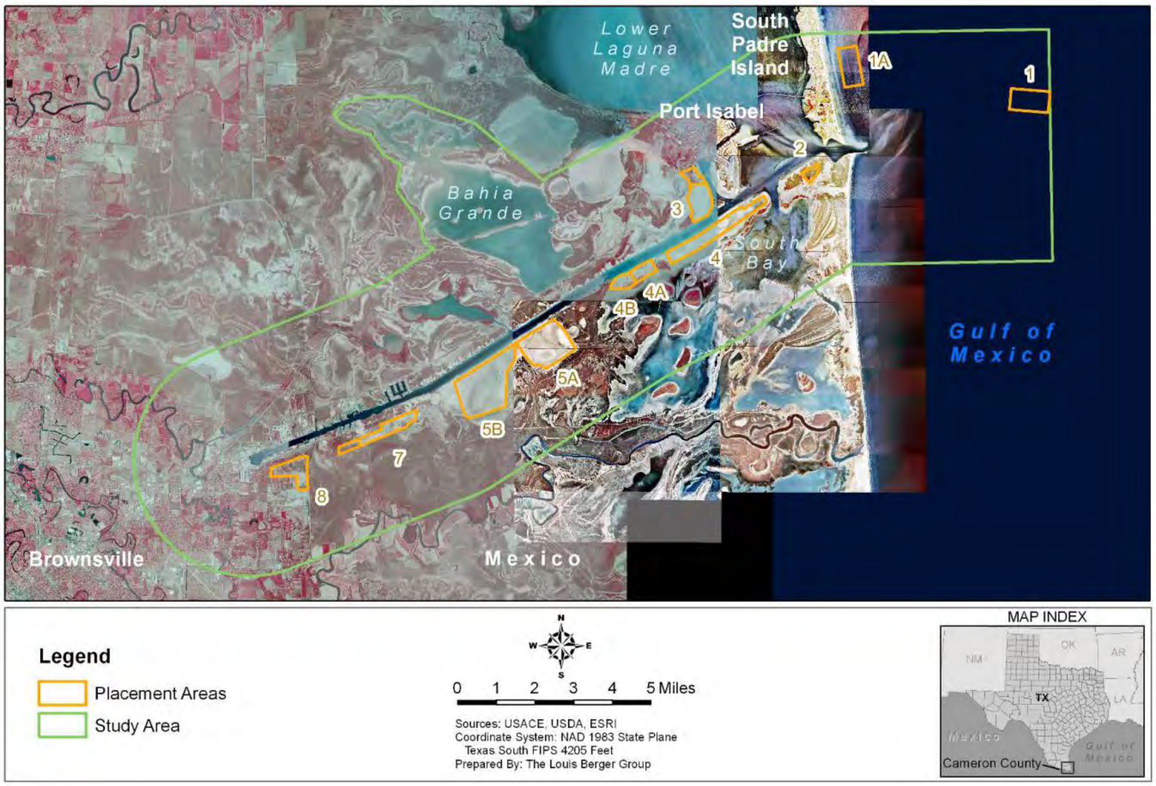


Figure 1: BIH project vicinity map

The proposed federal action is a channel improvement project for the Brazos Island Harbor (BIH) Project, an existing federal deep-draft navigation project in Cameron County, Texas (USACE 1990). The tentatively selected plan (TSP) would deepen the existing 42-foot authorized project to an authorized depth of 52-feet (ft) mean lower low water (MLLW). All information below describing the project activities is taken from the USACE draft BA (USACE 2013).

The 52- by 250-ft TSP for the BIH channel improvement project would (summarized in Table 1):

- extend the Brazos Island Harbor (BIH) Entrance Channel 0.75 mi farther into the Gulf of Mexico (station -17+000 to -13+000) at a depth of -54 ft mean lower low water (MLLW) and a width of 300 ft
- deepen the existing BIH Entrance Channel from station -13+000 to -6+000 to a depth of -54 ft MLLW at the existing width of 300 ft
- deepen the BIH Jetty Channel to -54 ft MLLW from station -6+000 to -1+026 at the existing width of 300 ft, transitioning to the existing 400-ft width through station 0+000
- deepen the Brownsville Main Channel to a depth of -52 ft MLLW at the existing 400-ft width from station 0+000 to 1+517, transitioning to the existing 250-ft width at station 2+329
- deepen 15.5 mi of the Brownsville Main Channel to a depth of -52 ft MLLW at existing widths ranging from 250 to 400 ft from station 2+239 to station 84+200; and maintain existing depth of -42 ft MLLW and width of 325 ft from station 84+200 to 86+000, and existing depth of -36 ft MLLW and width ranging from 325 to 1200 ft from station 86+000 through the end of the channel and turning basin at station 89+500

Table 1. Dimensions of Existing and Proposed Brazos Island Harbor Project (USACE 2013)

Channel Reach	Constructed Depth (ft, MLLW)	Proposed Depth (ft, MLLW)	Constructed Bottom Width (ft)	Proposed Bottom Width (ft)	Dredge type	Channel Length (mi)
Entrance Channel Extension		54		300	Hopper	0.75
Entrance Channel (GOM to offshore end of jetties)	44	54	300	same as existing	Hopper	1.3
Jetty Channel (GOM to Laguna Madre)	44	54	Transitions from 300 to 400	same as existing	Hopper	1.1
Main Channel (Laguna Madre to Turning Basin Extension)	42	52	Varies from 250 to 400	same as existing	Cutterhead	15.1
Turning Basin Extension	Transitions from 42 to 36	same as existing	Transitions from 400 to 325	same as existing	Cutterhead	1.3
Turning Basin	36	same as existing	Transitions from 325 - 1,200	same as existing	Cutterhead	0.6
				Total project length		20.15

New work material from channel deepening would be distributed among the existing New Work ODMDS and upland, confined PAs as shown in Table 2. Under the first construction contract, a hopper dredge would be used to construct the Entrance and Jetty Channels, with a total length (after extension of the Entrance Channel) of approximately 3.2 mi. Although the authorized depth of the offshore channels would be -54 ft MLLW, the potential dredging depth of the Entrance and Jetty Channels could actually be -58 ft MLLW, after accounting for 2 ft of advance maintenance and 2 ft of allowable overdepth. One hopper dredge would be operated continuously for an estimated duration of 7 months to remove approximately 2,066,300 cubic yards of new work material from the Entrance and Jetty Channels. Bed leveling may be performed at the conclusion of dredging by dragging a metal bar to smooth over high spots. All of the material would be placed at the existing New Work Ocean Dredged Material Disposal Site (ODMDS) (EPA 1991) (EPA, 1991). This site is located in a dispersive offshore environment and has unlimited capacity. It is located approximately 4 mi from shore in 60-70 ft of water (Figure 1, see placement areas). The 350-acre ODMDS site is large enough to contain the all new work material that would be placed there during construction.

Table 2. BIH TSP - New Work Quantities and Placement Area Dike Elevations

Channel Stations		Placement Area (PA)	Current PA Acreage	Deepening Dredge Quantity in Cubic Yards (CY)	Existing PA Dike Elevation in Feet (NAVD 88)	New Work Dike Elevation in Feet (NAVD 88)
-17+000	00+000	New Work ODMDS	350	2,066,300[1]		
00+000	07+000	2	71	937,200	27	36
07+000	25+000	4B	243	2,688,800	7	19
25+000	50+000	5A	704	3,611,800	6	12
50+000	70+000	5B	1020	2,599,000	12	15
70+000	82+000	7	257	1,804,000	20	26
82+000	89+500	8	288	438,900	22	25
			Total CY	14,146,000		

It is estimated that 5 subsequent contracts would be awarded for cutterhead suction dredging of the Brownsville Main Channel through station 84+200 for a total length of 15.9 mi. The remainder of the channel (the Turning Basin Extension and Turning Basin) would remain at existing depths. The authorized depth for the inland Main Channel would be -52 ft MLLW, but the potential dredging depth could actually be -55 ft MLLW, after accounting for 2 ft of advance

[1] Dredged by hopper. All other dredging is expected to be non-hopper.

maintenance and 1 ft of allowable overdepth. Two or three cutterhead dredges would be working simultaneously to remove approximately 12,079,700 cubic yards (cy) of new work material over an estimated 29 months. New work material from the Brownsville Main Channel (stations 0+000 through 84+200) would be pumped from the dredges through a combination of fully submerged and floating hydraulic pipelines into existing upland confined Placement Areas (PAs) managed by the Brownsville Navigation District (PAs 2, 4B, 5A, 5B, 7, and 8). In addition, new work material may be placed in PA 3, a PA managed by the San Benito Navigation District and generally used for Port Isabel Channel material. The clay new work material would be stockpiled and used to raise the PA 3 dikes for later, unrelated maintenance dredging of the Port Isabel Channel. Specific quantities going to PA 3 are unknown at this time; should PA 3 be utilized, quantities going to PA 2 and/or 4B would be reduced. None of the existing PAs would need to be expanded and no new PAs would be needed. Construction to raise the containment dikes to heights needed to accommodate new work quantities would be done within the footprints of the existing PAs. The resulting elevations of the PA dikes for the new work placement activities are also shown in Table 3. The dikes would range from a total elevation of 12 feet NAVD 88 around PA 5A to a total elevation of 36 feet around PA 2. Armoring of the exterior toe of the PA 4A and 4B dikes on the side facing the channel would be necessary from station 22+000 to 33+800.

Maintenance dredging would generally be conducted by hopper and cutterhead dredges, with material being distributed among a nearshore Feeder Berm or the existing Maintenance ODMDS, and upland, confined PAs as shown in Table 2 of the Draft Biological Assessment (USACE 2013). Maintenance dredging would utilize the same placement areas as those utilized for existing conditions, and the duration and frequency of dredging events would be within the range occurring under current conditions. Dredging of the Entrance and Jetty Channels and the first 11,000 feet of the Main Channel (+11+000 to -17+000) would generally be performed by a hopper dredge, and material would be placed in the nearshore Feeder Berm Site 1A, located between 1.5 and 2.5 mi from the north jetty and from 0.4 to 0.9 mi from shore (USACE 1988). Sediment removed by maintenance dredging would therefore be regularly placed back into the littoral system, available for cross-shore and longshore sediment transport to the beaches of South Padre Island. Monitoring of material placed at the Feeder Berm has demonstrated that it moves toward the beach and disperses with the major movement being in the alongshore direction (McLellan et al. 1997; USACE-CETN 1989). If for some reason the Feeder Berm cannot be used, maintenance material from the Entrance and Jetty Channels (station -17+000 to 0+000) could be placed in the Maintenance ODMDS which is located approximately 2.5 nautical mi from shore and north of the channel (USACE 1975; USACE 1999). The ODMDS and Feeder Berm are located in dispersive environments and have unlimited capacities.

Maintenance material from the remainder of the Main Channel (stations 11+000 through 89+500) would be placed in existing PAs 4A, 4B, 5A, 5B, 7 and 8. Upland PAs and containment dikes are sized to accommodate total quantities over the 50-year period of analysis. None of the existing PAs would need to be expanded and no new PAs would be needed. Construction to raise the containment dikes to heights needed to accommodate the 50-year maintenance quantities would be done within the footprints of the existing PAs. Dikes would be raised incrementally as needed to contain maintenance quantities. The resulting elevations of the PA dikes for the 50-year placement plan are also shown in Table 3. They range from a total elevation of 17 feet NAVD 88 around PA 5A to a total elevation of 38 feet around PA 7. Benthos in the project area is comprised of a mix of sand, mud, and clay.

Table 3. BIH TSP - O&M Quantities and Placement Area Dike Elevations

Stations		Shoaling Rate in Cubic Yards/ Year (CY/YR)	Placement Area	Dredge Cycle (Years)	Number of Cycles in 50 Years	Quantity per Cycle (CY/Cycle)	Total O&M Quantity in 50 Years (CY)	Total Dike Elevation in 50 Years (feet NAVD88)
-17+000	0+00	470,630	Nearshore Feeder Berm Site 1A	5	10	2,353,150	23,531,500	N/A
0+00	11+000	161,595	Nearshore Feeder Berm Site 1A	3	16	484,785	7,756,600	N/A
11+000	28+000	183,995	4A	4	12	735,980	8,831,800	35
28+000	34+000	43,047	4B	4	12	172,188	2,066,300	24
34+000	50+000	123,527	5A	4	12	494,108	5,929,300	17
50+000	65+000	143,577	5B	5	10	717,885	7,178,900	19
65+000	79+000	98,637	7	6	8	591,822	4,734,600	38
79+000	89+500	30,377	8	7	7	212,639	1,488,500	28
					Total CY	5,762,557	61,517,500	

2.2 Sea Turtle Impact Avoidance Plan

An avoidance plan has been developed to avoid and minimize adverse impacts to sea turtles from hopper dredging during construction of the TSP. 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 two decades. These measures are:

- *Training*: All contracted personnel involved in operating hopper dredges must receive thorough training (as specified by NMFS) on measures of dredge operation that will minimize sea turtle takes.
- *Seasonal Hopper Dredging Window*: Hopper dredging activities in Gulf waters up to one mile into rivers shall be completed, whenever possible, between December 1 and March 31, when sea turtle abundance is lowest throughout Gulf coastal waters.
- *Non-Hopper-Type Dredging*: Pipeline or hydraulic dredges, which are not known to take turtles, must be used whenever possible between April 1 and November 30 in Gulf waters up to one mile into rivers.
- *Observers*: The USACE will 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% monitoring (i.e., 2 observers) of hopper dredging operations will be implemented between April 1 and November 30, or if the surface water temperatures are 11°C or greater.

- *Screening*: 100% 4-in inflow screening of dredged material is required. If conditions prevent 100% inflow screening using 4-in mesh, the Galveston District, observers, and draghead operator must consult, and USACE must notify NMFS before reducing or eliminating inflow screening and provide details regarding effective overflow screening. If deemed necessary, screening may be modified gradually (increasing mesh size to 6-in by 6-in, then 9-in by 9-in, then 12-in by 12-in). If clogging is still an issue after gradual changes, then effective 100% overflow screening is required.
- *Sea Turtle Deflecting Draghead and Dredging Pumps*: A state-of-the-art rigid-deflector draghead will be used on all hopper dredges at all times of the year. Dredging pumps will 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 (especially important during dredging cleanup).
- *Dredge Lighting*: From March 15 through September 30, sea turtle nesting and emergence season, all lighting aboard hopper dredges and hopper dredge pumpout barges operating within 3 nautical mi of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and/or Occupational Safety and Health Administration requirements. Non-essential lighting shall be minimized through reduction, shielding, lowering, and appropriate placement.
- *Dredge Take Reporting*: Observer reports of incidental take by hopper dredges will be submitted by email (to *takereport.nmfsser@noaa.gov*) to NMFS Southeast Regional Office by onboard protected species observers within 24 hours of any observed sea turtle take. An end-of-project summary report of the hopper dredging results and any documented sea turtle takes will be submitted to NMFS Southeast Regional Office within 30 working days of completion of the dredging project. The USACE will submit an annual report to NMFS Southeast Regional Office summarizing hopper dredging projects and documented incidental takes. This report must include a complete explanation why alternative dredges (other than hopper dredges) were not used for maintenance dredging, if that activity occurs between April and November.
- *Sea turtle stranding and salvage network (STSSN) notification*: USACE or its representative will notify the STSSN state representative of start-up and completion of dredging, bed-leveling, and relocation trawling operations and ask to be notified of any turtle strandings in the project area that may bear the signs of draghead impingement or entrainment or interaction with a bed-leveling type dredge. Dredge relevant stranding information will be reported in the end-of-project summary report and end of year annual report (these strandings will not be counted against USACE take limit during maintenance).
- *Relocation Trawling*: Relocation trawling will be undertaken by the USACE where any of the following conditions are met: (a) 2 or more turtles are taken in a 24-hour period in the project; (b) 4 or more turtles are taken in the project; or, (c) when 75% of a District's sea turtle species fiscal year quota for a particular species has previously been met[2]. Handling of sea turtles captured during relocation trawling in association with hopper

[2] For this consultation, relocation trawling will be undertaken when 75% of the 'take' for any species is met.

dredging project in Gulf navigation channels and sand mining areas shall be conducted by NMFS-approved endangered species observers.

The USACE will also implement the USACE Management Protocol for Effective Implementation of the NMFS Regional Biological Opinion for Hopper Dredging Gulf of Mexico, dated December 29, 2009 (Appendix A)(USACE 2006).

2.3 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 the project includes all areas to be dredged from the turning basin of the navigation channel to the entrance channel extension (approximately 20.15 mi) to the PA offshore and all waters in between (shown in Figure 1).

3 SPECIES AND CRITICAL HABITAT OCCURRING IN THE ACTION AREA

Species and Critical Habitat:

Table 4 below lists the endangered (E) and threatened (T) species, and actual and proposed critical habitats under the jurisdiction of NMFS that may occur in the action area. These are limited to the sea turtles (loggerhead [Northwest Atlantic loggerhead distinct population segment (DPS)], Kemp's ridley, leatherback, hawksbill, and green) and whales (blue, fin, humpback, sei, and sperm).

Table 4. Status of Listed Species in the Action Area (E= Endangered, T=Threatened)

Species		**Scientific Name**	**Status**	**USACE Effect Determination**	**NMFS Effect Determination**
Sea Turtles	Loggerhead sea turtle, Northwest Atlantic (NWA) distinct population segment (DPS)	*Caretta caretta*	T	LAA (Likely to Adversely Affect)	LAA
	Green	*Chelonia mydas*	E/T[3]	LAA	LAA
	Kemp's ridley	*Lepidochelys kempii*	E	LAA	LAA
	Leatherback	*Dermochelys coriacea*	E	LAA	NLAA (Not Likely to Adversely Affect)
	Hawksbill	*Eretmochelys imbricata*	E	LAA	NLAA
Whales	Sei	*Balaenoptera borealis*	E	NE (No Effect)	NLAA
	Blue	*Balaenoptera musculus*	E	NE	NLAA
	Finback	*Balaenoptera physalus*	E	NE	NLAA
	Humpback	*Megaptera novaeangliae*	E	NE	NLAA
	Sperm	*Physeter macrocephalus*	E	NE	NLAA

[3] Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered.

3.1 Analysis of Species and Critical Habitats Not Likely to be Adversely Affected

We have determined that the proposed action being considered in this Opinion is not likely to adversely affect leatherback and hawksbill sea turtles, and whales (sei, blue, finback, humpback, and sperm). These species are excluded from further analysis and consideration in this Opinion. The following discussion summarizes our rationale for this determination.

3.1.1 Leatherback Sea Turtle

Leatherback sea turtles may be found in the action area, particularly when onshore winds and/or currents push jellyfish, their preferred prey, into inshore waters. However, leatherbacks are primarily a pelagic species, preferring deeper waters than those of the action area (the deepest portions of the offshore action area are less than 60 ft deep). No takes of leatherback sea turtles by hopper dredging activities have ever been reported in POB or the BIH navigation channel. Furthermore, only one leatherback sea turtle was captured, tagged, and released during relocation trawling operations in Texas (July 2003), however, this occurred in Port Aransas, approximately 120 miles to the north, as documented in the on-line Sea Turtle Data Warehouse[4] (STDW). The USACE STDW was created to centralize and archive historical and future data regarding sea turtle impacts from hopper dredging activities for long-term continuity and evaluation of these data. Because of the very few documented encounters with leatherback sea turtles during dredging operations, the turtles' very large size (compared to hopper dredge dragheads or mechanical dredge equipment), pelagic nature (surface and mid-water), preference for deeper waters located beyond the project area further offshore, and feeding habits (which make it unlikely they would ever encounter a bottom-hugging hopper dredge draghead or be exposed to any project blasting which will occur upriver), NMFS believes the possibility that leatherback sea turtles would be adversely affected by a hopper dredge is discountable.

3.1.2 Hawksbill Sea Turtle

NMFS believes the proposed project may affect, but is not likely to adversely affect, hawksbill sea turtles, as described below. Texas is the only state outside of Florida where hawksbills are sighted with any regularity. Most of these sightings involve post-hatchlings and juveniles, and are primarily associated with stone jetties. These small turtles are believed to originate from nesting beaches in Mexico[5] (NMFS, 2013d). On June 13, 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.[6] STSSN data from 2004–2007 show that 59 hawksbills were found along Texas waters or shorelines and that no hawksbills have been killed or captured during relocation trawls or maintenance dredging projects in the BIH area since record-keeping began in 1995. Hawksbill life history consists of an open ocean 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 1988; Meylan and Donnelly 1999), followed by residency in developmental habitats (foraging areas where immature turtles reside and grow) in coastal waters, which may include inlets, bays, seagrass areas, coastal lagoons, coral reefs, and hard-bottom habitats. Adult foraging habitat, which may or may not overlap with developmental habitat, is typically coral reefs, although other hard-bottom communities and mangrove fringed bays may occasionally be occupied. Adult hawksbills show fidelity to their foraging areas over

[4] http://el.erdc.usace.army.mil/seaturtles/index.cfm
[5] http://www.nmfs.noaa.gov/pr/species/turtles/hawksbill.htm (accessed June 6, 2013)
[6] http://www.nps.gov/pais/naturescience/hawksbill.htm (accessed June 6, 2013)

periods of time as great as several years (van Dam and Díez 1998). Hawksbills have a specialized diet consisting primarily of sponges (Meylan 1988), although other food items, notably corallimorphs and zooanthids, have been documented to be important in some areas of the Caribbean (León and Díez 2000; Mayor et al. 1998; van Dam and Díez 1997). Therefore, hawksbills are unlikely to forage in the mixed sand, mud, and clay project area, and NMFS believes it is extremely unlikely that hawksbill sea turtles will be present in the action area. As well, no takes of hawksbill sea turtles by hopper dredging activities have ever been reported in POB or the BIH navigation channel. Thus, we consider the potential for impacts to hawksbill sea turtles to be discountable.

3.1.3 Whales (sei, blue, fin, humpback, and sperm)

NMFS identifies 5 endangered whale species of potential occurrence in the Gulf. These are the sei whale (*Balaenoptera borealis*), blue whale (*Balaenoptera musculus*), finback whale (*Balaenoptera physalus*), humpback whale (*Megaptera novaeangliae*), and sperm whale (*Physeter macrocephalus*). These species are generally restricted to deeper offshore waters, while the project disposal area (the deepest portion of the proposed action) is located just 4 mi from shore in 60 feet of water; therefore, it is extremely unlikely that any of these 5 species would regularly occur in the project area (NMFS, 2003). Further, these species are not likely to be impacted by hopper dredges because of slow speed of these vessels. Thus, we conclude that the risk to these species is discountable.

Summary

NMFS has determined that leatherback and hawksbill sea turtles, and whales (sei, blue, fin, humpback, and sperm) are not likely to be adversely affected. These species will not be considered further in this opinion.

3.2 Species Likely to be Adversely Affected

NMFS believes the proposed action is likely to adversely affect loggerhead, green, and Kemp's ridley sea turtles. The status of these species is discussed in the following sections.

3.2.1 Loggerhead Sea Turtle – NW Atlantic DPS

The loggerhead sea turtle was listed as a threatened species throughout its global range on July 28, 1978. NMFS and USFWS published a final rule designating 9 DPSs for loggerhead sea turtles (76 FR 58868, September 22, 2011, effective October 24, 2011). The DPSs established by this rule include (1) Northwest Atlantic Ocean (threatened), (2) Northeast Atlantic Ocean (endangered), (3) South Atlantic Ocean (threatened), (4) Mediterranean Sea (endangered), (5) North Pacific Ocean (endangered), (6) South Pacific Ocean (endangered), (7) North Indian Ocean (endangered), (8) Southeast Indo-Pacific Ocean (endangered), and (9) Southwest Indian Ocean (threatened). The Northwest Atlantic (NWA) DPS is the only one that occurs within the action area and therefore is the only one considered in this Opinion.

Species Description and Distribution

Loggerheads are large sea turtles with the mean straight carapace length (SCL) of adults in the southeast United States being approximately 3 ft (92 cm). The corresponding mass is approximately 255 lb (116 kg) (Ehrhart and Yoder 1978). Adult and subadult loggerhead sea turtles typically have a light yellow plastron and a reddish brown carapace covered by non-overlapping scutes that meet along seam lines. They typically have 11 or 12 pairs of marginal scutes, 5 pairs of costals, 5 vertebrals, and a nuchal (precentral) scute that is in contact with the first pair of costal scutes (Dodd 1988).

The loggerhead sea turtle inhabits continental shelf and estuarine environments throughout the temperate and tropical regions of the Atlantic, Pacific, and Indian Oceans (Dodd 1988). Habitat uses within these areas vary by life stage. Juveniles are omnivorous and forage on crabs, mollusks, jellyfish and vegetation at or near the surface (Dodd 1988). Subadult and adult loggerheads are primarily found in coastal waters and prey on benthic invertebrates such as mollusks and decapod crustaceans in hard-bottom habitats.

The majority of loggerhead nesting occurs at the western rims of the Atlantic and Indian Oceans concentrated in the north and south temperate zones and subtropics (NRC 1990). In the western North Atlantic, loggerhead nesting is concentrated along the coasts of the United States from southern Virginia to Alabama. Additional nesting beaches are found along the northern and western Gulf of Mexico, eastern Yucatán Peninsula, at Cay Sal Bank in the eastern Bahamas (Addison 1997; Addison and Morford 1996), off the southwestern coast of Cuba (Gavilan 2001), and along the coasts of Central America, Colombia, Venezuela, and the eastern Caribbean Islands.

Non-nesting, adult female loggerheads are reported throughout the United States and Caribbean Sea. Little is known about the distribution of adult males who are seasonally abundant near nesting beaches although aerial surveys suggest that loggerheads in U.S. waters are distributed as a whole in the following proportions: 54% in the southeast U.S. Atlantic, 29% in the northeast U.S. Atlantic, 12% in the eastern Gulf of Mexico, and 5% in the western Gulf of Mexico (TEWG 1998).

Within the NWA, most loggerhead sea turtles nest from North Carolina to Florida and along the Gulf coast of Florida. Previous Section 7 analyses have recognized at least 5 Western Atlantic subpopulations, divided geographically as follows: (1) a Northern nesting subpopulation, occurring from North Carolina to Northeast Florida at about 29ºN; (2) a South Florida nesting subpopulation, occurring from 29°N on the east coast of the state 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 M 1990; TEWG 2000a); and (5) a Dry Tortugas nesting subpopulation, occurring in the islands of the Dry Tortugas, near Key West, Florida (NMFS-SEFSC 2001). The recovery plan for the Northwest Atlantic population of loggerhead sea turtles concluded, based on recent advances in genetic analyses, that there is no genetic distinction between loggerheads nesting on adjacent beaches along the Florida Peninsula and that specific boundaries for subpopulations could not be designated based on genetic differences alone. Thus, the plan uses a combination of geographic distribution of nesting densities, geographic separation, and geopolitical boundaries, in addition to genetic differences, to identify recovery units. The recovery units are (1) the Northern Recovery Unit (Florida/Georgia border north through southern Virginia), (2) the Peninsular Florida Recovery Unit (Florida/Georgia border through Pinellas County, Florida), (3) the Dry Tortugas Recovery Unit (islands located west of Key West, Florida), (4) the Northern Gulf of Mexico Recovery Unit (Franklin County, Florida, through Texas), and (5) the Greater Caribbean Recovery Unit (Mexico through French Guiana, the Bahamas, Lesser Antilles, and Greater Antilles) (NMFS and USFWS 2008a). The recovery plan concluded that all recovery units are essential to the recovery of the species. Although the recovery plan was written prior to the listing of the NWA DPS, the recovery units for what was then termed the Northwest Atlantic population apply to the NWA DPS.

Life History Information

The Northwest Atlantic Loggerhead Recovery Team defined the following 8 life stages for the loggerhead life cycle, including the ecosystems those stages generally use: (1) egg (terrestrial zone), (2) hatchling stage (terrestrial zone), (3) hatchling swim frenzy and transitional stage (neritic zone[7]), (4) juvenile stage (oceanic zone), (5) juvenile stage (neritic zone), (6) adult stage (oceanic zone), (7) adult stage (neritic zone), and (8) nesting female (terrestrial zone) (NMFS and USFWS 2008). Loggerheads are long-lived organisms that reach sexual maturity between 20 and 38 years of age, although this varies widely among populations (Frazer and Ehrhart 1985; NMFS and SEFSC 2001). The annual mating season for loggerhead sea turtles occurs from late March to early June, and eggs are laid throughout the summer months. Female loggerheads deposit an average of 4.1 nests within a nesting season (Murphy and Hopkins 1984) but an individual female only nests every 3.7 years on average (Tucker 2010). Along the southeastern United States, loggerheads lay an average of 100–126 eggs per nest (Dodd 1988) which incubate for 42–75 days before hatching (NMFS and USFWS 2008b).

As post-hatchlings, loggerheads hatched on U.S. beaches migrate offshore and become associated with Sargassum habitats,[8] driftlines, and other convergence zones (Carr 1986) (Witherington 2002). Loggerheads originating from the NWA DPS are believed to lead a pelagic existence in the North Atlantic Gyre for a period as long as 7–12 years (Bolten et al. 1998) before moving to more coastal habitats. Recent studies have suggested that not all loggerhead sea turtles follow the model of circumnavigating the North Atlantic Gyre as pelagic juveniles, followed by permanent settlement into benthic environments (Bolten and Witherington 2003; Laurent et al. 1998). These studies suggest some turtles may either remain in the pelagic habitat in the North Atlantic longer than hypothesized or move back and forth between pelagic and coastal habitats interchangeably (Witzell 2002). Stranding records indicate that when immature loggerheads reach 15–24 in (40-60 cm) SCL, they begin to occur in coastal inshore waters of the continental shelf throughout the U.S. Atlantic and Gulf of Mexico (Witzell 2002).

After departing the oceanic zone, neritic juvenile loggerheads in the Northwest Atlantic inhabit continental shelf waters from Cape Cod Bay, Massachusetts, south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Estuarine waters of the United States, including areas such as Long Island Sound, Chesapeake Bay, Pamlico and Core Sounds, Mosquito and Indian River Lagoons, Biscayne Bay, Florida Bay, and numerous embayments fringing the Gulf of Mexico, comprise important inshore habitat. Along the Atlantic and Gulf of Mexico shoreline, essentially all shelf waters are inhabited by loggerheads.

Like juveniles, non-nesting adult loggerheads also use the neritic zone. However, these adult loggerheads use the relatively enclosed shallow-water estuarine habitats with limited ocean

[7] Neritic refers to the inshore marine environment from the surface to the sea floor where water depths do not exceed 200 meters.

[8] Sargassum is a type of free floating seaweed sometimes occurring in extensive rafts that provides habitat for distinctive communities of organisms adapted to the buoyant Sargassum habitat.

access are less frequently than the juveniles. Areas such as Pamlico Sound, North Carolina, and the Indian River Lagoon, Florida, are regularly used by juveniles but not adult loggerheads. In comparison, adult loggerheads tend to use estuarine areas with more open ocean access, such as Chesapeake Bay in the U.S. Mid-Atlantic. Shallow-water habitats with large expanses of open ocean access, such as Florida Bay, provide year-round resident foraging areas for significant numbers of male and female adult loggerheads. Offshore, adults primarily inhabit continental shelf waters, from New York south through Florida, The Bahamas, Cuba, and the Gulf of Mexico. Seasonal use of Mid-Atlantic shelf waters, especially offshore New Jersey, Delaware, and Virginia during summer months, and offshore shelf waters, such as Onslow Bay (off the North Carolina coast), during winter months has also been documented (Hawkes et al. 2007a; Georgia Department of Natural Resources, unpublished data; South Carolina Department of Natural Resources, unpublished data). Satellite telemetry has identified the shelf waters along the west Florida coast, The Bahamas, Cuba, and the Yucatán Peninsula as important resident areas for adult female loggerheads that nest in Florida (Foley et al. 2008; Girard et al. 2009; Hart et al. 2012). The southern edge of the Grand Bahama Bank is important habitat for loggerheads nesting on the Cay Sal Bank in The Bahamas, but nesting females are also resident in the bights of Eleuthera, Long Island, and Ragged Islands as well as Florida Bay in the United States, and the north coast of Cuba (A. Bolten and K. Bjorndal, University of Florida, unpublished data). Moncada et al. (2010) report the recapture in Cuban waters of 5 adult female loggerheads originally flipper tagged in Quintana Roo, Mexico, indicating that Cuban shelf waters likely also provide foraging habitat for adult females that nest in Mexico.

Status and Population Dynamics

A number of stock assessments and similar reviews (Conant et al. 2009; Heppell et al. 2003; NMFS-SEFSC 2009a; NMFS and SEFSC 2001; NMFS and USFWS 2008a; TEWG 1998; TEWG 2000a; TEWG 2009) have examined the stock status of loggerheads in the Atlantic Ocean, but none have been able to develop a reliable estimate of absolute population size.

Numbers of nests and nesting females can vary widely from year to year. However, nesting beach surveys can provide a reliable assessment of trends in the adult female population, due to the strong nest site fidelity of female loggerhead sea turtles, as long as such studies are sufficiently long and effort and methods are standardized (e.g., NMFS and USFWS (2008a). NMFS and USFWS (2008a) concluded that the lack of change in 2 important demographic parameters of loggerheads, remigration interval and clutch frequency, indicate that time series on numbers of nests can provide reliable information on trends in the female population.

<u>Peninsular Florida Recovery Unit</u>

The Peninsular Florida Recovery Unit (PFRU) is the largest loggerhead nesting assemblage in the Northwest Atlantic. A near-complete nest census (all beaches including index nesting beaches[9]) undertaken from 1989 to 2007 showed a mean of 64,513 loggerhead nests per year, representing approximately 15,735 nesting females per year (NMFS and USFWS 2008a). The statewide estimated total for 2012 was 98,601 nests (FWRI nesting database).

[9] The index survey uses standardized data-collection criteria to measure seasonal nesting at specific locations to ensure accurate comparisons between beaches and between years.

In addition to the total nest count estimates, the Florida Fish and Wildlife Research Institute (FWRI) uses an index nesting beach survey method. The index survey uses standardized data-collection criteria to measure seasonal nesting and allow accurate comparisons between beaches and between years. This provides a better tool for understanding the nesting trends (Figure 2). FWRI performed a detailed analysis of the long-term loggerhead index nesting data (1989–2012[10]). Three distinct trends over that time period were identified. From 1989-1998 there was a 23% increase, that was then followed by a sharp decline over the subsequent decade. However, recent large increases in loggerhead nesting occurred since then. FWRI examined the trend from the 1998 nesting high through 2012 and found the decade-long post-1998 decline had reversed and there was no longer a demonstrable trend. Looking at the data from 1989 through 2012, FWRI concluded that there was an overall positive change in the nest counts.

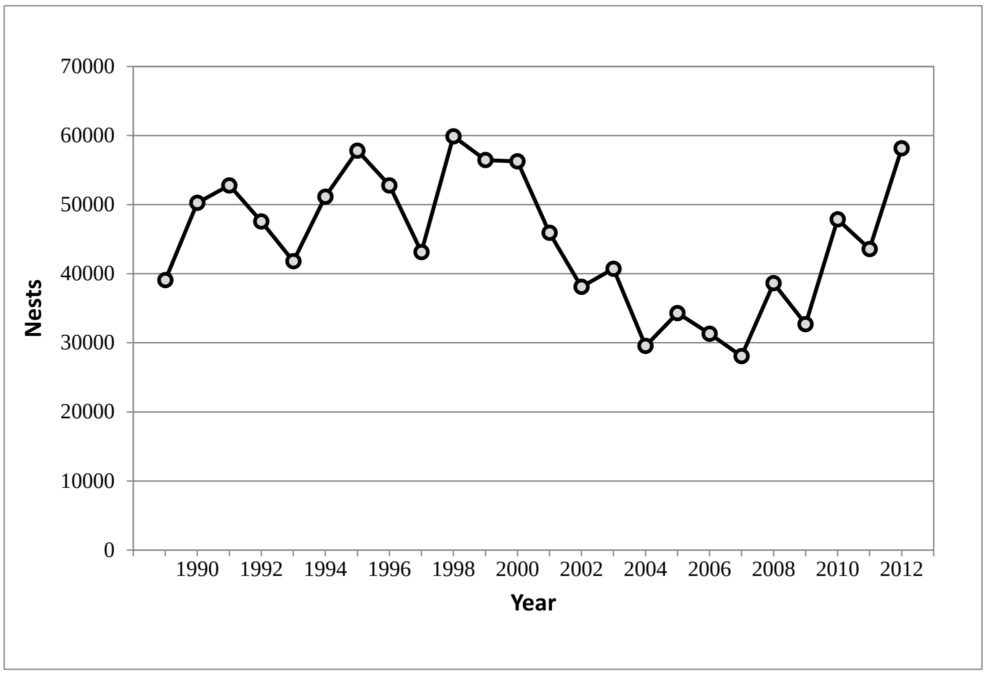


Figure 2. Loggerhead sea turtle nesting at Florida index beaches since 1989

Northern Recovery Unit

Annual nest totals from beaches within the Northern Recovery Unit (NRU) averaged 5,215 nests from 1989-2008, a period of near-complete surveys of NRU nesting beaches (Georgia Department of Natural Resources (GDNR) unpublished data, North Carolina Wildlife Resources Commission (NCWRC) unpublished data, South Carolina Department of Natural Resources (SCDNR) unpublished data), and represent approximately 1,272 nesting females per year, assuming 4.1 nests per female (Murphy and Hopkins 1984). The loggerhead nesting trend from daily beach surveys showed a significant decline of 1.3% annually from 1989-2008. Nest totals from aerial surveys conducted by SCDNR showed a 1.9% annual decline in nesting in South Carolina from 1980 through 2008. Overall, there is strong statistical data to suggest the NRU had experienced a long-term decline over that period of time.

[10] http://myfwc.com/research/wildlife/sea-turtles/nesting/loggerhead-trends

Data since that analysis (Table 5) are showing improved nesting numbers and a departure from the declining trend. Georgia nesting has rebounded to show the first statistically significant increasing trend since comprehensive nesting surveys began in 1989 (Mark Dodd, Georgia Department of Natural Resources (GADNR) press release, http://www.georgiawildlife.com/node/3139). South Carolina and North Carolina nesting have also begun to show a shift away from the past declining trend.

Table 5. Total Number of NRU Loggerhead Nests (GADNR, SCDNR, and NCWRC nesting datasets)

Nests Recorded	2008	2009	2010	2011	2012
Georgia	1,649	997	1,761	1,992	2,218
South Carolina	4,500	2,183	3,141	4,015	4,615
North Carolina	841	276	846	948	1,069
Total	6,990	3,456	5,748	6,955	7,902

South Carolina also conducts an index beach nesting survey similar to the one described for Florida. Although the survey only includes a subset of nesting, the standardized effort and locations allow for a better representation of the nesting trend over time. Increases in nesting were seen for the period from 2009–2012, with 2012 showing the highest index nesting total since the start of the program (Figure 3).[11]

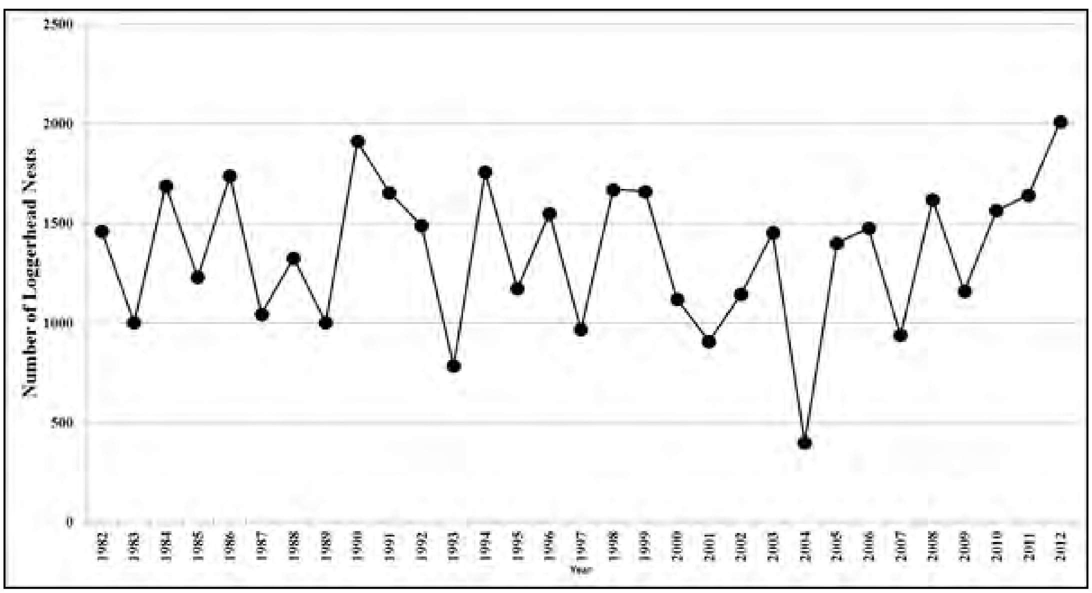


Figure 3. South Carolina Index nesting beach counts for loggerhead sea turtles

<u>Other NW Atlantic DPS Recovery Units</u>

The remaining 3 recovery units—Dry Tortugas (DTRU), Northern Gulf of Mexico (NGMRU), and Greater Caribbean (GCRU)—are much smaller nesting assemblages but still considered essential to the continued existence of the species. Nesting surveys for the DTRU are conducted as part of Florida's statewide survey program. Survey effort was relatively stable during the 9-year period from 1995–2004 (although the 2002 year was missed). Nest counts ranged from

[11] SCDNR website, http://www.dnr.sc.gov/seaturtle/nest.htm

168–270, with a mean of 246, but with no detectable trend during this period (NMFS and USFWS 2008a). Nest counts for the NGMRU are focused on index beaches rather than all beaches where nesting occurs. Analysis of the 12-year dataset (1997–2008) of index nesting beaches in the area shows a statistically significant declining trend of 4.7% annually (NMFS and USFWS 2008a). Nesting on the Florida Panhandle index beaches, which represents the majority of NGMRU nesting, had shown a large increase in 2008, but then declined again in 2009 and 2010 before rising back to a level similar to the 2003–2007 average in 2011. Nesting survey effort has been inconsistent among the GCRU nesting beaches and no trend can be determined for this subpopulation. Zurita et al. (2003) found a statistically significant increase in the number of nests on 7 of the beaches on Quintana Roo, Mexico, from 1987–2001, where survey effort was consistent during the period. However, nesting has declined since 2001, and the previously reported increasing trend appears to not have been sustained (NMFS and USFWS 2008a).

In-Water Trends

Nesting data are the best current indicator of sea turtle population trends; however, in-water data also provide some insight. Such research suggests the abundance of neritic juvenile loggerheads is steady or increasing. Although Ehrhart et al. (2007) found no significant regression-line trend in a long-term dataset, researchers have observed notable increases in catch per unit effort (CPUE) over the past several years (Ehrhart et al. 2007; Epperly et al. 2007; Arendt et al. 2009). Researchers believe that this increase in CPUE is likely linked to an increase in juvenile abundance, though it is unclear whether this increase in abundance represents a true population increase among juveniles or merely a shift in spatial occurrence. Bjorndal et al. (2005)cited in NMFS and USFWS (2008a), caution about extrapolating localized in-water trends to the broader population and relating localized trends in neritic sites to population trends at nesting beaches. The apparent overall increase in the abundance of neritic loggerheads in the southeastern United States may be due to increased abundance of the largest oceanic/neritic juveniles (historically referred to as small benthic juveniles), which could indicate a relatively large number of individuals around the same age may mature in the near future (TEWG 2009). However, in-water studies throughout the eastern United States also indicate a substantial decrease in the abundance of the smallest oceanic/neritic juvenile loggerheads, a pattern corroborated by stranding data (TEWG 2009).

Population Estimate

The NMFS Southeast Fishery Science Center developed a preliminary stage/age demographic model to help determine the estimated impacts of mortality reductions on loggerhead sea turtle population dynamics (NMFS-SEFSC 2009a). The model uses the range of published information for the various parameters including mortality by stage, stage duration (years in a stage), and fecundity parameters such as eggs per nest, nests per nesting female, hatchling emergence success, sex ratio, and remigration interval. Resulting trajectories of model runs for each individual recovery unit, as well as the western North Atlantic population as a whole, were found to be very similar. The model run estimates, from the adult female population size for the western North Atlantic (from the 2004-2008 time frame), suggests the adult female population size approximately 20,000 to 40,000 individuals, with a low likelihood of being up to 70,000 (NMFS-SEFSC 2009a). A less robust estimate for total benthic females in the western North Atlantic was also obtained, yielding approximately 30,000-300,000 individuals, up to less than 1 million (NMFS-SEFSC 2009a).

Threats
The threats faced by loggerhead sea turtles are well-summarized in the general discussion of threats in Section 3.2.4. However, the impact of fishery interactions is a point of further emphasis for this species. The Loggerhead Biological Review Team determined that the greatest threats to the NWA DPS of loggerheads result from cumulative fishery bycatch in neritic and oceanic habitats (Conant et al. 2009). Domestic fishery operations often capture, injure, and kill sea turtles at various life stages. Loggerheads in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Although loggerhead sea turtles are most vulnerable to pelagic longlines during their immature life history stage, there is some evidence that benthic juveniles may also be captured, injured, or killed by pelagic fisheries (Lewison 2004). Southeast U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of turtles each year. Loggerheads in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters including trawl, gillnet, purse seine, hook-and-line, including bottom longline and vertical line (e.g., bandit gear, handline, and rod-reel), pound net, and trap fisheries (refer to the Environmental Baseline section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). In addition to domestic fisheries, sea turtles are subject to incidental capture in numerous foreign fisheries, further exacerbating the ability of sea turtles to survive and recover on a global scale. For example, pelagic, immature loggerhead sea turtles circumnavigating the Atlantic are exposed to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom set lines in the coastal waters of Madeira, Portugal, are reported to take an estimated 500 pelagic immature loggerheads each year (Dellinger and Encarnaçâo 2000)and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets, making it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Regarding the impacts of pollution, loggerheads may be particularly affected by organochlorine[12] contaminants as they were observed to have the highest organochlorine concentrations in sampled tissues (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Storelli et al. (2008) analyzed tissues from stranded loggerhead sea turtles and found that mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms like dolphins, seals, and porpoises (Law et al. 1991a).

Specific information regarding potential climate change impacts on loggerheads is also available. Modeling suggests an increase of 2°C in air temperature would result in a sex ratio of over 80% female offspring for loggerheads nesting near Southport, North Carolina. The same increase in air temperatures at nesting beaches in Cape Canaveral, Florida, would result in close to 100%

[12] compounds that contain carbon, chlorine, and hydrogen

female offspring. Such highly skewed sex ratios could undermine the reproductive capacity of the species. More ominously, an air temperature increase of 3°C is likely to exceed the thermal threshold of most clutches, leading to death (Hawkes et al. 2007). Warmer sea surface temperatures have also been correlated with an earlier onset of loggerhead nesting in the spring (Hawkes et al. 2007; Weishampel et al. 2004), as well as short inter-nesting intervals (Hays et al. 2002) and shorter nesting season (Pike et al. 2006).

3.2.2 Green Sea Turtle

The green sea turtle was listed as threatened under the ESA on July 28, 1978, except for the Florida and Pacific coast of Mexico breeding populations, which were listed as endangered.

Species Description and Distribution

The green sea turtle is the largest of the hardshell marine turtles, growing to a weight of 350 lb (159 kg) and a straight carapace length of greater than 3.3 ft (1 m). Green sea turtles have a smooth carapace with 4 pairs of lateral (or costal) scutes and a single pair of elongated prefrontal scales between the eyes. They typically have a black dorsal surface and a white ventral surface, although the carapace of green sea turtles in the Atlantic Ocean has been known to change in color from solid black to a variety of shades of grey, green, or brown and black in starburst or irregular patterns (Lagueux 2001).

With the exception of post-hatchlings, green sea turtles live in nearshore tropical and subtropical waters where they generally feed on marine algae and seagrasses. They have specific foraging grounds and may make large migrations between these forage sites and natal beaches for nesting (Hays et al. 2001). Green sea turtles nest on sandy beaches of mainland shores, barrier islands, coral islands, and volcanic islands in more than 80 countries worldwide (Hirth and USFWS 1997). The 2 largest nesting populations are found at Tortuguero, on the Caribbean coast of Costa Rica, and Raine Island, on the Pacific coast of Australia along the Great Barrier Reef.

Differences in mitochondrial DNA properties of green sea turtles from different nesting regions indicate there are genetic subpopulations (Bowen et al. 1992; Fitzsimmons et al. 2006). Despite the genetic differences, sea turtles from separate nesting origins are commonly found mixed together on foraging grounds throughout the species' range. However, such mixing occurs at extremely low levels in Hawaiian foraging areas, perhaps making this central Pacific population the most isolated of all green sea turtle populations occurring worldwide (Dutton et al. 2008).

In U.S. Atlantic and Gulf of Mexico waters, green sea turtles are distributed in inshore and nearshore waters from Texas to Massachusetts. 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 in Florida (Ehrhart 1983), and the Atlantic Ocean off Florida from Brevard through Broward Counties (Guseman and Ehrhart 1992; Wershoven and Wershoven 1992). The summer developmental habitat for green sea turtles also encompasses estuarine and coastal waters from North Carolina to as far north as Long Island Sound (Musick and Limpus 1997). Additional important foraging areas in the western Atlantic include the Culebra archipelago and other Puerto Rico coastal waters, the south coast of Cuba, the Mosquito ("Miskito") Coast of Nicaragua, the Caribbean coast of

Panama, scattered areas along Colombia and Brazil (Hirth 1971), and the northwestern coast of the Yucatan Peninsula.

The complete nesting range of green sea turtles within the southeastern United States includes sandy beaches between Texas and North Carolina, as well as the U.S.V.I. and Puerto Rico (Dow et al. 2007; NMFS and USFWS 1991). However, the vast majority of green sea turtle nesting within the southeastern United States occurs in Florida (Johnson and Ehrhart 1994; Meylan et al. 1995). Principal U.S. nesting areas for green sea turtles are in eastern Florida, predominantly Brevard through Broward counties. For more information on green sea turtle nesting in other ocean basins, refer to the 1991 *Recovery Plan for the Atlantic Green Turtle* (NMFS and USFWS 1991) or the 2007 *Green Sea Turtle 5-Year Status Review* (NMFS and USFWS 2007a).

*Life History Informati*on
Green sea turtles reproduce sexually, and mating occurs in the waters off nesting beaches. Mature females return to their natal beaches (i.e., the same beaches where they were born) to lay eggs (Balazs 1982; Frazer and Ehrhart 1985) every 2-4 years while males are known to reproduce every year (Balazs 1983). In the southeastern United States, females generally nest between June and September, and peak nesting occurs in June and July (Witherington and Ehrhart 1989). During the nesting season, females nest at approximately 2-week intervals, laying an average of 3-4 clutches (Johnson and Ehrhart 1996). Clutch size often varies among subpopulations, but mean clutch size is around 110-115 eggs. In Florida, green sea turtle nests contain an average of 136 eggs (Witherington and Ehrhart 1989). Eggs incubate for approximately 2 months before hatching. Survivorship at any particular nesting site is greatly influenced by the level of anthropogenic stressors, with the more pristine and less disturbed nesting sites (e.g., along the Great Barrier Reef in Australia) showing higher survivorship values than nesting sites known to be highly disturbed (e.g., Nicaragua)(Campbell and Lagueux 2005; Chaloupka and Limpus 2005).

After emerging from the nest, hatchlings swim to offshore areas and go through a post-hatchling pelagic stage where they are believed to live for several years. During this life stage, green sea turtles feed close to the surface on a variety of marine algae and other life associated with drift lines and debris. This early oceanic phase remains one of the most poorly understood aspects of green sea turtle life history (NMFS and USFWS 2007b). Green sea turtles exhibit particularly slow growth rates of about 1-5 centimeters per year (Green 1993; McDonald-Dutton and Dutton 1998), which may be attributed to their largely herbivorous, low-net energy diet (Bjorndal 1982). At approximately 20-25 cm carapace length, juveniles leave the pelagic environment and enter nearshore developmental habitats such as protected lagoons and open coastal areas rich in sea grass and marine algae. Growth studies using skeletochronology[13] indicate that green sea turtles in the western Atlantic shift from the oceanic phase to nearshore developmental habitats after approximately 5-6 years (Bresette et al. 2006; Zug and Glor 1998). Within the developmental habitats, juveniles begin the switch to a more herbivorous diet, and by adulthood feed almost exclusively on seagrasses and algae (Rebel and Ingle 1974). However, some populations are known to also feed heavily on invertebrates (Carballo et al. 2002). Green sea turtles reach sexual

[13] Skeletochronology is used to determine the chronological age of a species of animal by counting the concentric growth rings found in a cross section of bone.

maturity at 20-50 years of age (Chaloupka and Musick 1997; Hirth and USFWS 1997), which is considered one of the longest ages to maturity of any sea turtle species.

While in coastal habitats, green sea turtles exhibit site fidelity to specific foraging and nesting grounds, and it is clear they are capable of "homing in" on these sites if displaced (McMichael et al. 2003). Reproductive migrations of Florida green sea turtles have been identified through flipper tagging and/or satellite telemetry. Based on these studies, the majority of adult female Florida green sea turtles are believed to reside in nearshore foraging areas throughout the Florida Keys and in the waters southwest of Cape Sable, with some post-nesting turtles also residing in Bahamian waters as well (NMFS and USFWS 2007b).

Status and Population Dynamics

Population estimates for marine turtles do not exist because of the difficulty in sampling turtles over their geographic ranges and within their marine environments. However, researchers have used nesting data to study trends in reproducing sea turtles over time. A summary of nesting trends is provided in the most recent 5-year status review for the species (NMFS and USFWS 2007b) organized by ocean region (i.e., Western Atlantic Ocean, Central Atlantic Ocean, Eastern Atlantic Ocean, Mediterranean Sea, Western Indian Ocean, Northern Indian Ocean, Eastern Indian Ocean, Southeast Asia, Western Pacific Ocean, Central Pacific Ocean, and Eastern Pacific Ocean) shows trends at 23 of the 46 nesting sites found that 10 appeared to be increasing, 9 appeared to be stable, and 4 appeared to be decreasing. With respect to regional trends, the Pacific, the Western Atlantic, and the Central Atlantic regions appeared to show more positive trends (i.e., more nesting sites increasing than decreasing) while the Southeast Asia, Eastern Indian Ocean, and possibly the Mediterranean Sea regions appeared to show more negative trends (i.e., more nesting sites decreasing than increasing). These regional determinations should be viewed with caution since trend data was only available for about half of the total nesting concentration sites examined in the review and that site specific data availability appeared to vary across all regions.

The Western Atlantic region (i.e., the focus of this Opinion) was one of the best performing in terms of abundance in the entire review as there were no sites that appeared to be decreasing. The 5-year status review for the species identified 8 geographic areas considered to be primary sites for green sea turtle nesting in the Atlantic/Caribbean and reviewed the trend in nest count data for each (NMFS and USFWS 2007a). These sites were: (1) Yucatán Peninsula, Mexico; (2) Tortuguero, Costa Rica; (3) Aves Island, Venezuela; (4) Galibi Reserve, Suriname; (5) Isla Trindade, Brazil; (6) Ascension Island, United Kingdom; (7) Bioko Island, Equatorial Guinea; and (8) Bijagos Archipelago, Guinea-Bissau. Nesting at all of these sites was considered to be stable or increasing with the exception of Bioko Island and the Bijagos Archipelago where the lack of sufficient data precluded a meaningful trend assessment for either (NMFS and USFWS 2007a). Seminoff (2004) likewise reviewed green sea turtle nesting data for 8 sites in the western, eastern, and central Atlantic Ocean, including all of the above with the exception that nesting in Florida was reviewed in place of Isla Trindade, Brazil. Seminoff (2004) concluded that all sites in the central and western Atlantic showed increased nesting, with the exception of nesting at Aves Island, Venezuela, while both sites in the eastern Atlantic demonstrated decreased nesting. These sites are not inclusive of all green sea turtle nesting in the Atlantic; however, other sites are not believed to support nesting levels high enough that would change the overall status of the species in the Atlantic (NMFS and USFWS 2007a). More information about site-specific trends for the other major ocean regions can be found in the most recent 5-year status review for the species (see NMFS and USFWS (2007a)).

By far, the largest known nesting assemblage in the Western Atlantic region occurs at Tortuguero, Costa Rica. According to monitoring data on nest counts, as well as documented emergences (both nesting and non-nesting events), there appears to be an increasing trend in this nesting assemblage since monitoring began in the early 1970s. For instance, from 1971-1975 there were approximately 41,250 average annual emergences documented and this number increased to an average of 72,200 emergences from 1992-1996 (Bjorndal et al. 1999). Troëng and Rankin (Troëng and Rankin 2005) collected nest counts from 1999-2003 and also reported increasing trends in the population consistent with the earlier studies, with nest count data suggesting 17,402-37,290 nesting females per year (NMFS and USFWS 2007a). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9% annually.

In the continental United States, green sea turtle nesting occurs along the Atlantic coast, primarily along the central and southeast coast of Florida where an estimated 200-1,100 females nest each year (Meylan et al. 1994; Weishampel et al. 2003). Occasional nesting has also been documented along the Gulf coast of Florida (Meylan et al. 1995). More recently, green sea turtle nesting has occurred in North Carolina on Bald Head Island, just east of the mouth of the Cape Fear River, on Onslow Island, and on Cape Hatteras National Seashore. In 2010, a total of 18 nests were found in North Carolina, 6 nests in South Carolina, and 6 nests in Georgia (nesting databases maintained on www.seaturtle.org).

In Florida, index beaches were established to standardize data collection methods and effort on key nesting beaches. Since establishment of the index beaches in 1989, the pattern of green sea turtle nesting has generally shown biennial peaks in abundance with a positive trend during the recent years of regular monitoring (Figure 4). According to data collected from Florida's index nesting beach survey from 1989-2012, green sea turtle nest counts across Florida have increased approximately ten-fold from a low of 267 in the early 1990s to a high of 10,701 in 2011. Two consecutive years of nesting declines in 2008 and 2009 caused some concern, but this was followed by increases in both 2010 and 2011, a decrease in 2012, and another significant increase in 2013 (Figure 6). While the nest count for 2013 was more than twice the count from the next highest year, it is not a guarantee of future years so additional surveys are necessary. Modeling by Chaloupka et al. (2008) using data sets of 25 years or more has resulted in an estimate of the Florida nesting stock at the Archie Carr National Wildlife Refuge growing at an annual rate of 13.9%.

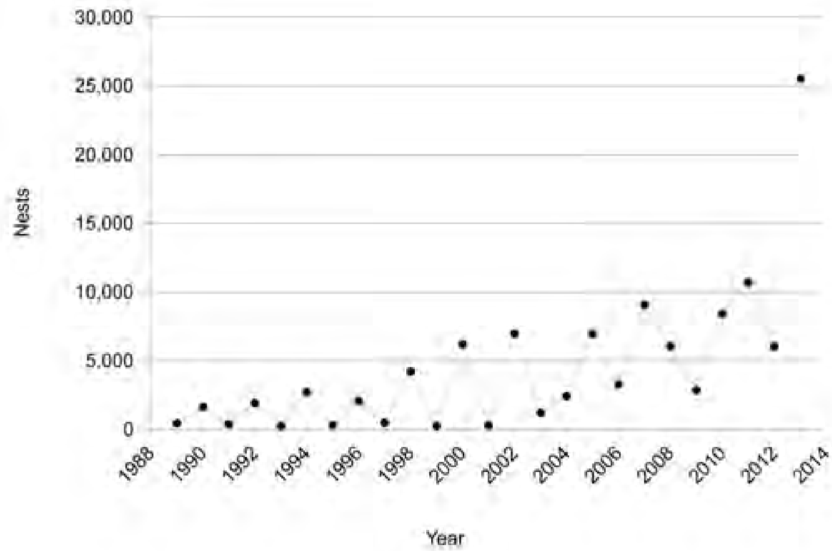


Figure 4. Green sea turtle nesting at Florida index beaches since 1989

Threats

The principal cause of past declines and extirpations of green sea turtle assemblages has been the overexploitation of the species 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. Green sea turtles also face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (e.g., plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (e.g., nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.4.

In addition to general threats, green sea turtles are susceptible to natural mortality from Fibropapillomatosis (FP) disease. FP results in the growth of tumors on soft external tissues (flippers, neck, tail, etc.), the carapace, the eyes, the mouth, and internal organs (gastrointestinal tract, heart, lungs, etc.) of turtles (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). These tumors range in size from 0.1 cm to greater than 30 cm in diameter and may affect swimming, vision, feeding, and organ function (Aguirre et al. 2002; Herbst 1994; Jacobson et al. 1989). Presently, scientists are unsure of the exact mechanism causing this disease, though it is believed to be related to both an infectious agent, such as a virus (Herbst et al. 1995), and environmental conditions (e.g., habitat degradation, pollution, low wave energy, and shallow water (Foley et al. 2005). Presently, FP is cosmopolitan, but has been found to affect large numbers of animals in specific areas, including Hawaii and Florida (Herbst 1994; Jacobson 1990; Jacobson et al. 1991).

Cold-stunning is another natural threat to green sea turtles. Although it is not considered a major source of mortality in most cases, as temperatures fall below 8°-10°C, turtles may lose their ability to swim and dive, often floating to the surface. The rate of cooling that precipitates cold-stunning appears to be the primary threat, rather than the water temperature itself (Milton and Lutz 2003). Sea turtles that overwinter in inshore waters are most susceptible to cold-stunning because temperature changes are most rapid in shallow water (Witherington and Ehrhart 1989). During January 2010, an unusually large cold-stunning event in the southeastern United States resulted in around 4,600 sea turtles, mostly greens, found cold-stunned, with hundreds found dead or dying. A large cold-stunning event occurred in the western Gulf of Mexico in February 2011, resulting in approximately 1,650 green sea turtles being found cold-stunned in Texas. Of these, approximately 620 were found dead or died after stranding, and approximately 1,030 were rehabilitated and released. Additionally, during this same time frame, approximately 340 green sea turtles were found cold-stunned in Mexico, though approximately 300 of those were subsequently rehabilitated and released.

3.2.3 Kemp's Ridley Sea Turtle

The Kemp's ridley sea turtle was listed as endangered on December 2, 1970, under the Endangered Species Conservation Act of 1969, a precursor to the ESA. Internationally, the Kemp's ridley is considered the most endangered sea turtle (Groombridge 1982; TEWG 2000b; Zwinenberg 1977).

Species Description

The Kemp's ridley sea turtle is the smallest of all sea turtles. Hatchlings generally range from 1.65-1.89 in (42-48 mm) SCL, 1.26-1.73 in (32-44 mm) in width, and 0.3-0.4 lb (15-20 g) in weight. Adults generally weigh less than 100 lb (45 kg) and have a carapace length of around 2.1 ft (65 cm). Adult Kemp's ridley shells are almost as wide as they are long. Coloration changes significantly during development from the grey-black dorsum and plastron of hatchlings, a grey-black dorsum with a yellowish-white plastron as post-pelagic juveniles, and then to the lighter grey-olive carapace and cream-white or yellowish plastron of adults. There are 2 pairs of prefrontal scales on the head, 5 vertebral scutes, usually 5 pairs of costal scutes, and generally 12 pairs of marginal scutes on the carapace. In each bridge adjoining the plastron to the carapace, there are 4 scutes, each of which is perforated by a pore.

Kemp's ridley habitat largely consists of sandy and muddy areas in shallow, nearshore waters less than 120 ft (37 m) deep, although they can also be found in deeper offshore waters. These areas support the primary prey species of the Kemp's ridley sea turtle, which consist of swimming crabs, but may also include fish, jellyfish, and an array of mollusks.

The primary range of Kemp's ridley sea turtles is within the Gulf of Mexico basin, though they also occur in coastal and offshore waters of the U.S. Atlantic Ocean. Juvenile Kemp's ridley sea turtles, possibly carried by oceanic currents, have been recorded as far north as Nova Scotia. Historic nesting records range from Mustang Island, Texas, in the north, to Veracruz, Mexico, in the south. Kemp's ridley sea turtles have recently been nesting along the Atlantic Coast of the United States, with nests recorded from beaches in Florida, Georgia, and the Carolinas. In 2012, the first Kemp's ridley sea turtle nest was recorded in Virginia. The Kemp's ridley nesting population is exponentially increasing, which may indicate a similar increase in the population as a whole (NMFS et al. 2011a; NMFS et al. 2011b).

Life History Information

Kemp's ridley sea turtles share a general life history pattern similar to other sea turtles. Females lay their eggs on coastal beaches where the eggs incubate in sandy nests. After 45-58 days of embryonic development, the hatchlings emerge and swim offshore into deeper, ocean water where they feed and grow until returning at a larger size. The return to nearshore coastal habitats typically occurs around 2 years of age (Ogren 1989), although the time spent in the oceanic zone may vary from 1-4 years or perhaps more (TEWG 2000). Juvenile Kemp's ridley sea turtles use these nearshore coastal habitats from April through November, but move towards more suitable overwintering habitat in deeper offshore waters (or more southern waters along the Atlantic coast) as water temperature drops.

The average rates of growth may vary by location, but generally fall within 2.2-2.9 ± 2.4 in per year (5.5-7.5 ± 6.2 cm/year) (Schmid and Barichivich 2006; Schmid and Woodhead 2000). Age to sexual maturity ranges greatly from 5-16 years, though NMFS et al. (2011a) determined the best estimate of age to maturity for Kemp's ridley sea turtles was 12 years. It is unlikely that most adults grow very much after maturity. While some sea turtles nest annually, the weighted mean remigration rate for Kemp's ridley sea turtles is approximately 2 years. Nesting generally occurs from April to July and females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs (Márquez M 1994).

Population Dynamics

Of the 7 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 beaches of Rancho Nuevo, Mexico (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, however, nesting numbers from Rancho Nuevo and adjacent Mexican beaches were below 1,000 (with a low of 702 nests in 1985). Yet, nesting steadily increased through the 1990s, and then accelerated during the first decade of the 21st century (Figure 5), indicating the species is recovering. It is worth noting that when the Bi-National Kemp's Ridley Sea Turtle Population Restoration Project was initiated in 1978, only Rancho Nuevo nests were recorded. In 1988, nesting data from southern beaches at Playa Dos and Barra del Tordo were added, in 1989, data from the northern beaches of Barra Ostionales and Tepehuajes were added, and, most recently in 1996, data from La Pesca and Altamira beaches were recorded. Currently, nesting at Rancho Nuevo accounts for just over 81% of all recorded Kemp's ridley nests in Mexico. Following a significant, unexplained 1-year decline in 2010, Kemp's ridley nests in Mexico reached a record high of 21,797 in 2012 (Gladys Porter Zoo nesting database 2013). A small nesting population is also emerging in the United States, primarily in Texas, rising from 6 nests in 1996 to 42 in 2004, to a record high of 209 nests in 2012.[14]

[14] National Park Service data, http://www.nps.gov/pais/naturescience/strp.htm, http://www.nps.gov/pais/naturescience/current-season.htm

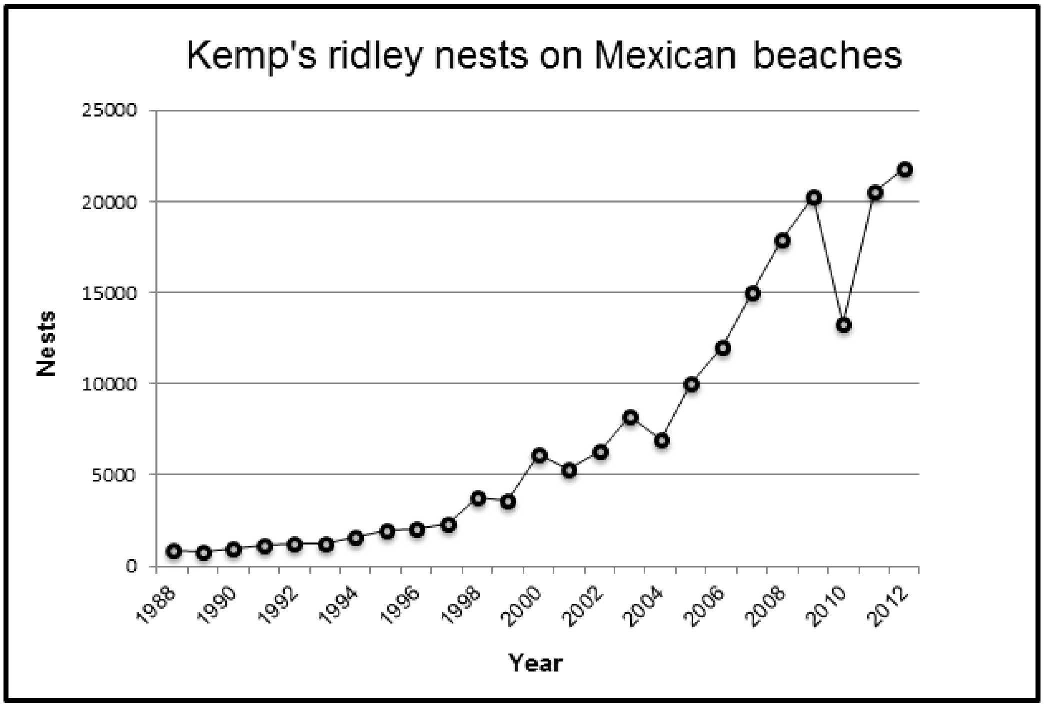


Figure 5. Kemp's ridley nest totals from Mexican beaches (Gladys Porter Zoo nesting database 2013)

Heppell et al. (2005) predicted in a population model that the population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011a) produced an updated model that predicted the population to increase 19% per year and attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. While counts did not reach 25,000 nests by 2012, it is clear that the population is steadily increasing. The recent increases in Kemp's ridley sea turtle nesting seen in the last 2 decades is likely due to a combination of management measures including elimination of direct harvest, nest protection, the use of turtle excluder devices (TED), reduced trawling effort in Mexico and the United States, and possibly other changes in vital rates (TEWG 1998; TEWG 2000b). While these results are encouraging, the species limited range as well as low global abundance makes it particularly vulnerable to new sources of mortality as well as demographic and environmental randomness, all of which are often difficult to predict with any certainty.

Threats

Kemp's ridley sea turtles face many of the same threats as other sea turtle species, including destruction of nesting habitat from storm events, oceanic events such as cold-stunning, pollution (plastics, petroleum products, petrochemicals, etc.), ecosystem alterations (nesting beach development, beach nourishment and shoreline stabilization, vegetation changes, etc.), poaching, global climate change, fisheries interactions, natural predation, and disease. A discussion on general sea turtle threats can be found in Section 3.2.4; the remainder of this section will expand on a few of the aforementioned threats and how they may specifically impact Kemp's ridley sea turtles.

As Kemp's ridley sea turtles continue to recover and nesting arribadas[15] are increasingly established, bacterial and fungal pathogens in nests are also likely to increase. Bacterial and fungal pathogen impacts have been well documented in the large arribadas of the olive ridley at Nancite in Costa Rica (Mo 1988). In some years, and on some sections of the beach, the hatching success can be as low as 5% (Mo 1988). As the Kemp's ridley nest density at Rancho Nuevo and adjacent beaches continues to increase, appropriate monitoring of emergence success will be necessary to determine if there are any density dependent effects on emergence success.

Over the past 3 years, NMFS has documented (via the Sea Turtle Stranding and Salvage Network data[16], elevated sea turtle strandings in the Northern Gulf of Mexico, particularly throughout the Mississippi Sound area. In the first 3 weeks of June 2010, over 120 sea turtle strandings were reported from Mississippi and Alabama waters, none of which exhibited any signs of external oiling to indicate effects associated with the Deepwater Horizon (DWH) oil spill event. A total of 644 sea turtle strandings were reported in 2010 from Louisiana, Mississippi, and Alabama waters, 561 (87%) of which were Kemp's ridley sea turtles. During March through May of 2011, 267 sea turtle strandings were reported from Mississippi and Alabama waters alone. A total of 525 sea turtle strandings were reported in 2011 from Louisiana, Mississippi, and Alabama waters, with the majority (455) occurring from March through July, 390 (86%) of which were Kemp's ridley sea turtles. During 2012, a total of 428 sea turtles were reported from Louisiana, Mississippi, and Alabama waters, though the data is incomplete. Of these reported strandings, 301 (70%) were Kemp's ridley sea turtles. These stranding numbers are significantly greater than reported in past years; Louisiana, Mississippi, and Alabama waters reported 42 and 73 sea turtle strandings for 2008 and 2009, respectively; however, it should be noted that stranding coverage has increased considerably due to the Deepwater Horizon (DWH) oil spill event. Nonetheless, considering that strandings typically represent only a small fraction of actual mortality, these stranding events potentially represent a serious impact to the recovery and survival of the local sea turtle populations. While a definitive cause for these strandings has not been identified, necropsy results indicate a significant number of stranded turtles from these events likely perished due to forced submergence, which is commonly associated with fishery interactions (B. Stacy, NMFS, personal communication to M. Barnette, March NMFS, 2012). Yet, available information indicates fishery effort was extremely limited during the stranding events. The fact that in both 2010 and 2011 approximately 85% of all Louisiana, Mississippi, and Alabama stranded sea turtles were Kemp's ridleys is notable; however, this statistic could simply be a function of the species' preference for shallow, inshore waters coupled with increased population abundance as reflected in recent Kemp's ridley nesting increases.

In response to these strandings, and due to speculation that fishery interactions may be the cause, fishery observer effort was shifted to evaluate the inshore skimmer trawl fishery during the summer of 2012. During May-July, observers reported 24 sea turtle interactions in the skimmer trawl fishery, all but one of which were identified as Kemp's ridleys (one sea turtle was an unidentified hardshell turtle). Encountered sea turtles were all very small, juvenile specimens ranging from 7.6-19.0 in (19.4-48.3 cm) curved carapace length (CCL), and all sea turtles were

[15] Arribada is the Spanish word for "arrival" and is the term used for massive synchronized nesting within the genus *Lepidochelys.*
[16] http://www.sefsc.noaa.gov/species/turtles/strandings.htm

released alive. The small average size of encountered Kemp's ridleys introduces a potential conservation issue, as over 50% of these reported sea turtles could potentially pass through the maximum 4-in bar spacing of TEDs currently required in the shrimp fishery. Due to this issue, a proposed 2012 rule to require TEDs in the skimmer trawl fishery (77 FR 27411) was not implemented. Based on anecdotal information, these interactions were a relatively new issue for the inshore skimmer trawl fishery. Given the nesting trends and habitat utilization of Kemp's ridley sea turtles, it is likely that fishery interactions in the Northern Gulf of Mexico may continue to be an issue of concern for the species, and one that may potentially slow the rate of recovery for Kemp's ridley sea turtles.

3.2.4 General Threats Faced by All Sea Turtle Species

Sea turtles face numerous natural and anthropogenic threats that shape their status and affect their ability to recover. As many of the threats are either the same or similar in nature for all listed sea turtle species, those identified in this section below are discussed in a general sense for all listed sea turtles. Threat information specific to a particular species are discussed above in the corresponding status sections where appropriate.

Fisheries

Incidental bycatch in commercial fisheries is identified as a major contributor to past declines, and threat to future recovery, for all of the sea turtle species (NMFS and USFWS 1991; NMFS and USFWS 1992; NMFS and USFWS 1993; NMFS and USFWS 2008a; NMFS et al. 2011b). Domestic fisheries often capture, injure, and kill sea turtles at various life stages. Sea turtles in the pelagic environment are exposed to U.S. Atlantic pelagic longline fisheries. Sea turtles in the benthic environment in waters off the coastal United States are exposed to a suite of other fisheries in federal and state waters. These fishing methods include trawls, gillnets, purse seines, hook-and-line gear (including bottom longlines and vertical lines [e.g., bandit gear, handlines, and rod-reel]), pound nets, and trap fisheries. Refer to the Environmental Baseline section of this opinion for more specific information regarding federal and state managed fisheries affecting sea turtles within the action area). The southeastern U.S. shrimp fisheries have historically been the largest fishery threat to benthic sea turtles in the southeastern United States, and continue to interact with and kill large numbers of sea turtles each year.

In addition to domestic fisheries, sea turtles are subject to direct as well as incidental capture in numerous foreign fisheries, further impeding the ability of sea turtles to survive and recover on a global scale. For example, pelagic stage sea turtles, especially loggerheads and leatherbacks, circumnavigating the Atlantic are susceptible to international longline fisheries including the Azorean, Spanish, and various other fleets (Aguilar et al. 1995; Bolten et al. 1994; Crouse 1999). Bottom longlines and gillnet fishing is known to occur in many foreign waters, including (but not limited to) the northwest Atlantic, western Mediterranean, South America, West Africa, Central America, and the Caribbean. Shrimp trawl fisheries are also occurring off the shores of numerous foreign countries and pose a significant threat to sea turtles similar to the impacts seen in U.S. waters. Many unreported takes or incomplete records by foreign fleets make it difficult to characterize the total impact that international fishing pressure is having on listed sea turtles. Nevertheless, international fisheries represent a continuing threat to sea turtle survival and recovery throughout their respective ranges.

Non-Fishery In-Water Activities
There are also many non-fishery impacts affecting the status of sea turtle species, both in the ocean and on land. In nearshore waters of the United States, the construction and maintenance of federal navigation channels has been identified as a source of sea turtle mortality. Hopper dredges, which are frequently used in ocean bar channels and sometimes in harbor channels and offshore borrow areas, move relatively rapidly and can entrain and kill sea turtles (NMFS 1997a). Sea turtles entering coastal or inshore areas have also been affected by entrainment in the cooling-water systems of electrical generating plants. Other nearshore threats include harassment and/or injury resulting from private and commercial vessel operations, military detonations and training exercises, in-water construction activities, and scientific research activities.

Coastal Development and Erosion Control
Coastal development can deter or interfere with nesting, affect nesting success, and degrade nesting habitats for sea turtles. Structural impacts to nesting habitat include the construction of buildings and pilings, beach armoring and re-nourishment, and sand extraction (Bouchard et al. 1998; Lutcavage et al. 1997). These factors may decrease the amount of nesting area available to females and change the natural behaviors of both adults and hatchlings, directly or indirectly, through loss of beach habitat or changing thermal profiles and increasing erosion, respectively. (Ackerman 1997; Witherington et al. 2003; Witherington et al. 2007). In addition, coastal development is usually accompanied by artificial lighting which can alter the behavior of nesting adults (Witherington 1992) and is often fatal to emerging hatchlings that are drawn away from the water (Witherington and Bjorndal 1991). In-water erosion control structures such as breakwaters, groins, and jetties can impact nesting females and hatchling as they approach and leave the surf zone or head out to sea by creating physical blockage, concentrating predators, creating longshore currents, and disrupting of wave patterns.

Environmental Contamination
Multiple municipal, industrial, and household sources, as well as atmospheric transport, introduce various pollutants such as pesticides, hydrocarbons, organochlorides (e.g., DDT, PCBs, and PFCs), and others that may cause adverse health effects to sea turtles (Garrett 2004; Grant and Ross 2002; Hartwell 2004; Iwata et al. 1993). Acute exposure to hydrocarbons from petroleum products released into the environment via oil spills and other discharges may directly injure individuals through skin contact with oils (Geraci 1990), inhalation at the water's surface and ingesting compounds while feeding (Matkin and Saulitis 1997). Hydrocarbons also have the potential to impact prey populations, and therefore may affect listed species indirectly by reducing food availability in the action area. In 2010, there was a massive oil spill in the Gulf of Mexico at BP's DWH well. Official estimates are that millions of barrels of oil were released into the Gulf of Mexico. Additionally, approximately 1.8 million gallons of chemical dispersant was applied on the seawater surface and at the wellhead to attempt to break down the oil. At this time the assessment of total direct impact to sea turtles has not been determined. Additionally, the long-term impacts to sea turtles as a result of habitat impacts, prey loss, and subsurface oil particles and oil components broken down through physical, chemical, and biological processes are not known.

Marine debris is a continuing problem for sea turtles. Sea turtles living in the pelagic environment commonly eat or become entangled in marine debris (e.g., tar balls, plastic bags/pellets, balloons, and ghost fishing gear) as they feed along oceanographic fronts where debris and their natural food items converge. This is especially problematic for sea turtles that spend all or significant portions of their life cycle in the pelagic environment (i.e., leatherbacks, juvenile loggerheads, and juvenile green turtles).

Climate Change

There is a large and growing body of literature on past, present, and future impacts of global climate change, exacerbated and accelerated by human activities. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate information portal provides basic background information on these and other measured or anticipated effects (see http://www.climate.gov).

Climate change impacts on sea turtles currently cannot be predicted with any degree of certainty; however significant impacts to the hatchling sex ratios of sea turtles may result (NMFS and USFWS 2007c). In sea turtles, sex is determined by the ambient sand temperature (during the middle third of incubation) with female offspring produced at higher temperatures and males at lower temperatures within a thermal tolerance range of 25°-35°C (Ackerman 1997). Increases in global temperature could potentially skew future sex ratios toward higher numbers of females (NMFS and USFWS 2007c).

The effects from increased temperatures may be intensified on developed nesting beaches where shoreline armoring and construction have denuded vegetation. Erosion control structures could potentially result in the permanent loss of nesting beach habitat or deter nesting females (NRC 1990). These impacts will be exacerbated by sea level rise. If females nest on the seaward side of the erosion control structures, nests may be exposed to repeated tidal overwash (NMFS and USFWS 2007c). Sea level rise from global climate change is also a potential problem for areas with low-lying beaches where sand depth is a limiting factor, as the sea may inundate nesting sites and decrease available nesting habitat (Baker et al. 2006; Daniels et al. 1993; Fish et al. 2005). The loss of habitat as a result of climate change could be accelerated due to a combination of other environmental and oceanographic changes such as an increase in the frequency of storms and/or changes in prevailing currents, both of which could lead to increased beach loss via erosion (Antonelis et al. 2006; Baker et al. 2006).

Other changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of lower trophic levels (e.g., phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc.) which could ultimately affect the primary foraging areas of sea turtles.

Other Threats

Predation by various land predators is a threat to developing nests and emerging hatchlings. The major natural predators of sea turtle nests are mammals, including raccoons, dogs, pigs, skunks, and badgers. Emergent hatchlings are preyed upon by these mammals as well as ghost crabs, laughing gulls, and the exotic South American fire ant.[17] In addition to natural predation, direct

[17] *Solenopsis invicta*

harvest of eggs and adults from beaches in foreign countries continues to be a problem for various sea turtle species throughout their ranges (NMFS and USFWS 2008a).

Diseases, toxic blooms from algae and other microorganisms, and cold stunning events are additional sources of mortality that can range from local and limited to wide-scale and impacting hundreds or thousands of animals.

4 ENVIRONMENTAL BASELINE

By regulation, environmental baselines for opinions include the past and present impacts of all state, federal, or private actions and other human activities in the action area, the anticipated impacts of all proposed federal projects in the action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation in process (50 CFR 402.02).

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 in the action area 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.

The proposed action occurs in the Gulf of Mexico, POB, and the man-made BIH navigation channel in Cameron County, Texas, to the PA offshore and all waters in between (Figure 1) (approximately 20.15 mi).

The following analysis examines actions that may affect these species' environment specifically within this defined action area. The environmental baseline for this Opinion includes the effects of several activities affecting the survival and recovery of ESA-listed sea turtle species, in the action area. The activities that shape the environmental baseline in the action area of this consultation are primarily oil and natural gas well operations, vessel operations, and dredging.

4.1 Status and Distribution of Sea Turtles in the Action Area

Sea turtle species occurring in the project area that may be adversely affected by the proposed action are loggerhead, green, and Kemp's ridley. 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. These impacts outside of the action area are discussed and incorporated as part of the overall status of the species as detailed in Section 3 above. The following environmental baseline includes past and ongoing human activities in the action area (Figure 1) that relate to the status of the species.

All of these species are highly migratory. The same individuals found in the action area may migrate into offshore waters and thus be impacted by activities occurring there; therefore, the species' statuses in the action area are considered to be the same as their range-wide statuses and supported by the species accounts in Section 3.

4.2 Factors Affecting Sea Turtles in the Action Area

As stated in Section 2.2 ("Action Area"), the action area for the project includes all areas to be dredged from the turning basin of the navigation channel to the entrance channel extension (approximately 20.15 mi) to the PA offshore and all waters in between (shown in Figure 1). The following analysis examines actions that may affect these species' environment specifically within the defined action area.

4.2.1 Federal Actions

NMFS has completed a number of Section 7 consultations to address the effects of federally-permitted dredging and other federal actions on threatened and endangered sea turtle species, and when appropriate, has authorized the incidental taking of these species. Each of those consultations sought to minimize the adverse impacts of the action on sea turtles. The summary below of federal actions and the effects these actions have had or are having on sea turtles includes only those federal actions in, or with effects within, the action area that have already concluded or are currently undergoing formal Section 7 consultation.

4.2.2 Dredging

Hopper Dredging

The construction and maintenance of federal navigation channels and dredging or sand mining from borrow areas has been documented to result in capture, injury and death of sea turtles. 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. The USACE has Biological Opinions from NMFS covering their implementation and authorization of hopper dredging in the Atlantic and Gulf of Mexico. For the entire Gulf of Mexico from the United States-Mexico border to Key West, the annual documented USACE incidental take per fiscal year by injury or mortality, is expected to consist of 20 Kemp's ridley turtles, 14 green turtles, 4 hawksbill turtles and 40 loggerhead turtles (NMFS 2003); because 50% of turtles taken by hopper dredges are expected to go unobserved, the total take of turtle species is predicted to be twice these levels.

Mechanical Dredging

NMFS has previously determined in dredging Biological Opinions that, while oceangoing hopper-type dredges may lethally entrain protected species, non-hopper type dredging methods (e.g., clamshell or bucket dredging, cutterhead dredging, pipeline dredging, sidecast dredging) are slower and unlikely to overtake or adversely affect them. NMFS has no new information that would alter that finding.

4.2.3 Beach Nourishment

The activity of beach nourishment has been documented to result in injury and death of juvenile sea turtles. A beach nourishment project was carried out at South Padre Island where approximately 400,000 cubic yards of beach-grade sand was placed along approximately 5,000 feet of shoreline covering approximately 79 acres (NMFS project number SER-2011-3592). The dredging and associated take was authorized under the existing GRBO.[18] The placement of materials (which did not take turtles) was addressed in the NLAA consultation.

4.2.4 Outer Continental Shelf Oil and Gas Exploration and Development

NMFS has issued several Biological Opinions to the Bureau of Ocean Energy Management for the effects of authorized oil and gas exploration and development on the outer continental shelf in the Gulf of Mexico. The most recent Opinion (NMFS 2007a) evaluated the effects of all activities associated with lease sales during the 5-year period 2007-2012, in the Western and Central Planning Areas. The Opinion predicted take of sea turtles and Gulf sturgeon caused by oil spills resulting from lease sale activities, but did not authorize such take because all releases of oil are prohibited by law. The Opinion also predicted take of sperm whales by harassment from seismic surveys, but this take will not be authorized until a take authorization under the Marine Mammal Protection Act (MMPA) is issued. The Opinion also predicted and authorized take of sea turtles from vessel strikes associated with lease sale activities.

The Gulf of Mexico is an area of high-density offshore oil extraction with chronic, low-level spills and occasional massive spills (such as the Deepwater Horizon oil spill, Ixtoc I oil well blowout and fire in the Bay of Campeche in 1979, and the explosion and destruction of a loaded supertanker, the Mega Borg, near Galveston in 1990). Oil spills can impact wildlife directly through 3 primary pathways: ingestion – when animals swallow oil particles directly or consume prey items that have been exposed to oil, absorption – when animals come into direct contact with oil, and inhalation – when animals breath volatile organics released from oil or from "dispersants" applied by response teams in an effort to increase the rate of degradation of the oil in seawater. Several aspects of sea turtle biology and behavior place them at particular risk, including the lack of avoidance behavior, indiscriminate feeding in convergence zones, and large pre-dive inhalations (Shigenaka et al. 2003). When large quantities of oil enter a body of water, chronic effects such as cancer, and direct mortality of wildlife becomes more likely (Lutcavage et al. 1997). Oil spills in the vicinity of nesting beaches just prior to or during the nesting season could place nesting females, incubating egg clutches, and hatchlings at significant risk (Fritts et al. 1982; Lutcavage et al. 1997; Witherington 1999). Continuous low-level exposure to oil in the form of tarballs, slicks, or elevated background concentrations also challenge animals facing other natural and anthropogenic stresses. Types of trauma can include skin irritation, altering of the immune system, reproductive or developmental damage, and liver disease (Keller et al. 2004; Keller et al. 2006). Chronic exposure may not be lethal by itself, but it may impair a turtle's overall fitness so that it is less able to withstand other stressors (Shigenaka et al. 2003).

The earlier life stages of living marine resources are usually at greater risk from an oil spill than adults. This is especially true for turtle hatchlings, since they spend a greater portion of their time at the sea surface than adults; thus, their risk of exposure to floating oil slicks is increased (Lutcavage et al. 1995). One of the reasons might be the simple effects of scale. For example, a given amount of oil may overwhelm a smaller immature organism relative to the larger adult. The metabolic machinery an animal uses to detoxify or cleanse itself of a contaminant may not be fully developed in younger life stages. Also, in early life stages, animals may contain

[18] NMFS Biological Opinion dated November 19, 2003: Dredging of Gulf of Mexico Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287). NMFS Southeast Regional Office, Protected Resources Division.

proportionally higher concentrations of lipids, to which many contaminants such as petroleum hydrocarbons bind. Most reports of oiled hatchlings originate from convergence zones, ocean areas where currents meet to form collection points for material at or near the surface of the water. Sixty-five of 103 post-hatchling loggerheads in convergence zones off Florida's east coast were found with tar in the mouth, esophagus or stomach (Loehefener et al. 1989). Of post-hatchlings captured in Sargassum off the Florida coast, 34% had tar in the mouth or esophagus and more than 50% had tar caked in their jaws (Witherington 1994). These zones aggregate oil slicks, such as a Langmuir cell, where surface currents collide before pushing down and around, and represents a virtually closed system where a smaller weaker sea turtle can easily become trapped (Witherington 2002) (Carr 1987). Lutz and Lutcavage (1989) reported that hatchlings have been found apparently starved to death, their beaks and esophagi blocked with tarballs. Hatchlings sticky with oil residue may have a more difficult time crawling and swimming, rendering them more vulnerable to predation.

(Frazier 1980) suggested that olfactory impairment from chemical contamination could represent a substantial indirect effect in sea turtles, since a keen sense of smell apparently plays an important role in navigation and orientation. A related problem is the possibility that an oil spill impacting nesting beaches may affect the locational imprinting of hatchlings, and thus impair their ability to return to their natal beaches to breed and nest (Shigenaka et al. 2003). Whether hatchlings, juveniles, or adults, tarballs in a turtle's gut are likely to have a variety of effects – starvation from gut blockage, decreased absorption efficiency, absorption of toxins, effects of general intestinal blockage (such as local necrosis or ulceration), interference with fat metabolism, and buoyancy problems caused by the buildup of fermentation gases (floating prevents turtles from feeding and increases their vulnerability to predators and boats), among others. Also, trapped oil can kill the seagrass beds that turtles feed upon.

Unfortunately, little is known about the effects of dispersants on sea turtles, and such impacts are difficult to predict in the absence of direct testing. While inhaling petroleum vapors can irritate turtles' lungs, dispersants can interfere with lung function through their surfactant (detergent) effect. Dispersant components absorbed through the lungs or gut may affect multiple organ systems, interfering with digestion, respiration, excretion, and/or salt-gland function—similar to the empirically demonstrated effects of oil alone (Shigenaka et al. 2003). Oil cleanup activities can also be harmful. Earth-moving equipment can dissuade females from nesting and destroy nests, containment booms can entrap hatchlings, and lighting from nighttime activities can misdirect turtles (Witherington 2002).

There are studies on organic contaminants and trace metal accumulation in green and leatherback sea turtles (Aguirre et al. 1994; Caurant et al. 1999; Corsolini et al. 2000). McKenzie et al. (1999) measured concentrations of chlorobiphenyls and organochlorine pesticides in sea turtles tissues collected from the Mediterranean (Cyprus, Greece) and European Atlantic waters (Scotland) between 1994 and 1996. Omnivorous loggerhead turtles had the highest organochlorine contaminant concentrations in all the tissues sampled, including those from green and leatherback turtles (Storelli et al. 2008). It is thought that dietary preferences were likely to be the main differentiating factor among species. Decreasing lipid contaminant burdens with turtle size were observed in green turtles, most likely attributable to a change in diet with age. (Sakai et al. 1995) found the presence of metal residues occurring in loggerhead turtle organs and eggs. Storelli et al. (2008) analyzed tissues from twelve loggerhead sea turtles stranded along the Adriatic Sea (Italy) and found that characteristically, mercury accumulates in sea turtle livers while cadmium accumulates in their kidneys, as has been reported for other marine organisms such as dolphins, seals and porpoises (Law et al. 1991b). No information on detrimental threshold concentrations is available, and little is known about the consequences of exposure of organochlorine compounds to sea turtles. Research is needed on the short- and long-term health and fecundity effects of chlorobiphenyl, organochlorine, and heavy metal accumulation in sea turtles.

Nutrient loading from land-based sources, such as coastal communities and agricultural operations, are known to stimulate plankton blooms in closed or semi-closed estuarine systems. The effects on larger embayments are unknown. An example is the large area of the Louisiana continental shelf with seasonally-depleted oxygen levels (< 2 mg/Liter) is caused by eutrophication from both point and non-point sources. Most aquatic species cannot survive at such low oxygen levels and these areas are known as “dead zones.” The oxygen depletion, referred to as hypoxia, begins in late spring, reaches a maximum in mid-summer, and disappears in the fall. Since 1993, the average extent of mid-summer, bottom-water hypoxia in the northern Gulf of Mexico has been approximately 16,000 km^2, approximately twice the average size measured between 1985 and 1992. The hypoxic zone attained a maximum measured extent in 2002, when it was about 22,000 km^2 which is larger than the state of Massachusetts (U.S. Geological Service 2005). The hypoxic zone has impacts on the animals found there, including sea turtles, and the ecosystem-level impacts continue to be investigated.

On April 20, 2010, there was a massive oil spill in the Gulf of Mexico at British Petroleum’s DWH well, in a lease sale area covered by the 2007 Opinion. Official estimates are that several million barrels of oil were released into the Gulf, with some experts estimating even higher volumes. The full environmental impact of this disaster will not be known for years to come and may never be known. Assessing the current impacts of this oil spill on loggerhead, green, and Kemp’s ridley sea turtles is difficult because so much remains unknown or unclear about the impacts to the environment and habitat. Given these uncertainties, it is not practical to speculate on spill effects to the species of sea turtles discussed in this environmental baseline at this time. However, we expect the primary route of effects to sea turtles from the release of oil and subsequent cleanup efforts, including the use of chemical dispersants, is to the benthos and the benthic community it supports. There are at least 2 routes of exposure: suffocation of infaunal organisms and toxicity of substrate. Both of these effects would impact the abundance of sea turtle prey. The long-term impact to sea turtles from exposure to oil and the subsequent response and cleanup efforts is currently unknown. The magnitude of the spill and the documented impacts, including take of sea turtles from the oil spill and oiling of inshore habitats, required reinitiation of consultation on the 2007 Opinion. Oil and gas rigs are located along the length of the Texas coast including within approximately eleven nautical mi of the POB in federal waters and likely closer in state waters.

4.2.5 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)). Sea turtles are the focus of research activities authorized by a Section 10 permit under the ESA. 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 nonlethal. 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 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.

4.2.6 State or Private Actions

Vessel Traffic

Commercial traffic and recreational boating pursuits can have adverse effects on sea turtles via propeller and boat strike damage. The STSSN data includes many records of vessel interactions (propeller injury) with sea turtles off Gulf of Mexico coastal states such as Texas, where there are high levels of vessel traffic in some areas of the coastline. The stranding records include all causes of mortality, such as disease, hopper dredge entrainment impacts, hypothermic stunning (i.e., cold-stunning), interactions with fisheries, interactions with pollution, and vessel strikes. However, due to the condition of stranded turtles in many cases (i.e., decomposition), it was impossible to definitively determine actual cause of mortality for 70% of the specimens. In addition, it was not possible to determine in many cases whether the vessel strike occurred before or after the turtle's death. Additionally, it should be noted that many turtles killed by anthropogenic causes will not show up in the strandings database, as the mortality event may occur far offshore or the damage to the turtle is so significant the carcass sinks, preventing the turtle from washing ashore. This point is important to remember when considering apparent geographical trends in the data, which may be an artifact of other factors rather than increased mortality risk in one area versus another. Additionally, stranding information does not indicate where a potential mortality event (e.g., vessel strike) occurred, as a turtle could have been injured/killed at one location and then drifted with currents for a considerable distance before coming ashore. Given these variables, it is difficult to definitively evaluate potential risk to sea turtles stemming from specific vessel traffic. This difficulty is compounded by a general lack of information on vessel use trends, particularly in regard to offshore vessel traffic.

State Fisheries

Recreational fishing from private vessels and from shore occurs in the area. Observations of recreational fisheries have shown that loggerhead, leatherback, and green sea turtles are known to take 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 2001). Additionally, lost fishing gear such as line cut after snagging on rocks, or discarded hooks and line, can also pose an entanglement threat to sea turtles in the area. A detailed summary of the known impacts of hook-and-line incidental captures to loggerhead sea turtles can be found in the TEWG reports (TEWG 1998; TEWG 2000a). In August of 2007, NMFS issued a regulation to require any fishing vessels subject to the jurisdiction of the United States to take observers upon NMFS's request (72 FR 43176, August 3, 2007). The purpose of the regulation is to learn more about sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary.

4.2.7 Other Potential Sources of Impacts in the Environmental Baseline

A number of activities that may affect sea turtles in the action area of this consultation include 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.

Marine Pollution

Sources of pollutants along the Gulf of Mexico coastal regions include atmospheric loading of pollutants such as polychlorinated biphenyls (PCBs), stormwater runoff from coastal towns and cities into rivers and canals emptying into bays and the ocean, groundwater, and other discharges. 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.

Climate Change

The Intergovernmental Panel on Climate Change has stated that global climate change is unequivocal (IPCC 2007; IPCC 2013) and its impacts to coastal resources may be significant. There is a large and growing body of literature on past, present, and future impacts of global climate change induced by human activities, i.e., global warming mostly driven by the burning of fossil fuels. Some of the likely effects commonly mentioned are sea level rise, increased frequency of severe weather events, and change in air and water temperatures. NOAA's climate change web portal[19] provides information on the climate-related variability and changes that are exacerbated by human activities. The Environmental Protection Agency's climate change webpage[20] also provides basic background information on these and other measured or anticipated effects. Changes in the marine ecosystem caused by global climate change (e.g., ocean acidification, salinity, oceanic currents, dissolved oxygen levels, nutrient distribution, etc.) could influence the distribution and abundance of phytoplankton, zooplankton, submerged aquatic vegetation, crustaceans, mollusks, forage fish, etc., which could ultimately affect the primary foraging areas of sea turtles. Sea-level rise is one of the more certain consequences of climate change; it has already had significant impacts on coastal areas and these impacts are likely to increase. Since 1852, when the first topographic maps of the southeastern United States were prepared, high tidal flood elevations have increased approximately 12 in. During the 20th century, global sea level has increased 15 to 20 cm (NAST 2000).

4.2.8 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 from commercial fisheries in the action area. These include sea turtle release gear requirements for Atlantic HMS and Gulf of Mexico reef fish fisheries, and TED requirements for the southeastern shrimp trawl fisheries. These regulations have relieved some of the pressure on sea turtle populations.

---

[19] http://www.climate.gov

[20] www.epa.gov/climatechange/index.html

Under Section 6 of the ESA, NMFS may enter into cooperative research and conservation agreements with states to assist in recovery actions of listed species. Prior to issuance of these agreements, the proposal must be reviewed for compliance with Section 7 of the ESA.

Outreach and Education, Sea Turtle Entanglements, and Rehabilitation
NMFS and cooperating states have established an extensive network of STSSN participants along the Atlantic and Gulf of Mexico coasts that collects data on dead sea turtles, and also rescues and rehabilitates any live stranded sea turtles.

Sea Turtle Handling and Resuscitation Techniques
NMFS published a final rule (66 FR 67495, December 31, 2001) detailing handling and resuscitation techniques for sea turtles that are incidentally caught during scientific research or fishing activities. Persons participating in fishing activities or scientific research are required to handle and resuscitate (as necessary) sea turtles as prescribed in the final rule. These measures help to prevent mortality of hard-shelled turtles caught in fishing or scientific research gear.

A final rule (70 FR 42508) published on July 25, 2005, allows any agent or employee of NMFS, the USFWS, the U.S. Coast Guard, or any other federal land or water management agency, or any agent or employee of a state agency responsible for fish and wildlife, when acting in the course of his or her official duties, to take endangered sea turtles encountered in the marine environment if such taking is necessary to aid a sick, injured, or entangled endangered sea turtle, or dispose of a dead endangered sea turtle, or salvage a dead endangered sea turtle that may be useful for scientific or educational purposes. NMFS already affords the same protection to sea turtles listed as threatened under the ESA [50 CFR 223.206(b)].

On August 3, 2007, NMFS published a final rule requiring selected fishing vessels to carry observers on board to collect data on sea turtle interactions with fishing operations, to evaluate existing measures to reduce sea turtle takes, and to determine whether additional measures to address prohibited sea turtle takes may be necessary (72 FR 43176). This rule also extended from 30 to 180 days, the maximum period NMFS observers may be placed on vessels in response to a determination by the Assistant Administrator that the unauthorized take of sea turtles may be likely to jeopardize their continued existence under existing regulations.

Other Actions
A revised recovery plan for the loggerhead sea turtle was completed in 2009 (NMFS and USFWS 2008a). An updated bi-national recovery plan for the Kemp's ridley sea turtle was completed in 2011 (NMFS et al. 2011a). Recovery teams comprised of sea turtle experts have been convened and are currently working towards revising other plans based upon the latest and best available information. Five-year status reviews have recently been completed for green, hawksbill, Kemp's ridley, leatherback, and loggerhead sea turtles. These reviews were conducted to comply with the ESA mandate for periodic evaluation of listed species to ensure that their threatened or endangered listing status remains accurate. Each review determined that no delisting or reclassification of a species status (i.e., threatened or endangered) was warranted at the time. However, further review of species data for the green, hawksbill, leatherback, and loggerhead sea turtles was recommended, to evaluate whether DPSs should be established for these species (NMFS and USFWS 2007a; NMFS and USFWS 2007b; NMFS and USFWS 2007c; NMFS and USFWS 2007d; NMFS and USFWS 2007e). The Services published a final

rule on September 22, 2011, listing the global population of loggerhead sea turtles as 9 separate DPSs.

5 EFFECTS OF THE ACTION

In this section of the Opinion, we assess the effects of the proposed action on loggerhead, green, and Kemp's ridley sea turtles within the action area. The analysis in this section forms the foundation for our jeopardy analysis in Section 7.0. A jeopardy determination is reached if we would reasonably expect the proposed action to cause reductions in numbers, reproduction, or distribution that would appreciably reduce listed species' likelihood of surviving and recovering in the wild.

The proposed BIH is likely to adversely affect loggerhead, green, and Kemp's ridley sea turtles by entrainment in hopper dredge suction dragheads. Impacts may include direct, short-term impacts from dredging and disposal operations for the BIH as well as relocation trawling effects.

5.1 Effects of the Action on Sea Turtles

5.1.1 Dredging

The potential for adverse effects of dredging operations on sea turtles has been previously assessed by NMFS (NMFS 1991; NMFS 1997b; NMFS 2007b) in the various versions of the regional biological opinions (RBO), the 2003 (revised in 2005 and 2007) Gulf of Mexico Regional Biological Opinion on Hopper Dredging (GRBO) (NMFS 2005; NMFS 2007c) and the South Atlantic Regional Biological Opinion on Hopper Dredging (SARBO) (NMFS 1997b). Additionally, the USACE has recently prepared a comprehensive analysis of data from Gulf and Atlantic hopper dredging projects to identify factors affecting sea turtle take rates (Dickerson et al. 2007). Furthermore, the USACE maintains the STDW with historical records of dredging projects and turtle interactions. These are the primary sources, discussed further below, for our analysis of dredging effects on sea turtles.

5.1.1.1 Mechanical (Clamshell/Bucket Dredges) and/or Cutterhead Dredging

The project may affect sea turtles by injury or death as a result of interactions with equipment or materials used during dredging; however, NMFS believes the chance of injury or death from interactions with clamshell and/or hydraulic dredging equipment is discountable as these species are highly mobile and are likely to avoid the areas during construction. NMFS has received very few reports of sea turtle takes associated with these dredging methods in the South Atlantic region: only one live sea turtle has been taken by a clamshell dredge over the past 20 years. The take occurred at Cape Canaveral, Florida, which routinely has very high local turtle abundance. Cold-stunned turtles have been taken by cutterhead dredging, but this also rarely happens[21] and

---

[21] In 2006, NMFS received a report of a potential cutterhead interaction with a loggerhead sea turtle offshore from Palm Beach, Florida (E-mail from Wendy Teas, NMFS, to Eric Hawk, NMFS, April 10, 2006); however, we suspect the turtle was already dead or impaired since it is likely that a healthy sea turtle would actively avoid the slow dredge. Since the 1990s, NMFS has also received few reports of juvenile green turtles taken by cutterhead dredges at Laguna Madre, an inshore shallow estuary in Texas, following the sudden onset of cold weather and rapid cooling of water temperatures within the estuary. We believe these small turtles were cold-stunned prior to being impacted by the dredge, which would explain their immobility (i.e., they were already dead or extremely lethargic and torpid due to the rapid drop in water temperatures).

has been generally limited to shallow, confined waters (e.g., Laguna Madre, Texas) or bays where turtles get trapped and stunned when the rapid passage of a cold front causes the temperature of the shallow water body to drop abruptly. Due to the infrequency of interactions with these gear types and the project location and channel depths located away from the shallow confined waters of Laguna Madre located to the north of the project area, NMFS believes that the possibility of a sea turtle being taken by a hydraulic cutterhead or a clamshell dredge is discountable.

5.1.1.2 Bed-Leveler Type Dredging

Bed-leveling is often associated with hopper dredging (and other types of dredging) operations, and may be utilized in this project. The applicant has stated that this is often not necessary in this area based on previous dredging experience; however, bed-leveling may be required during the proposed action. 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 for cleanup operations, i.e., to lower high spots left in channel bottoms and dredged material deposition areas by hopper dredges or other type dredges. Leveling devices typically weigh about 30 to 50 tons and are fixed with cables to a derrick mounted on a barge pushed or pulled by a tugboat at about 1–2 knots. Some evidence indicates that bed leveling devices may be responsible for occasional sea turtle mortalities (NMFS 2003). Sea turtles may be crushed as the leveling device passes over a turtle which fails to move or is not pushed out of the way by the sediment wedge "wave" generated by and pushed ahead of the device. Sea turtles in Georgia waters may have been crushed and killed in 2003 by bed-leveling which commenced after the hopper dredge finished its work associated with the Brunswick Harbor Entrance Channel dredging. The local sea turtle stranding network reported documented stranded crushed sea turtles in the area where the bed-leveler dredge was working, within days after the dredge was in the 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 sea turtles were in fact crushed by bed-leveler type dredges (there is no proof, but it is the most likely explanation), they failed to react quickly enough to avoid the bed-leveler. Bed-leveler use at other dredging operations has not resulted in observed or documented sea turtle mortalities; therefore, the best available evidence points to occasional potential interactions to brumating sea turtles at Brunswick. There are only 2 documented locations of sea turtles bromating in North America, one in Baja California Mexico, and the other in Cape Canaveral Florida(Ogren et al.). There have been no documented observations of brumating sea turtles in the BIH or POB areas and none are expected to occur there.

The project proposes to bed level only in the Entrance Channel. Furthermore, their use would be restricted to the leveling of high spots in the channel located and leveled using sonar or similar methods. Proposed modifications (i.e., integrated deflector configurations) to traditional bed-levelers are expected to reduce their unknown (but thought to be insignificant) potential to impact sea turtles. Because the bed leveler does not use suction NMFS believes that it is extremely unlikely that sea turtles would be entrained. A bed leveler is suspended at a set elevation, so in situations with a deep trench, the bed leveler may pass over a resting turtle. In other situations, the sand wave produced by a bed leveler may disturb a resting turtle and cause it to rise into the water column above the leveler. Therefore, because sea turtles are not known to bromate in the project area and the bed leveler does not include suction which could result in entrainment, NMFS believes the risk that a sea turtle will be taken by potential bed-leveling activities during "high-spot cleanup" during the proposed action is discountable. If evidence or compelling STSSN observer reports indicate that a turtle was killed by a bed-leveler associated with the proposed action covered by this Opinion, reinitiation of consultation will be required (see RPMs, Term and Condition No. 7).

5.1.1.3 Hopper Dredging

Since 1995, the USACE has used the same conservation recommendations as those defined by the GRBO, including onboard monitoring and relocation trawling.[22] By continuing to use these measures, we can expect that the sea turtle mortalities should be similar to those experienced in the project area since that time.

Calculation of Sea Turtle Entrainment Rates during Hopper Dredging
To calculate the expected catch per unit effort (CPUE) in hopper dredging for this project, NMFS consulted the STDW to find the most applicable historic dredging information for the project area. Prior hopper dredging of approximately 3.61 mcy resulted in 31 lethal observed turtle takes from hopper dredging which is equal to the mortality of one sea turtle associated with every 116,540 cy of dredged material (3.61 mcy/31 turtles) (Table 6). If the proposed project anticipates 2,066,300 cy of dredged material, then this would result in the expected mortality of 17.73 sea turtles (2,066,300 cy/116,540 cy) during the course of the proposed dredging, assuming the same mortality rate as has been observed in the project area since 1995. Because it is impossible to take a fraction of an animal, we will round this number up to 18. This estimate is based on the use of only hopper dredges for the entire project and represents the sea turtle mortalities detected by onboard observers only. Since turtle monitoring began in the POB and BIH navigation channel in Fiscal Year 1995 (FY, defined as October 1 through September 30), these areas have been dredged 11 times using hopper dredges.

[22] Undertaken by the USACE where any of the following conditions are met: (a) 2 or more turtles are taken in a 24-hour period in the project; (b) 4 or more turtles are taken in the project; or, (c) when 75% of the incidental take is met.

Table 6. Dredged material removed and sea turtle takes during dredging in the POB and BIH navigation channel, 1995-2013 (STDW)

Fiscal Year	Quantity of Dredged Material (Cubic yards) Brazos	Loggerhead	Green	Kemp's Ridley	Total turtles
1995	755,301	0	5	1	6
1997	350,907	1		1	2
1999	186,571		2		2
2002	207,338		2		2
2003	121,549		2		2
2004	355,957		3		3
2006	332,721		2		2
2007	443,000	1	5		6
2008 (entrance)	130,933	0	0	0	0
2008 (jetty)	490,690	1	1		2
2009	237,772	2	1	1	4
Total	**3,612,739**	**5**	**23**	**3**	**31**
Catch Per Unit Effort (per cy)	**0.00000858**	**% of each species**			
1 Sea Turtle every (cy)	**116,540**	**Loggerhead**	**Green**	**Kemp's Ridley**	
% of each species		0.161	0.742	0.097	
Total Sea Turtles predicted taken (2,066,300 cy)	**18.00**	**2.90**	**13.35**	**1.74**	

Historically a total of 31 turtles have been taken during dredging operations over an 18 year period[23], including 5 loggerhead (16.1%), 23 green (74.2%), and 3 Kemp's ridley (9.7%) sea turtles (Table 6). If we assume that future sea turtle takes in this area will continue in a similar pattern as those seen during dredging projects within the POB, then we can expect the estimated 18 sea turtle observed takes to be a likely combination of 2.9 loggerhead, 13.35 green, and 1.74 Kemp's ridley sea turtles.

In summary, anticipated *detected* take estimates by species (i.e., those takes witnessed and documented by hopper dredge protected species observers) are 18 sea turtle observed takes to be a likely combination of 2.9 loggerhead, 13.35 green, and 1.74 Kemp's ridley sea turtles (Table 6, above). Because it is impossible to take a fraction of a sea turtle, we expect take of 3 loggerhead, 14 green, and 2 Kemp's ridley sea turtles. The species specific take numbers do not sum to the total take number from which they were derived due to rounding up all the species-specific take estimates.

[23] Between 1995-2013 dredging occurred only during the years listed in Table 6.

Detected vs. Actual Takes

NMFS-approved observers monitor dredged material inflow and overflow screening baskets on many hopper dredging projects, and observers will be required to monitor the proposed action. Dredged material screening, however, is only partially effective, and observed takes likely provide only partial estimates of total sea turtle mortality. NMFS believes that some turtles killed by hopper dredges go undetected because body parts are forced through the sampling screens by water pressure and are buried in the dredged material, or animals are crushed or killed, but their bodies or body parts are not entrapped by the suction and so the takes may go unnoticed. The only mortalities that are noticed and documented are those where body parts float, are large enough to be caught in the screens, and can be identified as sea turtle parts. Body parts that are forced through the 4-in (or greater) inflow screens by the suction-pump pressure and that do not float are very unlikely to be observed, since they will sink to the bottom of the hopper and not be detected by the overflow screening. Unobserved takes are not documented, thus, observed takes may under-represent actual lethal takes. It is not known how many turtles are killed but unobserved. Because of this, in the Gulf of Mexico Regional Biological Opinion (GRBO) (NMFS 2003), when making its jeopardy analysis, NMFS estimated that up to 1 out of 2 impacted turtles may go undetected (i.e., that observed take constituted only about 50% of total take. That estimate was based on region-wide (overall Gulf of Mexico) hopper dredging projects including navigation channel dredging and sand borrow area dredging for beach re-nourishment projects, year-round, including seasonal windows when no observers are required, times when 100% coverage is required, and times when only 50% observer coverage is required (i.e., at sand borrow sites).

The proposed dredging of the BIH will include observer coverage at certain times during hopper dredging operations for the duration of work.[24] NMFS estimates, as it did in the GRBO, that with observer coverage as described in the proposed action, protected species observers aboard hopper dredges for the proposed project will detect approximately just 1 of every 2 turtles that are struck and killed by the suction draghead and either crushed and pushed away or entrained during hopper dredging. This results in an additional estimated 18 sea turtles (2.9 loggerhead, 13.35 green, and 1.74 Kemp's ridley) taken, but not detected, for a total of 36 sea turtles taken (killed) (Table 7). We will use these total, by species, estimates (6 loggerheads, 27 greens, and 4 Kemp's ridleys; totaling 36 turtles) rounded up (because you can't take a part of a sea turtle) for our jeopardy analyses.[25]

Table 7. Estimated sea turtle takes (observed and unobserved) with assumed 50% detection rate by onboard protected species observers over the life of the project

	Loggerhead	Green	Kemp's Ridley	Total Sea Turtle Takes
Observed Sea Turtles	2.90	13.35	1.74	18
Unobserved	2.90	13.35	1.74	18
Total Sea Turtles for BIH	5.81	26.71	3.48	36
Rounded up	6.00	27.00	4.00	

[24] Observer coverage sufficient for 100% monitoring (i.e., 2 observers) of hopper dredging operations will be implemented between April 1 and November 30 and/or if the surface water temperatures are 11°C or greater.

[25] The species-specific take numbers do not sum to the total take number from which they were derived due to rounding up all the species-specific take estimates.

As with previous NMFS Biological Opinions on hopper dredging, our subsequent jeopardy analysis (Section 7 of this Opinion) is necessarily based on our knowledge (in this case, our best estimate) of the total number of turtles that will be lethally taken, which includes those that are killed, but not detected. Our best estimate of turtles lethally taken will be the sum of the observed and unobserved takes, i.e., those observed and documented by onboard protected species observers, plus those unobserved, undocumented lethal takes (because the turtles/turtle parts were either not entrained, or were entrained but were not seen/counted by onboard protected species observers). For example, the 2003 GRBO on hopper dredging estimated that 80 loggerhead sea turtles would be killed annually by hopper dredges, but that only 40 would be detected by onboard observers. Similarly, in this Opinion we have estimated that 36 sea turtles (6 loggerheads, 27 greens, 4 Kemp's ridleys) will be killed by dredges, but shipboard protected species observers will only detect half of each of these takes by species.

Our ITS is based on observed takes, not only because observed mortality gives us an estimate of unobserved mortality, but because observed, documented take numbers serve as triggers for some of the reasonable and prudent measures, and for potential reinitiation of consultation if actual observed takes exceed the anticipated/authorized number of observed takes. Furthermore, our ITS level of anticipated/authorized lethal takes is based on the implementation of relocation trawling, since it is an integral and important part of the proposed action. Without the implementation of relocation trawling, mortalities resulting from hopper dredge activities could be higher.

A very few turtles (over the years, a fraction of 1%) survive entrainment in hopper dredges, and those that do are usually smaller juveniles that are sucked through the pumps without being dismembered or badly injured. Often they will appear uninjured only to die days later of unknown internal injuries, while in rehabilitation. Experience has shown that the vast majority of hopper-dredge impacted turtles are immediately crushed or dismembered by the violent forces they are subjected to during entrainment. Therefore, we are conservatively predicting that all takes by hopper dredges will be lethal.

5.1.2 Dredge Vessel Collisions

NMFS believes that the possibility that the hopper dredge vessel(s) will collide with and injure or kill sea turtles during dredging and/or sand pumpout operations is discountable, given the vessel's slow speed, the ability of these species to move out of the way, and anticipated avoidance behavior by sea turtles at the sea surface or in the water column.

5.1.3 Relocation Trawling Activities and Estimated Take by Trawlers

Relocation trawling, when it can be done safely, is a means to reduce sea turtle mortalities because it is a proven method of reducing sea turtle density in front of an advancing hopper dredge and very likely results in reduced sea turtle/hopper dredge interactions. Nets are dragged on the bottom for 30 minutes or less before each retrieval and re-setting. Its effects are mostly nonlethal and non-injurious to trawl captured sea turtles. Over the course of 20+ years that relocation trawling has been conducted by the USACE, very few sea turtle mortalities (approximately 8, of which 3 died under unusual circumstances (apparently drowned) during intensive relocation trawling efforts associated with the Deepwater Horizon event) have occurred, while approximately 2,000 sea turtles have been safely relocated. NMFS has previously estimated in dredging opinions that the risk of a sea turtle being killed in a capture trawl net is less than 0.4% and has no new information to alter the basis of that conclusion. NMFS believes that it is unlikely that a sea turtle will be killed or injured during capture trawling (using modified shrimp trawl nets).

During previous capture trawling from 2003-2013 associated with hopper dredging of harbors, turning basins, and/or entrance channels to the POB and BIH, a total of 138 sea turtles were safely trawled-captured and released over 102 days of relocation trawling[26] (Table 8). Relocation trawling data was reviewed from 2003-2013, however relocation trawling in POB and BIH occurred only in the years listed in the table. This averages out to be approximately 1.35 turtle captures per relocation trawling day. Estimating the expected number of trawl captured turtles during this project is difficult and necessarily imprecise, given the uncertainties associated with the project, the various seasons, varying water temperatures and differences in availability and location of sea turtle potential foraging habitat from year to year (which may cause turtles to move into or out of the action area), and different bottom substrates (sand and mud to hard clay) and topography (smooth vs. rough and undulating) over which the trawling may be performed (which affects capture trawling effectiveness). On average, 1.35 turtles were captured per day of relocation trawling, but averaging, though useful, is just an estimate. Relocation trawling for the BIH will only occur during hopper dredging which will take 7 months (~210 days) to complete (USACE 2013).

Table 8. Relocation trawling efforts in POB and BIH, 2003-2013

Fiscal Year	DAY OF TRAWLING	Loggerhead	Green	Kemp's Ridley	Total turtles
2003	6	1	5		6
2004	18		13		13
2006	10		34		34
2007	24	1	64	1	66
2008 (entrance)	7	2		1	3
2008 (jetty)	21	11	1	2	14
2,009	16	1	1		2
Total	102	16.00	118.00	4.00	138
Species Percentage		11.6%	85.5%	2.9%	100%
Turtles per day	1.35				
BIH Relocation Trawling Days	210				
Turtles Relocated	283.5				

To determine the number of each species of turtle expected to be relocated, we multiplied the turtles per day from Table 8 (1.35) times the number of possible relocation trawling days (210) then apply the species percentages for previous relocation trawling efforts in the area from Table 8 (11.6% loggerhead, 85.5% green, and 2.9% Kemp's) to determine the quantity and species composition of the expected relocated sea turtles (Table 9). In total, we expect 283.5 sea turtles to be relocated. When we apply the species percentages (and round up because a fraction of a sea turtle cannot be taken, we end up with 33 loggerhead, 243 green, and 9 Kemp's Ridley sea

[26] STDW

turtles (for a total of 285 sea turtles) relocated during the expected 210 days of relocation trawling.

Table 9. Relocation trawling species composition

Trawling days: 210	Loggerhead	Green	Kemp's Ridley	
Species Percentage	11.6%	85.5%	2.9%	100%
Turtles relocated	32.87	242.41	8.22	284
Rounded up	33	243	9	285

The effects of capture and handling during relocation trawling 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 effects are expected to dissipate within a day (Stabenau and Vietti 2003). 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. We believe that properly conducted and supervised relocation trawling (i.e., observing trawl speed and tow-time limits, and taking adequate precautions to release captured animals) and tagging is unlikely to result lethal takes of sea turtles.

Relocation trawling will be undertaken by the USACE where any of the following conditions are met: (a) 2 or more turtles are taken in a 24-hour period in the project; or, (b) Total dredge takes in the project approach 75% (rounded-down) of any of the incidental take limits (Table 10); i.e., 2 loggerheads, 10 greens, or 1 Kemp's ridley taken.. Handling of sea turtles captured during relocation trawling in association with hopper dredging projects in Gulf navigation channels and sand mining areas shall be conducted by NMFS-approved endangered species observers.

5.1.4 Dredged Material Disposal

NMFS believes the proposed dredged material (approximately 14,146,000 cy) disposal activities over the life of the project are not likely to adversely affect sea turtles. Sea turtles may be attracted to ODMDS sites, to forage on the bycatch that may be occasionally found in the dredged material being dumped. As such, turtles could be potentially impacted by the sediments being discharged overhead. However, NMFS has never received a report of an injury to a sea turtle resulting from burial in, or impacts from, hopper-dredge-released sediments, from either inshore or offshore disposal sites, anywhere the USACE conducts dredged material disposal operations. Sea turtles are highly mobile and are able to 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. Even if temporarily enveloped in a sediment plume, NMFS believes the possibility of injury, or burial of normal, healthy sea turtles by dredged material (i.e., sand and silt) disposal, is discountable or its effects insignificant. NMFS believes that foraging habitat for sea turtles is not likely a limiting factor in the action area, and thus the loss of potential sand bottom foraging habitat adjacent to, or on the surface of, the disposal areas (compared to remaining foraging habitat) from burial by dredged material sediments will have insignificant effects on sea turtles. The risk of injury to sea turtles from collisions with dredge-related vessels (dredges/barges/scows) carrying dredge spoils to the ODMDS and/or returning to the dredging sites is also considered discountable.

6 CUMULATIVE EFFECTS

ESA Section 7 regulations require NMFS to consider cumulative effects in formulating their Biological Opinions (50 CFR 402.14). Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this Opinion. Because many activities that affect marine habitat involve some degree of federal authorization (e.g., through USACE), NMFS expects that ESA Section 7 will apply to most major, future actions that could affect sea turtles. In addition, other activities identified in the environmental baseline are expected to continue to affect sea turtles, at similar levels into the foreseeable future.

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 affected ESA-listed sea turtles and sturgeon. In Section 5, we outlined how the proposed action can affect sea turtles and the extent of those effects in terms of estimates of the numbers of each species expected to be killed or captured. 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.

It is the responsibility of the action agency to ensure that "any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered species or threatened species…" (ESA Section 7(a)(2)). Action agencies must consult with and seek assistance from the Services to meet this responsibility. The Services must ultimately determine in a Biological Opinion whether the action jeopardizes listed 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, NMFS must look at whether the action directly or indirectly reduces the reproduction, numbers, or distribution of a listed species. Then, if there is a reduction in one or more of these elements, we evaluate whether it would be expected to cause an appreciable reduction in the likelihood of both the survival and the recovery of the species. In the following section we evaluate the responses of loggerhead (NWA DPS), green, and Kemp's ridley sea turtles, to the effects of the action.

Effects of the Action on Sea Turtles' Likelihood of Survival and Recovery in the Wild
The lethal (observed and unobserved) take of 36 sea turtles (6 loggerheads, 28 greens, 4 Kemp's ridleys) by hopper dredges over the life of the project will result in a temporary reduction in total population numbers. Sea turtle mortality resulting from hopper dredges could result in the loss of reproductive value of an adult turtle. The death of an adult female eliminates an individual's contribution (thousands of hatchlings over a lifetime of nesting) to future generations, and the action will result in a reduction in sea turtle reproduction. While the death of any individual is regrettable, its value in terms of reproductive potential is considerably less than that of an equal number of adults.

7.1 Loggerhead NWA DPS

The maximum potential lethal take of up to 6 loggerhead sea turtles (3 observed and 3 unobserved) by hopper dredge is a reduction in numbers. These lethal takes would also result in a reduction in reproduction as a result of lost reproductive potential, as some of these individuals could be females who could have survived other threats and reproduced in the future, thus eliminating each female individual's contribution to future generations. For example, an adult female 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 adult female sea turtles, on average, could preclude the production of thousands of eggs and hatchlings of which a small percentage would be expected to survive to sexual maturity. The non-injurious capture of 33 turtles due to relocation trawling is not expected to result in a reduction in numbers or in reproduction for the species, as the capture and release are not expected to reduce the fitness and growth prior to maturity of any juveniles that are captured. Because all the potential interactions are expected to occur at random throughout the proposed action area and sea turtles generally have large ranges in which they disperse, the distribution of loggerhead sea turtles in the action area is expected to be unaffected.

Whether or not the reductions in loggerhead sea turtle numbers and reproduction attributed to the proposed action would appreciably reduce the likelihood of survival for loggerheads depends on what effect these reductions in numbers and reproduction would have on overall population sizes and trends, i.e., whether the estimated reductions, when viewed within the context of the environmental baseline and status of the species, are of such an extent that adverse effects on population dynamics are appreciable. In Section 3.1, we reviewed the status of the species in terms of nesting and female population trends and several recent assessments based on population modeling (e.g., (Conant et al. 2009; NMFS-SEFSC 2009a). Below we synthesize what that information means in general terms and also in the more specific context of the proposed action and the environmental baseline.

Loggerhead sea turtles are a slow growing, late-maturing species. Because of their longevity, loggerhead sea turtles require high survival rates throughout their life to maintain a population. In other words, late-maturing species cannot tolerate much anthropogenic mortality without going into decline. Conant et al. (2009) concluded loggerhead natural growth rates are small; natural survival needs to be high; and even low to moderate mortality can drive the population into decline. Because recruitment to the adult population is slow, population modeling studies suggest even small increased mortality rates in adults and subadults could substantially impact population numbers and viability (Chaloupka and Musick 1997; Crouse et al. 1987; Crowder et al. 1994; Heppell et al. 1995).

The best available information indicates that the NWA DPS of loggerheads is still large, but is possibly experiencing more mortality than it can withstand. All of the results of population models in both NMFS SEFSC (2009a) and Conant et al. (2009) indicated western North Atlantic loggerheads were likely to continue to decline in the future unless action was taken to reduce anthropogenic mortality. With the inclusion of newer nesting data beyond the 2007 data used in those analyses, the status of loggerhead nesting is beginning to show improvement. As previously described in the Status of the Species section, in 2008 nesting numbers were high, but not enough to change the negative trend line. Nesting dipped again in 2009, but rose substantially in 2010. The 2010 Florida index nesting number was the largest since 2000. With the addition of data through 2010, the nesting trend for the NWA DPS of loggerheads is only slightly negative and not statistically different from zero (no trend) (NMFS and USFWS 2010). Additionally, although the best-fit trend line is slightly negative, the range from the statistical analysis of the nesting trend includes both negative and positive growth (NMFS and USFWS 2010). The 2011 nesting was on par with 2010, providing further evidence that the nesting trend may have stabilized. It is important to note, however, that even if the trend has stabilized, overall numbers have a long way to go to meet the goals of the recovery plan.

NMFS SEFSC (2009a) estimated the minimum adult female population size for the western North Atlantic in the 2004-2008 time frame to likely be between 20,000 to 40,000 (median 30,050) individuals, with a low likelihood of being as many as 70,000 individuals. Estimates were based on the following equation: Adult females = (nests/(nests per female)) x remigration interval. The estimate of western North Atlantic adult loggerhead female was considered conservative for several reasons. The number of nests used for the western North Atlantic was based primarily on U.S. nesting beaches. Thus, the results are a slight underestimate of total nests because of the inability to collect complete nest counts for many non-U.S. nesting beaches. In estimating the current population size for adult nesting female loggerhead sea turtles, NMFS SEFSC (2009a) simplified the number of assumptions and reduced uncertainty by using the minimum total annual nest count over the relevant 5-year period (2004-2008) (i.e., 48,252 nests). This was a particularly conservative assumption considering how the number of nests and nesting females can vary widely from year to year (cf., 2008's nest count of 69,668 nests, which would have increased the adult female estimate proportionately, to between 30,000 and 60,000). Also, minimal assumptions were made about the distribution of remigration intervals and nests per female parameters, which are fairly robust and well known parameters.

Although not in NMFS SEFSC (2009a), NMFS SEFSC, in conducting its loggerhead assessment also produced a much less robust estimate for total benthic females in the western North Atlantic, with a likely range of approximately 60,000 to 700,000, up to less than 1 million. This estimate was discussed during the SEFSC's presentation on the loggerhead assessment to the Gulf Council's Reef Fish Committee at its June 16, 2009, meeting (NMFS-SEFSC 2009b). The estimate of overall benthic females is considered less robust because it is model-derived, assumes a stable age/stage distribution, and is highly dependent upon the life history input parameters. Relative to the more robust estimate of adult females, this estimate of total benthic female population is consistent with our knowledge of loggerhead life history and the relative abundance of adults and benthic juveniles: the benthic juvenile population is an order of magnitude larger than adults. Therefore, we believe female benthic loggerheads number in the hundreds of thousands, and therefore smaller pelagic stage individuals would occur in similar or even greater numbers.

As described in the Environmental Baseline section, we believe that the DWH oil release event had an adverse impact on loggerhead sea turtles, and resulted in mortalities to an unquantified number of individuals, along with unknown lingering impacts resulting from nest relocations, nonlethal exposure, and foraging resource impacts. It is also possible that the DWH oil release event reduced that survival rate of all age classes to varying degrees, and may continue to do so for some undetermined time into the future. However, there is no information at this time that it has, or should be expected to have, substantially altered the long-term survival rates in a manner that would significantly change the population dynamics compared to the conservative estimates used in this Opinion.

Also described in the Environmental Baseline section, we believe that climate change has the potential to adversely impact loggerhead sea turtles through rising sea levels, increased frequency of severe weather events, and changes in air and water temperatures. However, there is not enough information yet to determine exactly how climate change will affect the long term survivability of sea turtles.

Recent studies (Conant et al. 2009; Merrick et al. 2008; NMFS-SEFSC 2009a; NMFS and USFWS 2008a; TEWG 2009; Witherington et al. 2009) have all concluded that loggerhead nesting and adult female populations in the western North Atlantic are in decline and likely to continue to decline, while more recent analyses have indicated that the trend may have stabilized (NMFS and USFWS 2010). While the nesting and adult female populations are in decline, there is information on increases of abundance in some juvenile age classes (TEWG (2009), . The population is clearly not at a stable age distribution, given past population perturbations, thus making an assessment of overall population trends is difficult (adults decreasing, juveniles increasing, etc.). It is possible that observed declines may be transitory effects, which will be compensated for by a wave of recruitment, which may be what we are seeing with the latest data. However, the fact remains that NMFS-SEFSC (2009b), even though it was completed prior to nesting data from 2008-2010, is still the most comprehensive demographic model to date and predicted that a continued decline in the total population is likely, given our present knowledge of loggerhead life history parameters. Because more recent data is not enough to determine if the trend has been altered or reversed, we believe a conservative assessment of the NWA DPS is to consider the effects of the action as if the population is still in an overall minor declining trend.

Despite the recently observed decline of the NWA DPS, its total population remains large. Adult female population size is conservatively estimated, based on the minimum nesting year of 2007, in the range of 20,000 to 40,000. The adult male population would be similar. Benthic juveniles number into the hundreds of thousands. As detailed previously, although the DWH event is expected to have impacted individuals within the Gulf of Mexico, there is no information at this time to indicate population-level impacts occurred that were significant enough to alter the population status in such a manner that it would change the relative impact of the proposed action on the NWA DPS.

We believe that the effects on loggerhead turtles associated with the proposed action are not reasonably expected to cause an appreciable reduction in the likelihood of survival of the NWA DPS of loggerheads, even in light of the impacts of the DWH oil release event. We believe the currently large population is still under the threat of possible future decline until large mortality reductions in fisheries and other sources of mortality (including impacts outside U.S. jurisdiction) are achieved or the impacts of past protection and conservation efforts are realized within the population. However, over at least the next several decades, we expect the NWA population of adult females to remain large and to retain the potential for recovery. Although the effects of the proposed action will have an instantaneous effect on the overall size of the population, the action will not measurably reduce the size of the population, which we believe will remain sufficiently large for several decades to come even if the population were still in a minor decline, cause the population to lose genetic heterogeneity or broad demographic representation, impede successful reproduction, or affect loggerheads' ability to meet their life cycle requirements, including reproduction, sustenance, and shelter.

The Services' recovery plan for the NWA population of the loggerhead turtle (NMFS and USFWS 2008a) which is the same population of turtles as the NWA DPS, provides additional explanation of the goals and vision for recovery for this population. The objectives of the recovery plan most pertinent to the threats posed by the proposed action are numbers 1 and 2:

1. Ensure that the number of nests in each recovery unit is increasing and that this increase corresponds to an increase in the number of nesting females.
2. Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes.

Recovery objective 1, "Ensure that the number of nests in each recovery unit is increasing…," is the plan's overarching objective and has associated demographic criteria. Currently, none of the plan's criteria are being met, but the plan acknowledges that it will take 50-150 years to do so. Further reduction of multiple threats throughout the North Atlantic, Gulf of Mexico, and Greater Caribbean will be needed for strong, positive population growth, following implementation of more of the plan's actions. Although any continuing mortality in what might be an already declining population can affect the potential for population growth, we believe that given the large total population size, the lethal take of up to 6 individuals will not impede or prevent achieving this recovery objective over the anticipated 50- to 150-year time frame.

Recovery objective 2, "Ensure the in-water abundance of juveniles in both neritic and oceanic habitats is increasing and is increasing at a greater rate than strandings of similar age classes." Currently, there are not enough data to determine if this objective is being met. The NWA DPS nesting trend for loggerhead sea turtles remains slightly negative, although as mentioned above the trend has likely stabilized and in some areas improved. Overall, loggerhead populations may require many years before the population decline is reversed and numerical increases in population meet the goals of the recovery plan. As with recovery objective 1 above, we believe that given the large total population size, the lethal take of up to 6 individuals will not impede or prevent achieving this recovery objective over the anticipated 50- to 150-year time frame.

We believe that the proposed action is not reasonably expected to cause an appreciable reduction in the likelihood of recovery of the NWA DPS of loggerheads. Recovery is the process of removing threats so self-sustaining populations persist in the wild. The proposed action would not impede progress on achieving the identified relevant recovery objectives or achieving the overall recovery strategy.

7.2 Green Sea Turtles

The maximum potential lethal take of up to 27 green sea turtles (14 observed and 13 unobserved by hopper dredge) is a reduction in numbers. These lethal takes would also result in a potential reduction in future reproduction, assuming some individuals would be females and would have survived otherwise to reproduce. For example, an adult green sea turtle can lay 1-7 clutches (usually 2-3) of eggs every 2 to 4 years, with 110-115 eggs/nest of which a small percentage is expected to survive to sexual maturity. The non-injurious capture of 243 green turtles due to relocation trawling is not expected to result in a reduction in numbers or in reproduction for the species, as the capture and release are not expected to reduce the fitness and growth prior to maturity of any juveniles that are captured. Green sea turtles are highly migratory, and individuals from all Atlantic nesting populations may range throughout the Gulf of Mexico, Atlantic Ocean, and Caribbean Sea. While the potential lethal take and relocation of turtles captured in trawls would result in a displacement of individuals from important developmental habitat, the loss is not significant in terms of local, regional, or global distribution as a whole. The majority of reproductive effort for green sea turtles comes from Florida and the Florida population distribution would be expected to remain the same. Therefore, we believe the anticipated impacts will not affect the species' distribution.

Whether the reductions in numbers and reproduction of green sea turtles species would appreciably reduce the species' likelihood of survival depends on the probable effect the changes in numbers and reproduction would have on current population sizes and trends.

The 5-year status review for green sea turtles states that of the 7 green sea turtle nesting concentrations in the Atlantic Basin for which abundance trend information is available, all were determined to be either stable or increasing (NMFS and USFWS 2007a). That review also states that the annual nesting female population in the Atlantic basin ranges from 29,243-50,539 individuals. Additionally, the pattern of green sea turtle nesting shows biennial peaks in abundance, with a generally positive trend during the 10 years of regular monitoring since establishment of index beaches in Florida in 1989. An average of 5,039 green turtle nests were laid annually in Florida between 2001 and 2006 with a low of 581 in 2001 and a high of 9,644 in 2005 (NMFS and USFWS 2007a). Data from the index nesting beaches program in Florida substantiate the dramatic increase in nesting. In 2007, there were 9,455 green turtle nests found just on index nesting beaches, the highest since index beach monitoring began in 1989. The number fell back to 6,385 in 2008, further dropping under 3,000 in 2009, but that consecutive drop was a temporary deviation from the normal biennial nesting cycle for green turtles, as 2010 saw an increase back to 8,426 nests on the index nesting beaches (FWC Index Nesting Beach Survey Database). Modeling by Chaloupka et al. (2008) using data sets of 25 years or more resulted in an estimate of the Tortuguero, Costa Rica, population growing at 4.9% annually.

Also described in the Environmental Baseline section, we believe that climate change has the potential to adversely impact green sea turtles through rising sea levels, increased frequency of severe weather events, and changes in air and water temperatures. However, there is not enough information yet to determine exactly how climate change will affect the long term survivability of sea turtles.

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 exceeded through recruitment of new breeding individuals from successful reproduction of non-taken sea turtles. Since the abundance trend information for green sea turtles is clearly increasing, we believe the lethal interactions attributed to the proposed action will not have any measurable effect on that trend. As described in the Environmental Baseline section, although the DWH oil spill is expected to have resulted in adverse impacts to green turtles, there is no information to indicate, or basis to believe, that a significant population-level impact has occurred that would have changed the species' status to an extent that the expected interactions from the proposed action would result in a detectable change in the population status of green turtles in the Atlantic. Any impacts are not thought to alter the population status to a degree in which the number of mortalities from the proposed action could be seen as reducing the likelihood of survival of the species. Therefore, we conclude the proposed action is not likely to appreciably reduce the likelihood of survival of green sea turtles in the wild.

The Recovery plan for the population of Atlantic green sea turtles (NMFS and USFWS 1991) 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
    - Status: Green sea turtle nesting in Florida between 2001-2006 was documented as follows: 2001 – 581 nests, 2002 – 9,201 nests, 2003 – 2,622, 2004 – 3,577 nests, 2005 – 9,644 nests, 2006 – 4,970 nests. This averages 5,039 nests annually over those 6 years (2001-2006) (NMFS and USFWS 2007a). Subsequent nesting has shown even higher average numbers (i.e., 2007 – 9,455 nests, 2008 – 6,385 nests, 2009 – 3,000 nests, 2010 – 8,426 nests, 2011 – 10,701); thus, this recovery criterion continues to be met.
- A reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds
    - Status: Several actions are being taken to address this objective; however, there are currently no estimates available specifically addressing changes in abundance of individuals on foraging grounds. Given the clear increases in nesting, however, it is likely that numbers on foraging grounds have increased by at least the same amount. This Opinion's effects analysis assumes that in-water abundance has increased at the same rate as Tortuguero nesting.

Lethal take of up to 27 green sea turtles are not likely to reduce population numbers over time due to current population sizes, nesting increases and expected recruitment. Thus, the proposed action is not likely to impede the recovery objectives above and will not result in an appreciable reduction in the likelihood of green sea turtles' recovery in the wild.

7.3 Kemp's Ridley Sea Turtles

The maximum potential lethal take of 4 Kemp's ridley sea turtles (2 observed and 2 unobserved by hopper dredge) is a reduction in numbers. These lethal takes would also result in a potential reduction in future reproduction, assuming some individuals would be females and would have survived otherwise to reproduce. For example, females lay approximately 2.5 nests per season with each nest containing approximately 100 eggs, though only a small percentage is expected to survive to sexual maturity. The non-injurious capture of up to 9 Kemp's ridleys due to relocation trawling is not expected to result in a reduction in numbers or a reduction in reproduction for the species, as the capture and release is not expected to reduce the fitness and growth prior to maturity of any juveniles that are captured. Kemp's ridleys are wide ranging throughout the Gulf of Mexico and along the Atlantic coast, and while the potential lethal take and relocation of turtles captured in trawls would result in a displacement of individuals from important developmental habitat, the loss is not significant in terms of the species' rangewide distribution as a whole.

The proposed action's reductions in numbers and reproduction would reduce the species' population compared to the number that would have been present in the absence of the proposed action, assuming all other variables remained the same. Whether the reductions in numbers and reproduction of Kemp's ridley sea turtles species would appreciably reduce this species' likelihood of survival depends on the probable effect the changes in numbers and reproduction would have on current population sizes and trends.

Heppell et al. (2005) predicted in a population model that the Kemp's ridley sea turtle population is expected to increase at least 12-16% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2015. NMFS et al. (2011a) contains an updated model which predicted that the population is expected to increase 19% per year and that the population could attain at least 10,000 females nesting on Mexico beaches by 2011. Approximately 25,000 nests would be needed for an estimate of 10,000 nesters on the beach, based on an average 2.5 nests/nesting female. In 2009, the population consisted of 21,144 nests, but an unexpected and as yet unexplained drop in nesting occurred in 2010 (13,302), deviating from the NMFS et al. (2011a) model prediction. A subsequent increase to 20,570 nests in 2011 occurred. Though we will not know if the population is continuing the recovery trajectory and timeline predicted by the model until future nesting data is available, there is nothing to indicate the trend of increases in this species' population will cease.

It is likely that the Kemp's ridley sea turtle was the sea turtle species most affected by the DWH oil spill on a population level. In addition, the sea turtle strandings documented in 2011 in Alabama, Louisiana, and Mississippi primarily involved Kemp's ridley sea turtles (see Environmental Baseline section). Also, as described in the Environmental Baseline section, we believe that climate change has the potential to adversely impact Kemp's ridley sea turtles through rising sea levels, increased frequency of severe weather events, and changes in air and water temperatures. However, there is not enough information yet to determine exactly how climate change will affect the long term survivability of sea turtles. Nevertheless, the one-time loss of 3 Kemp's ridley sea turtles from the proposed action is not likely to measurably affect overall population numbers due to current large population sizes, expected recruitment, and continuing strong nesting numbers (including, based on preliminary information, in 2011), even in light of the adverse impacts expected to have occurred from the DWH oil spill and the strandings documented in 2011. Thus, we believe the proposed action will not result in an appreciable reduction in the likelihood of Kemp's ridley sea turtles' survival in the wild.

The recovery plan for the Kemp's ridley sea turtle (NMFS et al. 2011a) lists the following relevant recovery objectives:

- A population of at least 10,000 nesting females in a season (as measured by clutch frequency per female per season) distributed at the primary nesting beaches (Rancho Nuevo, Tepehuajes, and Playa Dos) in Mexico is attained. Methodology and capacity to implement and ensure accurate nesting female counts have been developed.

  The recovery plan states average nests per female is 2.5 and sets a recovery goal of 10,000 nesting females that would be represented by 25,000 nests in a season. As discussed above, nesting levels had been steadily increasing to a high of 21,144 nests in 2009, exhibited a substantial decline in 2010, but rebounded markedly in 2011 to 20,570 nests and again in 2012 with 21,797 nests. The potential nonlethal relocation of 9 Kemp's ridley turtles and the one-time lethal take of 3 Kemp's ridleys by the proposed action will not affect the overall level or trend in adult female nesting population numbers 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 sea turtle recovery in the wild.

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 the Northwest Atlantic DPS of loggerhead, green, and Kemp's ridley sea turtles.

Loggerhead (NWA DPS), Green, and Kemp's Ridley Sea Turtles
Because the proposed action is not reasonably expected to reduce appreciably the likelihood of survival and recovery of loggerhead (NWA DPS), green, or Kemp's ridley or sea turtles, it is our opinion that the BIH is not likely to jeopardize their continued existence.

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.

9.1 Anticipated Amount or Extent of Incidental Take

Section 9 of the ESA and federal regulation pursuant to Section 4(d) of the ESA prohibit take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by NMFS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. 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 ESA 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 provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

Based on historical distribution data, hopper dredge observer reports, observations of past strandings, and increasing turtle populations of loggerhead, green, and Kemp's ridley sea turtles in the action area, we estimate that these 3 species may occur in the action area and may be taken by the hopper dredging operations of this project, by crushing and/or entrainment in suction dragheads. NMFS anticipates incidental take will consist of up to 18 sea turtles[27] (3 loggerheads, 14 greens, and 2 Kemp's ridleys) killed during BIH, which will be detected and documented by onboard protected species observers (Table 10). NMFS also anticipates that capture trawling may result in up to 285 non-injurious captures and relocations of an estimated (up to) 33 loggerheads, 243 greens, and 9 Kemp's ridleys.

Table 10. Amount of authorized observed take during the BIH project and associated relocation trawling

During Dredging		Loggerhead	Green	Kemp's Ridley
Total Sea Turtles Observed Taken	18.00	2.90	13.35	1.74
Rounded up	19.00	3.00	14.00	2.00
During Relocation Trawling				
Total Sea Turtles Relocated	285.00	46	211	28

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 (NWA DPS), green, or Kemp's ridley sea turtles.

9.3 Reasonable and Prudent Measures

Section 7(b)(4) of the ESA requires NMFS to issue a statement specifying the impact of any incidental take on listed species, which results from an agency action otherwise found to comply with Section 7(a)(2) of the ESA. It also states the RPMs necessary to minimize the impacts of take and the terms and conditions to implement those measures, must be provided and must be followed to minimize those impacts. Only incidental taking by the federal agency that complies with the specified terms and conditions is authorized.

The RPMs and terms and conditions are specified as required, by 50 CFR 402.14(i), to document the incidental take of ESA-listed species by the proposed action, to minimize the impact of that take, and to specify the procedures to be used to handle any individuals taken. These measures and terms and conditions are non-discretionary and must be implemented by the USACE in order for the protection of Section 7(o)(2) to apply. The USACE has a continuing duty to regulate the activity covered by this incidental take statement. If the USACE fails to adhere to the terms and

[27] The species-specific take numbers do not sum to the total take number from which they were derived due to rounding up all the species-specific take estimates.

conditions through enforceable terms, and/or fails to retain oversight to ensure compliance with these terms and conditions, the protective coverage of Section 7(o)(2) may lapse.

Current regional Opinions for hopper dredging require observers to document takes, deflector dragheads, and conditions and guidelines for relocation trawling, which NMFS believes are necessary to minimize effects dredging activities on listed sea turtle species that occur in the action area. NMFS has determined that the following RPMs, patterned after long-standing hopper dredging requirements, 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 and monitor the impacts of the proposed hopper dredging have been discussed with the USACE in the past and are standard operating procedures, including use of sea turtle deflector dragheads, of intake and overflow screening, observer and reporting requirements, and relocation trawling. The following RPMS and associated terms and conditions are established to implement these measures, to document incidental takes, and to specify procedures for handling individuals taken. Only incidental takes that occur while these measures are in full implementation are authorized.

1. The USACE shall implement best management measures, including use of temperature- and date-based dredging windows, sea turtle deflector dragheads, disengagement of dredging pumps when they are not on the bottom, limiting dredge lights seasonally, and relocation trawling to reduce the risk of injury or mortality of listed species and lessen the number of sea turtles killed by the proposed action.

   Rationale: Temperature- and date-based dredging windows appear to be very effective in reducing sea turtle entrainments, by avoiding times and places either where turtle densities are high or their behaviors may make them less susceptible to entrainment. Draghead deflectors provide a last line of defense, by acting as physical barriers, reducing the likelihood that turtles that are close to the draghead are actually entrained. When the suction dragheads are not firmly placed on the bottom during dredging operations, sea turtles encountered by the dragheads can be crushed underneath them and/or impinged or sucked into the suction pipes by the powerful suction, almost always resulting in death. Seasonally limiting dredge lights will help reduce potential disorientation effects on female sea turtles approaching the nesting beaches and sea turtle hatchlings making their way seaward from their natal beaches. Relocation (i.e., capture) trawling reduces the risk of turtle entrainment even when turtle densities are high, possibly by either temporarily reducing the local density of turtles in the channel where the dredge is working or by modifying the turtles' behavior temporarily and making them less susceptible to entrainment. In addition, the use of relocation trawling provides the USACE with valuable real-time estimates of sea turtle abundance, takes, and distribution which have been helpful to USACE project planning efforts to reduce sea turtle impacts, for example by delaying or changing the location of hopper dredge deployment in response to sea turtle density information in the channel.

2. The USACE shall have measures in place to detect and report all interactions with any protected species (ESA or Marine Mammal Protection Act) resulting from the proposed action. These measures include endangered species observers aboard the hopper dredge and relocation trawlers, screening of dredge material to allow discovery of any entrained turtles, and handling procedures for incidentally taken animals.

Rationale: NMFS-approved observers monitor dredged material inflow and overflow screening baskets and relocation trawling efforts to monitor and report incidental take. Gathering basic biological information (e.g., size which will help determine the age class) will enable monitoring of the impact of the take on the species taken. 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 important monitoring information about the animals taken during relocation trawling. Tagging will inform about the fate of the turtles relocated should they be recaptured or strand subsequent to being relocated. Tissue sampling will identify which sea turtle stocks are being impacted and their geographic origin.

9.4 Terms and Conditions

In order to be exempt from the prohibitions of Section 9 of the ESA, the USACE must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting and monitoring requirements. 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) Operational Procedures (RPM 1): During periods in which hopper dredges are operating and NMFS-approved protected species observers are *not* required, (December 1 through March 31, if water temperatures are under 11°C), the USACE 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 encountered while traveling between the dredge site and offshore disposal area, and to immediately contact the USACE if sea turtles are seen in the vicinity.
    c) Notify NMFS immediately by e-mail (takereport.nmfsser@noaa.gov) if a sea turtle or other threatened or endangered species is taken by the dredge, and reference this biological opinion (F/SER/2013/11766).
4) Dredging Pumps (RPM 1): 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.
5) 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 nautical miles of sea turtle nesting beaches shall be limited to the minimal

lighting necessary to comply with U.S. Coast Guard and/or Occupational Safety and Health Administration 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.

6) Sea Turtle Deflecting Draghead (RPM 1): A state-of-the-art solid, plow-type rigid deflector dragheads must be used on all hopper dredges at all times. The use of alternative, experimental dragheads is not authorized without prior written approval from NMFS, in consultation with USACE ERDC. Slotted draghead deflectors or chain-type deflectors are currently not authorized.

7) Training – Personnel on Hopper Dredges (RPM 1): The USACE 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, USACE 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.

8) Observers (RPM 2): The USACE 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, or whenever surface water temperatures are 11°C or greater.

9) Screening (RPM 2): When sea turtle observers are required on hopper dredges, 100 % 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, 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 USACE, in consultation with observers and the draghead operator, determines that the draghead is clogging and reducing production substantially, other than in sand borrow areas the screens may be modified sequentially. Mesh size may be increased to 8-inch by 8-inch; if that fails to solve the clogging problem, then 16-inch by 16-inch openings may be used. Clogging should be greatly reduced or eliminated with these options; however, further clogging may compel removal of the screening altogether, in which case effective 100% overflow monitoring and screening is mandatory. The USACE shall notify NMFS beforehand if inflow screening is going to be reduced or eliminated, what attempts were made to reduce the clogging problem, 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.

10) Dredge Take Reporting and Final Report (RPM 2): Observer reports of incidental take by hopper dredges must be emailed to the Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion - F/SER/2013/11766) by onboard NMFS-approved protected species observers, the dredging company, or the USACE 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 (takereport.nmfsser@noaa.gov with reference to this biological opinion) within 60 working days of completion of the dredging project. The 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 USACE deems relevant.

11) Sea Turtle Strandings (RPM 2): The USACE Project Manager or designated representative shall notify the 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.

    a) Information on any such strandings shall be reported in writing within 30 days of project end to NMFS' Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion) with a report detailing incidents, with photographs when available, of stranded sea turtles that bear indications of draghead impingement or entrainment. Because the deaths of these turtles, if hopper dredge related, have already been accounted for in NMFS' jeopardy analysis, these strandings will not be counted against the USACE's take limit if they do not exceed the take limits set forth in this consultation.

12) Conditions Requiring Relocation Trawling (RPM 1): The USACE shall require trawling to start as soon as possible within 72 hours of either:

    a) Two or more turtles are taken by hopper dredges in a 24-hour period, or

    b) Total dredge takes in the project approach 75% (rounded-down) of any of the incidental take limits (Table 10); i.e., 2 loggerheads, 10 greens, or 1 Kemp's ridley taken.

    Relocation trawling may be suspended if no relocation or dredge takes occur within 14 days.

13) Relocation Trawling (RPM 1): Any relocation trawling conducted or contracted by the USACE to temporarily reduce abundance of these listed species during hopper dredging in order to reduce the possibility of lethal hopper dredge interactions, is subject to the following conditions:

a) Trawl Time: Trawl tow-time duration shall not exceed 42 minutes (measured from the time the trawl doors enter the water until the time the trawl doors are out of the water) and trawl speeds shall not exceed 3.5 knots.

b) Protected Species Handling During Trawling: Handling of sea turtles captured during relocation trawling in association with the dredging project shall be conducted by NMFS-approved protected species observers. 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 B).

c) Captured Sea Turtle Holding Conditions: Sea turtles may be held briefly for the collection of important biological information, 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) Biological Data Collection: 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.

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 nautical miles from the dredge site. Turtles to which satellite tags will be affixed may be held up to 24 hours before release. If two or more released turtles are later recaptured, subsequent turtle captures shall be released not less than 5 nautical miles 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 USACE shall ensure that logistical arrangements and support to accomplish this are pre-planned and ready. The USACE shall bear the financial cost of all sea turtle transport, treatment, rehabilitation, and release.

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 Opinion's authority.

h) PIT-Tag: This opinion serves as the permitting authority for any NMFS-approved protected species observer aboard a relocation trawler to PIT-tag captured sea turtles. 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 tag the animal prior to release (in addition to the standard external tagging):

   i) 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);

   ii) 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) 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. 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.

j) 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.

k) Additional Data Collection Allowed During the Handling of Sea Turtles and Other Incidentally-caught ESA-listed species: The USACE shall allow NMFS-approved protected species observers to conduct additional investigations that may include more invasive 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 research projects but only if 1) the additional work does not interfere with any project operations (dredging activities, relocation trawling, etc), 2) the observer holds a valid federal research permit (and any required state permits) authorizing the activities, either as the permit holder, or as designated agent of the permit holder, 3) the additional work does not incur any additional expenses to the USACE or the USACE approves of the expense, and 4) the observer has first coordinated with USACE Galveston District and notified NMFS's Southeast Regional Office, Protected Resources Division (takereport.nmfsser@noaa.gov with reference to this biological opinion).

14) Relocation Trawling Report (RPM 2): The USACE shall provide NMFS' Southeast Regional Office (takereport.nmfsser@noaa.gov with reference to this biological opinion) 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.

15) 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 shall be tissue-sampled by a NMFS-approved protected species observer prior to release.

    Sea turtle tissue samples shall be taken in accordance with NMFS SEFSC's procedures for sea turtle genetic analyses (Appendix II of this opinion). The USACE shall ensure that tissue samples taken during the dredging project are collected, stored properly, and mailed no later than 60 days of 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.

10 CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to utilize their authority to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat to help implement recovery plans or to develop information.

Pursuant to Section 7(a)(1) of the ESA, the following conservation recommendations are made to assist the USACE in contributing to the conservation of sea turtles by further reducing or eliminating adverse impacts that result from dredging.

1. <u>Channel Conditions and Seasonal Abundance Studies</u>: 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 USACE 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 USACE 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 USACE 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 USACE 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 preferred winter dredging window. NMFS should be consulted regarding the development of a protocol for draghead evaluation tests. NMFS recommends that USACE coordinate with ERDC, 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 USACE 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.

5. Overflow Screening: The USACE 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.

6. Preferential Consideration for Horizontal Overflow Screening: The USACE 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.

7. 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 USACE ERDC apply to NMFS for an ESA Section 10 research permit to conduct additional endangered species research on species incidentally captured during traditional relocation trawling. SERO shall assist the USACE with the permit application process.

NMFS also encourages the USACE to cooperate with NMFS scientists, other federal agencies' scientists, and university scientists holding appropriate research permits to make more 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 or authorized individuals or their authorized designees.

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.

8. <u>Draghead Improvements - Water Ports</u>: NMFS recommends that the USACE require, or at least recommend, that dredge operators have all dragheads on hopper dredges contracted by the USACE for dredging projects outfitted (eventually) 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 USACE personnel for various draghead modifications to address scenarios where turtles may be entrained during hopper dredging (Dickerson and Clausner 2003). These proposals 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.

9. <u>Economic Incentives for No Turtle Takes</u>: The USACE 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.

10. <u>Sodium Vapor Lights on Offshore Equipment</u>: On offshore equipment (i.e., hopper dredges, pumpout barges) shielded low-pressure sodium vapor lights are highly recommended for lights that cannot be eliminated when the vessels are operating with 10 mi of sea turtle nesting beaches.

11 REINITIATION OF CONSULTATION

This concludes formal consultation on the proposed project, the Brazos Island Harbor Channel Improvement. 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. In instances where the amount or extent of take is exceeded, USACE must immediately request reinitiation of formal consultation.

12 LITERATURE CITED

Ackerman, R. A. 1997. The nest environment and embryonic development of sea turtles. . Pages 432 *in* P. L. Lutz, and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press, New York.

Addison, D. S. 1997. Sea turtle nesting on Cay Sal, Bahamas, recorded June 2-4, 1996. Bahamas Journal of Science 5:34-35.

Addison, D. S., and B. Morford. 1996. Sea turtle nesting activity on the Cay Sal Bank, Bahamas. Bahamas Journal of Science 3:31-36.

Aguilar, R., J. Mas, and X. Pastor. 1995. Impact of Spanish swordfish longline fisheries on the loggerhead sea turtle, Caretta caretta, population in the western Mediterranean. Pages 1 *in* 12th Annual Workshop on Sea Turtle Biology and Conservation, Jekyll Island, Georgia.

Aguirre, A. A., G. H. Balazs, T. R. Spraker, S. K. K. Murakawa, and B. Zimmerman. 2002. Pathology of Oropharyngeal Fibropapillomatosis in Green Turtles Chelonia mydas. Journal of Aquatic Animal Health 14(4):298-304.

Aguirre, A. A., G. H. Balazs, B. Zimmerman, and F. D. Galey. 1994. Organic Contaminants and Trace Metals in the Tissues of Green Turtles (Chelonia mydas) Afflicted with Fibropapillomas in the Hawaiian Islands. Marine Pollution Bulletin 28(2):109-114.

Antonelis, G. A., J. D. Baker, T. C. Johanos, R. C. Braun, and A. L. Harting. 2006. Hawaiian monk seal (Monachus schauinslandi): status and conservation issues. Atoll Research Bulletin 543:75-101.

Baker, J. D., C. L. Littnan, and D. W. Johnston. 2006. Potential effects of sea level rise on the terrestrial habitats of endangered and endemic megafauna on the Northwestern Hawaiian Islands. . Endangered Species Research 2:21-30.

Balazs, G. 1982. Growth rates of immature green turtles in the Hawaiian Archipelago. Pages 117-125 *in* K. A. Bjorndal, editor. Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington D.C.

Balazs, G. H. 1983. Recovery records of adult green turtles observed or originally tagged at French Frigate Shoals, northwestern Hawaiian Islands. NMFS, Washington, D.C.; Springfield, VA.

Bjorndal, K. A. 1982. The consequences of herbivory for the life history pattern of the Caribbean green turtle, Chelonia mydas. Pages 111-116 In: Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles. Smithsonian Institution Press. Washington, D.C.

Bjorndal, K. A., A. B. Bolten, and M. Y. Chaloupka. 2005. Evaluating trends in abundance of immature green turtles, Chelonia mydas, in the Greater Caribbean. Ecological Applications 15(1):304-314.

Bjorndal, K. A., J. A. Wetherall, A. B. Bolten, and J. A. Mortimer. 1999. Twenty-Six Years of Green Turtle Nesting at Tortuguero, Costa Rica: An Encouraging Trend. Conservation Biology 13(1):126-134.

Bolten, A. B., K. A. Bjorndal, and H. R. Martins. 1994. Life history model for the loggerhead sea turtle (Caretta caretta) populations in the Atlantic: Potential impacts of a longline fishery. U.S. Department of Commerce.

Bolten, A. B., and coauthors. 1998. Transatlantic developmental migrations of loggerhead sea turtles demonstrated by mtDNA sequence analysis. Ecological Applications 8:1-7.

Bolten, A. B., and B. E. Witherington. 2003. Loggerhead sea turtles. Smithsonian Books, Washington, D.C.

Bouchard, S., and coauthors. 1998. Effects of Exposed Pilings on Sea Turtle Nesting Activity at Melbourne Beach, Florida. Journal of Coastal Research 14:1343-1347.

Bowen, B. W., and coauthors. 1992. Global Population Structure and Natural History of the Green Turtle (Chelonia mydas) in Terms of Matriarchal Phylogeny. Evolution 46:865-881.

Bresette, M. J., D. Singewald, and E. D. Maye. 2006. Recruitment of post-pelagic green turtles (Chelonia mydas) to nearshore reefs on Florida's east coast. Page 288 In: Frick, M., A. Panagopoulou, A.F. Rees, and K. Williams (compilers). Book of Abstracts. Twenty-sixth annual symposium on sea turtle biology and conservation. International Sea Turtle Society, Athens, Greece.

Caldwell, D. K., and A. Carr. 1957. Status of the sea turtle fishery in Florida. Pages 457-463 *in* Transactions of the 22nd North American Wildlife Conference.

Campbell, C. L., and C. J. Lagueux. 2005. Survival probability estimates for large juvenile and adult green turtles (Chelonia mydas) exposed to an artisanal marine turtle fishery in the western Caribbean. Herpetologica 61(2).

Carballo, A. Y., C. Olabarria, and T. Garza Osuna. 2002. Analysis of four macroalgal assemblages along the Pacific Mexican coast during and after the 1997-98 El Niño. Ecosystems 5(8):749-760.

Carr, A. 1984. So Excellent a Fishe. Charles Scribner's Sons, New York.

Carr, A. 1986. New perspectives on the pelagic stage of sea turtle development. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Center, Panama City Laboratory, Panama City, Fla.

Carr, A. 1987. Impact of nondegradable marine debris on the ecology and survival outlook of sea turtles. Marine Pollution Bulletin 18(6, Supplement 2):352-356.

Caurant, F., P. Bustamante, M. Bordes, and P. Miramand. 1999. Bioaccumulation of cadmium, copper and zinc in some tissues of three species of marine turtles stranded along the French Atlantic coasts. Marine Pollution Bulletin 38(12):1085-1091.

Chaloupka, M., and C. Limpus. 2005. Estimates of sex- and age-class-specific survival probabilities for a southern Great Barrier Reef green sea turtle population. Marine Biology 146(6):1251-1261.

Chaloupka, M., T. M. Work, G. H. Balazs, S. K. K. Murakawa, and R. Morris. 2008. Cause-specific temporal and spatial trends in green sea turtle strandings in the Hawaiian Archipelago (1982-2003). Marine Biology 154:887-898.

Chaloupka, M. Y., and J. A. Musick. 1997. Age, growth, and population dynamics. Pages 233-276 *in* P. L. Lutz, and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press, Boca Raton.

Conant, T. A., and coauthors. 2009. Loggerhead sea turtle (Caretta caretta) 2009 status review under the U.S. Endangered Species Act. Report of the Loggerhead Biological Review Team to the National Marine Fisheries Service.

Corsolini, S., S. Aurigi, and S. Focardi. 2000. Presence of polychlobiphenyls (PCBs) and coplanar congeners in the tissues of the Mediterranean loggerhead turtle Caretta caretta. Marine Pollution Bulletin 40:952–960.

Crouse, D. T. 1999. Population modeling implications for Caribbean hawksbill sea turtle management. . Chelonian Conservation and Biology 3(2):185-188.

Crouse, D. T., L. B. Crowder, and H. Caswell. 1987. A Stage-Based Population Model for Loggerhead Sea Turtles and Implications for Conservation. Ecology 68(5):1412-1423.

Crowder, L. B., D. T. Crouse, S. S. Heppell, and T. H. Martin. 1994. Predicting the Impact of Turtle Excluder Devices on Loggerhead Sea Turtle Populations. Ecological Applications 4(3):437-445.

Daniels, R., T. White, and K. Chapman. 1993. Sea-level rise: Destruction of threatened and endangered species habitat in South Carolina. Environmental Management 17(3):373-385.

Dellinger, T., and H. Encarnaçâo. 2000. Accidental capture of sea turtles by the fishing fleet based at Madeira Island, Portugal. Pages 218 *in* H. J. Kalb, and T. Wibbels, editors. Proceedings of the Nineteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-443.

Dickerson, D., M. Wolters, and C. Theriot. 2007. Commitments of the Corps of Engineers: Navigation, dredging, and sea turtles. Pages 191 *in* Twenty-Fourth Annual Symposium on Sea Turtle Biology and Conservation.

Dodd, C. K. 1988. Synopsis of the biological data on the loggerhead sea turtle: Caretta caretta (Linnaeus, 1758). Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C.

Doughty, R. W. 1984. Sea turtles in Texas: a forgotten commerce. Southwestern Historical Quarterly 88:43-70.

Dow, W., K. Eckert, M. Palmer, and P. Kramer. 2007. An Atlas of Sea Turtle Nesting Habitat for the Wider Caribbean Region. The Wider Caribbean Sea Turtle Conservation Network and The Nature Conservancy, Beaufort, North Carolina.

Dutton, P. H., and coauthors. 2008. Composition of Hawaiian green turtle foraging aggregations: mtDNA evidence for a distinct regional population. Endangered Species Research 5:37-44.

Ehrhart, L. M. 1983. Marine Turtles of the Indian River Lagoon System. Florida Sci. 46:334-346.

Ehrhart, L. M., W. E. Redfoot, and D. Bagley. 2007. Marine turtles of the central region of the Indian River Lagoon system. Florida Sci. 70(4):415-434.

Ehrhart, L. M., and R. G. Yoder. 1978. Marine turtles of Merritt Island National Wildlife Refuge, Kennedy Space Center, Florida. Pages 25-30 *in* G. E. Henderson, editor Proceedings of the Florida and Interregional Conference on Sea Turtles. Florida Marine Research Publications.

EPA. 1991. Environmental Impact Statement, Final: Brazos Island Harbor 42-foot Project, Texas, Ocean Dredged Material Disposal Site Designation. U.S. Environmental Protection Agency, Region VI.

Fish, M. R., and coauthors. 2005. Predicting the Impact of Sea-Level Rise on Caribbean Sea Turtle Nesting Habitat. Conservation Biology 19(2):482-491.

Fitzsimmons, N. N., L. W. Farrington, M. J. McCann, C. J. Limpus, and C. Moritz. 2006. Green turtle populations in the Indo-Pacific: a (genetic) view from microsatellites. Pages 111 *in* N. Pilcher, editor Proceedings of the Twenty-Third Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-536.

Foley, A. M., B. A. Schroeder, and S. L. MacPherson. 2008. Post-nesting migrations and resident areas of Florida loggerhead turtles (Caretta caretta). Pages 75-76 *in* H. J. Kalb, A. Rohde, K. Gayheart, and K. Shanker, editors. Twenty-Fifth Annual Symposium on Sea Turtle Biology and Conservation.

Foley, A. M., B. A. Schroeder, A. E. Redlow, K. J. Fick-Child, and W. G. Teas. 2005. Fibropapillomatosis in stranded green turtles (*Chelonia mydas*) from the eastern United

States (1980-98): trends and associations with environmental factors. Journal of Wildlife Diseases 41(1):29-41.
Frazer, N. B., and L. M. Ehrhart. 1985. Preliminary Growth Models for Green, Chelonia mydas, and Loggerhead, Caretta caretta, Turtles in the Wild. Copeia 1985(1):73-79.
Frazier, J. G. 1980. Marine turtles and problems in coastal management. Pages 2395-2411 *in* B. C. Edge, editor Coastal Zone '80: Second Symposium on Coastal and Ocean Management 3. American Society of Civil Engineers, Washington, D.C.
Fritts, T. H., M. A. McGehee, Coastal Ecosystems Project., U.S. Fish and Wildlife Service. Office of Biological Services., and United States. Minerals Management Service. Gulf of Mexico OCS Region. 1982. Effects of petroleum on the development and survival of marine turtle embryos. U.S. Dept. of the Interior/Minerals Management Service, Gulf of Mexico Outer Continental Shelf Regional Office, Washington, D.C.
Garrett, C. 2004. Priority Substances of Interest in the Georgia Basin - Profiles and background information on current toxics issues. Technical Supporting Document.
Gavilan, F. M. 2001. Status and distribution of the loggerhead turtle, (Caretta caretta), in the wider Caribbean region. Pages 36-40 *in* K. L. Eckert, and F. A. Abreu Grobois, editors. Marine turtle conservation in the wider Caribbean region: a dialogue for effective regional management, St. Croix, U.S. Virgin Islands.
Geraci, J. R. 1990. Physiological and toxic effects on cetaceans. Pages 167-197 *in* J. R. Geraci, and D. J. St. Aubin, editors. Sea Mammals and Oil: Confronting the Risks
Academic Press, Inc.
Girard, C., A. D. Tucker, and B. Calmettes. 2009. Post-nesting migrations of loggerhead sea turtles in the Gulf of Mexico: dispersal in highly dynamic conditions. Marine Biology 156(9):1827-1839.
Grant, S. C. H., and P. S. Ross. 2002. Southern Resident killer whales at risk: toxic chemicals in the British Columbia and Washington environment. . Canadian Technical Report of Fisheries and Aquatic Sciences, Sidney, B.C.
Green, D. 1993. Growth rates of wild immature green turtles in the Galapagos Islands, Ecuador. Journal of Herpetology 27(3):338-341.
Groombridge, B. 1982. Kemp’s Ridley or Atlantic Ridley, *Lepidochelys kempii* (Garman 1880). Pages 201-208 *in* The IUCN Amphibia, Reptilia Red Data Book.
Guseman, J. L., and L. M. Ehrhart. 1992. Ecological geography of Western Atlantic loggerheads and green turtles: evidence from remote tag recoveries. M. Salmon, and J. Wyneken, editors. 11th Annual Workshop on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS.
Hart, K. M., M. M. Lamont, I. Fujisaki, A. D. Tucker, and R. R. Carthy. 2012. Common coastal foraging areas for loggerheads in the Gulf of Mexico: Opportunities for marine conservation. Biological Conservation 145(1):185-194.
Hartwell, S. I. 2004. Distribution of DDT in sediments off the central California coast. Marine Pollution Bulletin 49:299-305.
Hawkes, L. A., A. C. Broderick, M. H. Godfrey, and B. J. Godley. 2007. Investigating the potential impacts of climate change on a marine turtle population. Global Change Biology 13(5):923-932.
Hays, G. C., and coauthors. 2001. The diving behaviour of green turtles undertaking oceanic migration to and from Ascension Island: dive durations, dive profiles and depth distribution. Journal of Experimental Biology 204:4093-4098.

Hays, G. C., and coauthors. 2002. Water temperature and internesting intervals for loggerhead (Caretta caretta) and green (Chelonia mydas) sea turtles. Journal of Thermal Biology 27(5):429-432.

Heppell, S. S., L. B. Crowder, D. T. Crouse, S. P. Epperly, and N. B. Frazer. 2003. Population models for Atlantic loggerheads: past, present, and future. Pages 255-273 *in* A. B. Bolten, and B. E. Witherington, editors. Loggerhead Sea Turtles. Smithsonian Books, Washington.

Heppell, S. S., L. B. Crowder, and J. Priddy. 1995. Evaluation of a fisheries model for hawksbill sea turtle (Eretmochelys imbricata) harvest in Cuba. NOAA Tech. Memor. NMFS-OPR-5.

Heppell, S. S., and coauthors. 2005. A population model to estimate recovery time, population size, and management impacts on Kemp's ridley sea turtles. Chelonian Conservation and Biology 4(4):767-773.

Herbst, L. H. 1994. Fibropapillomatosis of marine turtles. Annual Review of Fish Diseases 4:389-425.

Herbst, L. H., and coauthors. 1995. An infectious etiology for green turtle fibropapillomatosis. Proceedings of the American Association for Cancer Research Annual Meeting 36:117.

Hildebrand, H. 1963. Hallazgo del area de anidación de la tortuga "lora" *Lepidochelys kempii* (Garman 1880), en la costa occidental del Golfo de México (Rept. Chel.). Ciencia Mex 22(1):105-112.

Hildebrand, H. 1982. A historical review of the status of sea turtle populations in the Western Gulf of Mexico. Pages 447-453 *in* K. A. Bjorndal, editor. Biology and Conservation of Sea Turtles. Smithsonian Institution Press, Washington D.C.

Hirth, H. F. 1971. Synopsis of biological data on the green turtle Chelonia mydas (Linnaeus) 1758. Food and Agriculture Organization of the United Nations, Rome.

Hirth, H. F., and USFWS. 1997. Synopsis of the biological data on the green turtle Chelonia mydas (Linnaeus 1758). U.S. Fish and Wildlife Service, U.S. Dept. of the Interior, Washington, D.C.

IPCC. 2007. Climate Change 2007: Climate Change Impacts, Adaptation and Vulnerability. Summary for Policymakers. S. Solomon, and coeditors, editors. Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPPC (Intergovernmental Panel on Climate Change). Cambridge University Press, Cambridge, UK and New York, NY.

IPCC. 2013. Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Pages 1535 *in* T. F. Stocker, and coeditors, editors. Cambridge University Press, Cambridge, United Kingdom; New York, NY, USA.

Iwata, H., S. Tanabe, N. Sakai, and R. Tatsukawa. 1993. Distribution of persistent organochlorines in the oceanic air and surface seawater and the role of ocean on their global transport and fate Environmental Science and Technology 27:1080- 1098.

Jacobson, E. R. 1990. An update on green turtle fibropapilloma. Marine Turtle Newsletter 49:7-8.

Jacobson, E. R., and coauthors. 1989. Cutaneous fibropapillomas of green turtles (Chelonia mydas). Journal of Comparative Pathology 101(1):39-52.

Jacobson, E. R., S. B. Simpson, and J. P. Sundberg. 1991. Fibropapillomas in green turtles. Pages 99-100 *in* G. H. Balazs, and S. G. Pooley, editors. Research Plan for Marine Turtle Fibropapilloma. NOAA.

Johnson, S. A., and L. M. Ehrhart. 1994. Nest-site fidelity of the Florida green turtle. B. A. Schroeder, and B. Witherington, editors. Proceedings of the 13th Annual Symposium on Sea Turtle Biology and Conservation.

Johnson, S. A., and L. M. Ehrhart. 1996. Reproductive Ecology of the Florida Green Turtle: Clutch Frequency. Journal of Herpetology 30:407-410.

Keller, J. M., J. R. Kucklick, M. A. Stamper, C. A. Harms, and P. D. McClellan-Green. 2004. Associations between Organochlorine Contaminant Concentrations and Clinical Health Parameters in Loggerhead Sea Turtles from North Carolina, USA. Environmental Health Perspectives 112:1074-1079.

Keller, J. M., P. D. McClellan-Green, J. R. Kucklick, D. E. Keil, and M. M. Peden-Adams. 2006. Effects of Organochlorine Contaminants on Loggerhead Sea Turtle Immunity: Comparison of a Correlative Field Study and In Vitro Exposure Experiments. Environmental Health Perspect 114.

Lagueux, C. 2001. Status and distribution of the green turtle, Chelonia mydas, in the Wider Caribbean Region, pp. 32-35. In: K. L. Eckert and F. A. Abreu Grobois (eds.). 2001 Proceedings of the Regional Meeting: Marine Turtle Conservation in the Wider Caribbean Region: A Dialogue for Effective Regional Management. Santo Domingo, 16-18 November 1999. WIDECAST, IUCN-MTSG, WWF, UNEP-CEP.

Laurent, L., and coauthors. 1998. Molecular resolution of marine turtle stock composition in fishery bycatch: a case study in the Mediterranean. Molecular Ecology 7:1529-1542.

Law, R. J., and coauthors. 1991a. Concentrations of trace metals in the livers of marine mammals (seals, porpoises and dolphins) from waters around the British Isles. Marine Pollution Bulletin 22:183-191.

Law, R. J., and coauthors. 1991b. Concentrations of trace metals in the livers of marine mammals (seals, porpoises and dolphins) from waters around the British Isles. Marine Pollution Bulletin 22(4):183-191.

León, Y. M., and C. E. Díez. 2000. Ecology and population biology of hawksbill turtles at a Caribbean feeding ground. Pages 32-33 *in* Proceedings of the 18th International Sea Turtle Symposium. NOAA Technical Memorandum.

Loehefener, R. R., W. Hoggard, C. L. Roden, K. D. Mullin, and C. M. Rogers. 1989. Petroleum structures and the distribution of sea turtles. In: Proc. Spring Ternary Gulf of Mexico Studies Meeting, Minerals Management Service. U.S. Department of the Interior.

Lutcavage, M. E., P. L. Lutz, G. D. Bossart, and D. M. Hudson. 1995. Physiologic and clinicopathologic effects of crude oil on loggerhead sea turtles. Archives of Environmental Contamination and Toxicology 28(4):417-422.

Lutcavage, M. E., P. Plotkin, B. Witherington, and P. L. Lutz. 1997. Human impacts on sea turtle survival. Pages 432 *in* P. L. Lutz, and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press.

Lutz, P. L., and M. Lutcavage. 1989. The effects of petroleum on sea turtles: applicability to Kemp‘s ridley. J. C.W. Caillouet, and J. A.M. Landry, editors. First International Symposium on Kemp‘s Ridley Sea Turtle Biology, Conservation and Management.

Márquez M, R. 1990. Sea turtles of the world : an annotated and illustrated catalogue of sea turtle species known to date. Food and Agriculture Organization of the United Nations, Rome.

Márquez M, R. 1994. Synopsis of biological data on the Kemp’s ridley turtle, *Lepidochelys kempii* (Garman 1880). U. S. Dept. of Commerce, National Oceanic and Atmospheric

Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, Florida.
Matkin, C. O., and E. Saulitis. 1997. Restoration notebook: killer whale (Orcinus orca). Exxon Valdez Oil Spill Trustee Council, Anchorage, Alaska.
Mayor, P. A., B. Phillips, and Z.-M. Hillis-Starr. 1998. Results of the stomach content analysis on the juvenile hawksbill turtles of Buck Island Reef National Monument, U.S.V.I. Pages 230-233 *in* S. P. Epperly, and J. Braun, editors. Seventeenth Annual Sea Turtle Symposium.
McDonald-Dutton, D., and P. H. Dutton. 1998. Accelerated growth in San Diego Bay green turtles? Pages 175-176 *in* S. P. Epperly, and J. Braun, editors. Proceedings of the seventeenth annual symposium on sea turtle biology and conservation. NOAA Technical Memorandum NMFS-SEFSC-415. National Marine Fisheries Service, Southeast Fisheries Science Center, Orlando, FL.
McKenzie, C., B. J. Godley, R. W. Furness, and D. E. Wells. 1999. Concentrations and patterns of organochlorine contaminants in marine turtles from Mediterranean and Atlantic waters. Marine Environmental Research 47(117-135).
McLellan, T. N., H. Maurer, B. Fudge, and D. Heilman. 1997. A Decade of Beneficial Use, Brazos Island Harbor, Dredging. 21st Western Dredging Association Conference.
McMichael, E., R. R. Carthy, and J. A. Seminoff. 2003. Evidence of Homing Behavior in Juvenile Green Turtles in the Northeastern Gulf of Mexico. Pages 223-224 *in* J. A. Seminoff, editor Proceedings of the Twenty-Second Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFSSEFSC-503. National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, Fl.
Merrick, R. L., H. Haas, and Northeast Fisheries Science Center (U.S.). 2008. Analysis of Atlantic sea scallop (Placopecten magellanicus) fishery impacts on the North Atlantic population of loggerhead sea turtles (Caretta caretta). Pages I electronic text (28 p.) *in* NOAA technical memorandum NMFS-NE ; 207. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Northeast Region, Northeast Fisheries Science Center, Woods Hole, Mass.
Meylan, A. 1988. Spongivory in hawksbill turtles: a diet of glass. Science 239:393-395.
Meylan, A., and M. Donnelly. 1999. Status Justification for Listing the Hawksbill Turtle (*Eretmochelys imbricata*) as Critically Endangered on the 1996 IUCN Red List of Threatened Animals. Chelonian Conservation and Biology 3(2):200-224.
Meylan, A. B., B. A. Schroeder, and A. Mosier. 1995. Sea Turtle Nesting Activity in the State of Florida, 1979-1992. Florida Dept. of Environmental Protection, Florida Marine Research Institute, St. Petersburg, FL.
Meylan, A. M., B. Schroeder, and A. Mosier. 1994. Marine Turtle Nesting Activity in the State of Florida, 1979-1992. Pages 83 *in* K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, editors. Proceedings of the Fourteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351. National Marine Fisheries Service, Southeast Fisheries Science Center, Hilton Head, SC.
Milton, S. L., and P. L. Lutz. 2003. Physiological and Genetic Responses to Environmental Stress. Pages 163-197 *in* P. L. Lutz, J. A. Musick, and J. Wyneken, editors. The Biology of Sea Turtles, volume 2. CRC Press, Boca Raton, Florida.
Mo, C. L. 1988. Effect of bacterial and fungal infection on hatching success of olive ridley sea turtle eggs. U. S. World Wildlife Fund.

Moncada, F., and coauthors. 2010. Movement patterns of loggerhead turtles Caretta caretta in Cuban waters inferred from flipper tag recaptures. Endangered Species Research 11(1):61-68.
Murphy, T. M., and S. R. Hopkins. 1984. Aerial and ground surveys of marine turtle nesting beaches in the southeast region. NMFS-SEFSC.
Musick, J. A., and C. J. Limpus. 1997. Habitat utilization and migration in juvenile sea turtles. Pages 432 *in* P. L. Lutz, and J. A. Musick, editors. The Biology of Sea Turtles. CRC Press.
NAST. 2000. Climate change impacts on the United States: the potential consequences of climate variability and change. US Global Change Research Program, Washington D.C. National Assessment Synthesis Team.
NMFS-SEFSC. 2001. Stock assessments of loggerhead and leatherback sea turtles: and, an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the western North Atlantic. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, FL.
NMFS-SEFSC. 2009a. An assessment of loggerhead sea turtles to estimate impacts of mortality reductions on population dynamics. NMFS Southeast Fisheries Science Center.
NMFS-SEFSC. 2009b. Estimated impacts of mortality reductions on loggerhead sea turtle population dynamics, preliminary results. Presented at the meeting of the Reef Fish Management Committee of the Gulf of Mexico Fishery Management Council. Gulf of Mexico Fishery Management Council, Tamps, FL.
NMFS. 1991. Biological Opinion for the Dredging of channels in the Southeastern United States from North Carolina through Cape Canaveral, Florida. .
NMFS. 1997a. ESA Section 7 consultation on Navy activities off the southeastern United States along the Atlantic Coast. Biological Opinion.
NMFS. 1997b. ESA Section 7 consultation on the continued hopper dredging of channels and borrow areas in the southeastern United States. Biological Opinion.
NMFS. 2001. Biological Opinion: Endangered Species Act section 7 consultation on the reinitiation of consultation on the Atlantic highly migratory species fishery management plan and its associated fisheries.
NMFS. 2003. Biological Opinion on Dredging of Gulf of Mexico Navigation Channels and Sand Mining ("Borrow") Areas Using Hopper Dredges by COE Galveston, New Orleans, Mobile, and Jacksonville Districts (Consultation Number F/SER/2000/01287). National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida [Plus Revisions].
NMFS. 2005. Revision No. 1 to November 19, 2003, Gulf of Mexico Regional Biological Opinion (GOM RBO) on Hopper Dredging of Navigation Channels and Borrow Areas in the U.S. Gulf of Mexico. National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida. 22p.
NMFS. 2007a. ESA Section 7 consultation on Gulf of Mexico Oil and Gas Activities: Five-Year Leasing Plan for Western and Central Planning Areas 2007-2012. Biological Opinion.
NMFS. 2007b. ESA Section 7 consultation on Gulfport Harbor Navigation Project maintenance dredging and disposal. Biological Opinion.
NMFS. 2007c. Revision 2 to the National Marine Fisheries Service (NMFS) November 19, 2003, Gulf of Mexico Regional Biological Opinion (GRBO) to the U.S. Army Corps of Engineers (COE) on Hopper Dredging of Navigation Channels and Borrow Areas in the

U.S. Gulf of Mexico. National Marine Fisheries Service, Southeast Regional Office, Protected Resources Division, St. Petersburg, Florida. 15p.
NMFS, and SEFSC. 2001. Stock assessments of loggerhead and leatherback sea turtles and an assessment of the impact of the pelagic longline fishery on the loggerhead and leatherback sea turtles of the Western North Atlantic U.S. Department of Commerce, National Marine Fisheries Service, Miami, FL.
NMFS, and USFWS. 1991. Recovery plan for U.S. population of Atlantic green turtle (Chelonia mydas).
NMFS, and USFWS. 1992. Recovery Plan for the Kemp's Ridley Sea Turtle (*Lepidochelys kempii*). Pages 47 *in* U.S. Department of Interior, and U.S. Department of Commerce, editors. U.S. Fish and Wildlife Service, National Marine Fisheries Service.
NMFS, and USFWS. 1993. Recovery plan for hawksbill turtles in the U.S. Caribbean Sea, Atlantic Ocean, and Gulf of Mexico (Eretmochelys imbricata). U.S. Dept. of Commerce, National Oceanic and Atmopsheric Administration U.S. Dept. of the Interior, U.S. Fish and Wildlife Service, [Washington, D.C].
NMFS, and USFWS. 2007a. Green sea turtle (Chelonia mydas) 5-year review: Summary and evaluation. National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2007b. Hawksbill sea turtle (Eretmochelys imbricata) 5-year review: Summary and evaluation. National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2007c. Kemp’s ridley sea turtle (Lepidochelys kempii) 5-year review: Summary and evaluation. National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2007d. Leatherback sea turtle (Dermochelys coriacea) 5-year review: Summary and evaluation. National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2007e. Loggerhead sea turtle (Caretta caretta) 5-year review: Summary and evaluation. National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2008a. Recovery Plan for the Northwest Atlantic Population of the Loggerhead Sea Turtle (Caretta caretta), Second Revision National Marine Fisheries Service, Silver Spring, MD.
NMFS, and USFWS. 2010. Unpublished Final Draft Report, Washington, D.C.
NMFS, USFWS, and SEMARNAT. 2011a. Bi-National Recovery Plan for the Kemp’s Ridley Sea Turtle (*Lepidochelys kempii*), Second Revision. National Marine Fisheries Service, Silver Spring, Maryland.
NMFS, USFWS, and SEMARNAT. 2011b. BiNational Recovery Plan for the Kemp’s Ridley Sea Turtle (Lepidochelys kempii), Second Revision. National Marine Fisheries Service, Silver Spring, Maryland.
NMFS and USFWS. 2008b. Recovery plan for the northwest Atlantic population of the loggerhead sea turtle (Caretta caretta), second revision. . National Marine Fisheries Service, Silver Spring, Maryland.
NRC. 1990. Decline of the sea turtles: causes and prevention. National Research Council, Washington DC.
Ogren, L., C. McVea, U. S. N. M. F. S. P. C. Laboratory, and U. S. N. M. F. S. P. Laboratory. Apparent Hibernation by Sea Turtles in North American Waters.
Ogren, L. H. 1989. Distribution of juvenile and sub-adult Kemp’s ridley sea turtle: Preliminary results from 1984-1987 surveys. C. W. Caillouet, and A. M. Landry, editors. First Intl. Symp. on Kemp’s Ridley Sea Turtle Biol, Conserv. and Management, Galveston, Texas.

Pike, D. A., R. L. Antworth, and J. C. Stiner. 2006. Earlier Nesting Contributes to Shorter Nesting Seasons for the Loggerhead Seaturtle, Caretta caretta. Journal of Herpetology 40(1):91-94.

Pritchard, P. C. H. 1969. The survival status of ridley sea-turtles in American waters. Biological Conservation 2(1):13-17.

Rebel, T. P., and R. M. Ingle. 1974. Sea turtles and the turtle industry of the West Indies, Florida, and the Gulf of Mexico, Rev. edition. University of Miami Press, Coral Gables, Fla.

Sakai, H., H. Ichihashi, H. Suganuma, and R. Tatsukawa. 1995. Heavy metal monitoring in sea turtles using eggs. Marine Pollution Bulletin 30:347-353.

Schmid, J. R., and J. A. Barichivich. 2006. *Lepidochelys kempii*–Kemp’s ridley. Pages 128-141 *in* P. A. Meylan, editor. Biology and conservation of Florida turtles. Chelonian Research Monographs, volume 3.

Schmid, J. R., and A. Woodhead. 2000. Von Bertalanffy growth models for wild Kemp’s ridley turtles: analysis of the NMFS Miami Laboratory tagging database. U. S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, Florida.

Schroeder, B. A., and A. M. Foley. 1995. Population studies of marine turtles in Florida Bay. Pages 117 *in* J. I. Richardson, and T. H. Richardson, editors. Proceedings of the Twelfth Annual Workshop on Sea Turtle Biology and Conservation. NOAA.

Seminoff, J. A. 2004. Chelonia mydas. 2004 IUCN Red List of Threatened Species.

Shaver, D. J. 1994. Relative Abundance, Temporal Patterns, and Growth of Sea Turtles at the Mansfield Channel, Texas. Journal of Herpetology 28(4):491-497.

Shigenaka, G., S. Milton, and United States. National Ocean Service. Office of Response and Restoration. 2003. Oil and sea turtles : biology, planning, and response. National Oceanic and Atmospheric Administration, NOAA's National Ocean Service, Office of Response and Restoration, [Silver Spring, Md.].

Stabenau, E. K., and K. R. N. Vietti. 2003. The physiological effects of multiple forced submergences in loggerhead sea turtles (Caretta caretta). Fishery Bulliten (101):889-899.

Storelli, M. M., G. Barone, A. Storelli, and G. O. Marcotrigiano. 2008. Total and subcellular distribution of trace elements (Cd, Cu and Zn) in the liver and kidney of green turtles (Chelonia mydas) from the Mediterranean Sea. Chemosphere 70:908-913.

TEWG. 1998. An assessment of the Kemp’s ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the western North Atlantic. U. S. Dept. Commerce.

TEWG. 2000a. Assessment update for the kemp's ridley and loggerhead sea turtle populations in the western North Atlantic : a report of the Turtle Expert Working Group. U.S. Dept. of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, Fla.

TEWG. 2000b. Assessment update for the Kemp’s ridley and loggerhead sea turtle populations in the western North Atlantic: a report of the Turtle Expert Working Group. U. S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Southeast Fisheries Science Center, Miami, FL.

TEWG. 2009. An Assessment of the Loggerhead Turtle Population in the Western North Atlantic Ocean. NOAA.

Troëng, S., and E. Rankin. 2005. Long-term conservation efforts contribute to positive green turtle Chelonia mydas nesting trend at Tortuguero, Costa Rica. Biological Conservation 121(1):111-116.

Tucker, A. D. 2010. Nest site fidelity and clutch frequency of loggerhead turtles are better elucidated by satellite telemetry than by nocturnal tagging efforts: Implications for stock estimation. Journal of Experimental Marine Biology and Ecology 383(1):48-55.
USACE-CETN. 1989. Coastal Engineering Technical Note - Physical Monitoring of Nearshore Sand Berms. CETN-II-20, U.S. Army Engineer Waterways Experiment Station, Vicksburg.
USACE. 1975. Final Environmental Impact Statement - Maintenance Dredging, Brazos Island Harbor. U.S. Army Engineer District, Galveston, Texas.
USACE. 1988. Environmental Assessment, Brazos Island Harbor Underwater Feeder Berm Construction. U.S. Army Engineer District,Galveston, Galveston, Texas.
USACE. 1990. Project Design Memorandum, Channel Improvements for Navigation, Brazos Island Harbor, Texas (Brownsville Channel). U.S. Army Engineer District, Galveston, Texas.
USACE. 1999. Preliminary Project Assessment, Brazos Island Harbor, Texas. U.S. Army Engineer District, Galveston, Texas.
USACE. 2006. USACE Management Protocol for Effective Implementation of the NMFS Regional Biological Opinion for Hopper Dredging.
USACE. 2013. DRAFT BIOLOGICAL ASSESSMENT FOR BRAZOS ISLAND HARBOR CHANNEL IMPROVEMENT PROJECT TENTATIVELY SELECTED PLAN (52 FEET BY 250 FEET PROJECT) CAMERON COUNTY, TEXAS. PREPARED BY U.S. ARMY CORPS OF ENGINEERS, GALVESTON DISTRICT, Galvaston, TX.
van Dam, R., and C. E. Díez. 1997. Predation by hawksbill turtles on sponges at Mona Island, Puerto Rico. . Pages 1421-1426 *in* 8th International Coral Reef Symposium.
van Dam, R. P., and C. E. Díez. 1998. Home range of immature hawksbill turtles (Eretmochelys imbricata (Linnaeus) at two Caribbean islands. Journal of Experimental Marine Biology and Ecology 220(1):15-24.
Vargo, S., P. Lutz, D. Odell, E. V. Vleet, and G. Bossart. 1986. Effects of oil on marine turtles, Florida Institute of Oceanography.
Weishampel, J. F., D. A. Bagley, and L. M. Ehrhart. 2004. Earlier nesting by loggerhead sea turtles following sea surface warming. Global Change Biology 10:1424-1427.
Weishampel, J. F., D. A. Bagley, L. M. Ehrhart, and B. L. Rodenbeck. 2003. Spatiotemporal patterns of annual sea turtle nesting behaviors along an East Central Florida beach. Biological Conservation 110(2):295-303.
Wershoven, J. L., and R. W. Wershoven. 1992. Juvenile green turtles in their nearshore habitat of Broward County, Florida: A five year review. 11th Annual Workshop on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS.
Witherington, B., and L. M. Ehrhart. 1989. Hypothermic stunning and mortality of marine turtles in the Indian River Lagoon system, Florida. Copeia 1989:696-703.
Witherington, B., S. Hirama, and A. Mosier. 2003. Effects of beach armoring structures on marine turtle nesting. Florida Fish and Wildlife Conservation Commission.
Witherington, B., S. Hirama, and A. Mosier. 2007. Changes to armoring and other barriers to sea turtle nesting following severe hurricanes striking Florida beaches. Florida Fish and Wildlife Conservation Commission.
Witherington, B., P. Kubilis, B. Brost, and A. Meylan. 2009. Decreasing annual nest counts in a globally important loggerhead sea turtle population. Ecological Applications 19(1):30-54.
Witherington, B. E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. Herpetologica 48(1):31-39.

Witherington, B. E. 1994. Flotsam, jetsam, post-hatchling loggerheads, and the advecting surface smorgasbord. Pages 166 *in* K. A. Bjorndal, A. B. Bolten, D. A. Johnson, and P. J. Eliazar, editors. Proc. 14th Ann. Symp. Sea Turtle Biology and Conservation. NOAA Technical Memorandum. NMFS-SEFSC-351, Miami, Fl.
Witherington, B. E. 1999. Reducing threats to nesting habitat. Eckert, K.L., K.A. Bjorndal, F.A. Abreu-Grobois, and M. Donnelly (editors). Research and Management Techniques for the Conservation of Sea Turtles. IUCN/SSC Marine Turtle Specialist Group Publication 4:179-183.
Witherington, B. E., and K. A. Bjorndal. 1991. Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles, Caretta caretta. Biological Conservation 55(2):139-149.
Witherington, B. W. 2002. Ecology of neonate loggerhead turtles inhabiting lines of downwelling near a Gulf Stream front. Marine Biology 140(4):843-853.
Witzell, W. N. 2002. Immature Atlantic loggerhead turtles (Caretta caretta): suggested changes to the life history model. Herpetological Review 33(4):266-269.
Zug, G. R., and R. E. Glor. 1998. Estimates of age and growth in a population of green sea turtles (Chelonia mydas) in the Indian River Lagoon system, Florida: a skeletochronological analysis Canadian Journal of Zoology 76:1497-1506.
Zurita, J. C., and coauthors. 2003. Nesting loggerhead and green sea turtles in Quintana Roo, Mexico. NOAA Tech. Memo. , Twenty-Second Annual Symposium on Sea Turtle Biology and Conservation.
Zwinenberg, A. J. 1977. Kemp’s ridley, *Lepidochelys kempii* (Garman 1880), undoubtedly the most endangered marine turtle today (with notes on the current status of *Lepidochelys olivacea*). Bulletin of the Maryland Herpetological Society 13(3):378-384.

13 APPENDIX A

US Army Corps of Engineers
Management Protocol for Effective Implementation of the
National Marine Fisheries Service
Regional Biological Opinion for Hopper Dredging
Gulf of Mexico

29 December 2006

1. **General.**

a. **Purpose.** This management protocol was developed to effectively implement the Gulf Regional Biological Opinion (GRBO) for the Gulf of Mexico issued by National Marine Fisheries Service (NMFS), SE Region, on 19 November 2003, and subsequently revised on 24 June 2005 (Revision Number 1) and 9 January 2007 (Revision Number 2).

b. **Applicability.** This management protocol applies to all hopper dredging conducted within the Gulf of Mexico region, for US Army Corps of Engineers (COE) conducted dredging and COE permitted dredging under a Clean Water Act (CWA) Section 10/404 permit or Marine Protection, Research, Sanctuaries Act (MPRSA) Section 103 permit.

c. **District Points of Contact.** Each COE District under the GRBO will designate a single primary point of contact (POC) to ensure full day-to-day coordination of all relevant sea turtle related issues (as well as other protected species issues associated with the GRBO) across functional elements for COE conducted dredging and COE permitted dredging within his/her organization. At the beginning of each fiscal year (FY), each District will be responsible for preparation of its annual Protocol Management Plan. The District POC will coordinate the plan with his/her counterpart in the four Gulf Districts and with the Executive Advisory Group (EAG) for the Gulf Region.

d. **Executive Advisory Group - Gulf Region.** A Gulf Regional Biological Opinion Executive Advisory Group (EAG) composed of the Chiefs of Operations from Southwestern Division, Mississippi Valley Division, and South Atlantic Division will provide oversight and implementation of this Protocol. The EAG will make recommendations involving policy and oversight for the implementation of the GRBO and this Management Protocol. The EAG will collectively make recommendations on whether or not hopper dredging operations for COE conducted and COE permitted projects should continue or be permanently stopped based on an overall view of the Corps' compliance with the GRBO. The EAG will communicate its collective recommendations through the respective Gulf District POCs. After considering the recommendations of the EAG, the District Commander will make the final decision on whether or not dredging will cease or continue. Each Gulf District POC will be responsible for managing their District's "trigger" limits in the GRBO (paragraph 2c) and informing all relevant elements within his/her District of EAG recommendations. The

EAG will regularly communicate and will conduct meetings (formal or informal) to review progress under the GRBO and with related sea turtle and Gulf sturgeon protection initiatives.

e. **Coordination of Incidental Take Information.** All reporting of sea turtles and Gulf sturgeon takes (both lethal and non-lethal takes) from dredging activities and relocation trawling within each District will be reported immediately by the District POC to NMFS (SE Region) and the Engineer Research and Development Center (ERDC) staff which maintains the Sea Turtle Database Warehouse. The Sea Turtle Warehouse Website is: http://el.erdc.usace.army.mil/seaturtles/index.cfm. Non-lethal takes from relocation trawling will be compiled and reported at least weekly to the same entities or more frequently if appreciable numbers of turtles are being captured and relocated.

f. **Implementation of Reasonable and Prudent Measures (RPM).** Each Gulf District covered under the GRBO, ERDC, and the EAG will work together to foster application of contract specifications and/or permit conditions that consistently and effectively implement the Reasonable and Prudent Measures to avoid/minimize take of protected species as specified in the GRBO.

g. **Annual Sea Turtle Report.** Each Gulf District POC will prepare an annual sea turtle report covering dredging during the previous Fiscal Year (FY) within its jurisdiction by 30 November of each year. In addition to project specifics (location, duration, amount dredged) and endangered/threatened (E/T) species take data, the report will include data on sea turtle relocation trawling per project, summary totals by District and Gulf-wide total relocation trawling captures, and other data required by the GRBO. ERDC, with the assistance of the Gulf District POCs, is responsible for consolidating District reports and developing a brief Gulf-wide summary report to be forwarded to NMFS, SE Region, by 31 December, for the previous FY.

h. **Annual Review of Protocol.** This protocol will be reviewed annually (formal or informal) by the EAG and the Gulf Districts before the end of each FY to determine whether revisions/updates are required. Revisions or updates will be scheduled to be implemented the following FY.

i. **Dispute Resolution.** Disagreements and unresolved issues relating to implementation of specific provisions of this protocol by the staffs of pertinent COE Divisions and Districts will be quickly elevated to the EAG for resolution. Disputes that cannot be resolved by the EAG will be elevated to the Senior Executive Management Group comprised of a Senior Executive Service (SES) member from each of the three Gulf Divisions.

j. **Period of Coverage.** This management protocol will be in effect for a period of five years unless terminated prior to that time by mutual consent. At the end of the five-year period, this protocol may be extended by mutual consent of the affected COE Divisions.

2. **Conditions Applicable to COE Conducted Hopper Dredging.**

a. **Federal Activities.** COE conducted dredging, as defined for the GRBO, includes any hopper dredging conducted in the Gulf of Mexico by the COE to maintain federally authorized navigation channels, for sand mining to construct federally authorized hurricane/storm damage reduction projects, or to restore coastal habitat restoration projects. New Congressionally authorized Federal navigation dredging projects and authorized navigation channel improvements are not covered by the GRBO. Separate Section 7 consultations are required for any such activity.

b. **Gulf-wide Incidental Takes.** The GRBO assigns incidental takes for Federal activities by FY for Threatened (T) and Endangered (E) protected species as follows:

Loggerhead sea turtles (T): thirty-two (32)

Kemp's ridley sea turtles (E): sixteen (16)

Green sea turtles (T): eleven (11)

Hawksbill sea turtles (E): three (3)

Gulf sturgeon (E): three (3)

c. **District Trigger Points.** The GRBO does not assign specific take allowances by species by District. However, for management purposes, each District will be asked to work within identified "Trigger Points" or limits by species. The EAG will be engaged when identified Trigger Points are reached by any given District. The Trigger Points for each District, by species, are:

District	Loggerhead	Kemp's ridley	Green	Hawksbill	Total Turtles	Gulf sturgeon
SAJ (FL West Coast)	4	3	3	1	11	1
SAM (MS, AL, FL Panhandle)	4	3	2	0	9	2
MVN (LA)	12	4	2	1	19	0
SWG (TX)	12	6	4	1	23	0
Totals	32	16	11	3	62	3

Note that these are trigger points to engage the EAG and are not take limit allocations by Districts.

d. **<u>MSC Oversight and Responsibilities - COE Conducted Dredging.</u>**

(1) Each District will implement all Reasonable and Prudent Measures to minimize incidental take on COE conducted dredging. As takes occur and are reported, the District POC and the assigned Project Manager for the particular project on which the take occurs will assess potential causes for the take and potential risk for additional takes for each project. All incidental takes associated with the dredging activity and relocation trawling will be reported as specified in paragraph 1e above by the District POC.

(2) Each District will be responsible for monitoring trigger point limits for all listed turtle species (or Gulf sturgeon as applicable) for COE conducted dredging projects and keeping the EAG informed. The EAG will be notified when any of the following occurs:

(a) four sea turtles are taken on any single project,

(b) seventy-five percent (75%) of the District trigger point limit for any protected species as listed in the table above is approached/taken, or

(c) any single take of a Gulf sturgeon.

(3) The EAG will make a recommendation on whether dredging operations will continue or be permanently stopped based on an overall view of the Corps compliance with the GRBO. The District Commander, in consultation with the EAG, will make the final decision on whether or not dredging will cease or continue. E-mail notification of recommendations will be sufficient. The District POC will be responsible for communication and coordination among the various functional elements within each District.

e. **<u>Operational Protocol for COE Conducted Projects.</u>**

(1) A hopper dredge inspection will be performed using the "COE Sea Turtle Inspection Checklist for Hopper Dredges for COE Projects or COE/Army Permitted Project" (attachment 1). The District POC will be responsible for ensuring that the hopper dredge inspection has been performed and that all recommendations have been implemented or addressed prior to giving the project approval to proceed.

(2) Silent Inspector (SI) will be activated and operational in accordance with CECW-CO memorandum, 17 April 2006, subject: Implementation of Automated Dredging Quality Assurance Monitoring.

(3) Sea turtle deflecting dragheads, sea turtle observers, and inflow and overflow screens will be used during all dredging operations. Variations from these provisions may be granted by the MSC, but any approved variation must be justified from a technical perspective. All corrective actions proposed during the hopper dredge inspection will be made prior to initiation of dredging.

(4) Based on project conditions, pre-trawling condition and abundance surveys may be performed prior to initiation of dredging in accordance with the GRBO. The need for relocation trawling during the project may include assessments of pre-trawling surveys and conditions as found in paragraph 4 below, and/or historical records for the project.

(5) A risk assessment will be performed after each incidental take up to three sea turtles on a particular project. While the risk assessments are being performed dredging may continue. The risk assessments will include a review of the circumstances which contributed to the take, a review of the Silent Inspector (SI) data, and a physical inspection of the dredge and its operating procedures. A risk management plan will be developed after each take. This plan will address what occurred and suggested changes to the hopper dredge operations. This plan will be provided to the contractor (or the dredge Captain for Corps-owned hopper dredges) for implementation in order to minimize the likelihood of additional sea turtle takes and to ensure compliance with the terms and conditions of the GRBO. E-mail notification of recommendations and documentation will be sufficient. Additionally, the District findings will be provided to the EAG for information.

(6) At the first take of a Gulf sturgeon on a particular project, a risk assessment will be performed and a risk management plan prepared. Results will be implemented. While the risk assessment is being performed dredging may continue. The results of the risk assessment and recommendations in the risk management plan will be provided to the EAG for information.

(7) Should a total of four sea turtle on a particular project, a risk assessment will be performed and a risk management plan prepared. Results will be implemented. While the risk assessment is being performed dredging may continue. The EAG will be engaged in dialogue and remain engaged until such time as the project is completed or the District Commander, in consultation with the EAG, makes a decision to stop work on that project.

f. **Reinitiation of Consultation.** If the overall allotted takes assigned to COE conducted dredging projects for one or more species are reached in any given FY for federal projects, the Executive Advisory Group will reinitiate formal Section 7 consultation with NMFS. Formal reinitiation documentation in draft form will be coordinated with each Gulf Division/District. During reinitiation of consultation, the COE is not necessarily required to suspend dredging or relocation trawling operations pending the conclusion of the reinitiated consultation so long as the continuation of operations (by all Districts) would not violate Sections 7(a)(2) or 7(d) of the Endangered Species Act (ESA). The COE will document its determination that these provisions will not be violated by continuing activities covered by the GRBO during the reinitiation period and will notify NMFS of its findings.

3. **Conditions Applicable to COE Permitted Dredging.** COE permitted hopper dredging, as defined in the GRBO, includes any dredging conducted under a Department of the Army Permit (Section 10/404 permits or Section 103 permit) authorizing dredging for sand mining to construct hurricane/storm damage reduction projects or for coastal habitat restoration. All applicable requirements for COE permitted projects will be conducted through the respective District Regulatory Project Manager for the Department of the Army Permit.

a. The EAG involvement for COE permitted activities will be more frequent than COE conducted activities because of the variability in the number of Department of the Army permit projects being conducted annually and the number of allocated takes assigned to these activities per FY.

b. **Incidental Take Allowance.** The GRBO assigns incidental takes for COE permitted projects by FY for Threatened (T) and Endangered (E) protected species as follows:

Loggerhead sea turtles (T): eight (8)

Kemp's ridley sea turtles (E): four (4)

Green sea turtles (T): three (3)

Hawksbill sea turtles (E): one (1)

Gulf sturgeon (E): one (1)

c. **Incidental Take Limits.** For COE permitted dredging, the GRBO assigns an overall incidental take allowance for the entire Gulf of Mexico. There are no assigned "Trigger Points" for COE permitted dredging. Each District Regulatory Division will be expected to monitor takes for the FY using the ERDC Sea Turtle warehouse. The EAG will be consulted in all discussions when and after fifty percent (50%) of the allotted COE permitted dredging takes for any protected species are reached during the FY. Dredging may continue during the reinitiation period in accordance with Sections 7(a)(2) and 7(d) of the ESA in compliance with the RPMs and Terms and Conditions of the Incidental Take Statement, and so long as continuing the activity would not violate Sections 7(a)(2) and 7(d) of the ESA.

d. **Coordination with NMFS.** The Regulatory Project Manager assigned to the permit application will be responsible for initiating contact with NMFS on behalf of permit applicants. Each Regulatory Project Manager will be responsible for coordinating their actions with their District POC using the Engineer Research and Development Center (ERDC) Sea Turtle Database Warehouse webpage. NMFS will respond to a District's permit application within 15 days. E-mail and other forms of electronic notification are acceptable.

e. **Individual Consultation.** Where a permit applicant so desires and requests in writing, the Regulatory Project Manager responsible for the permit application will initiate consultation on their permit application with the NMFS.

f. **Project Schedules.** Where a Permittee cannot demonstrate that it intends to commence construction within 30 days of permit issuance, the permit will be conditioned to require the Permittee to return to the District within 30 days prior to construction, and sufficiently in advance to allow for NMFS to approve authorization of the permit conditions.

g. **Standard Permit Terms and Conditions.** Each COE permit will include standard terms and conditions to implement the terms and conditions of the GRBO. Prior to issuing a permit allowing the use of hopper dredges, the District Navigation Section or the Dredging Function in Operations Division will be consulted to ensure that the project can be executed using such equipment. The navigation "expert" will evaluate the project conditions, particularly the borrow site, to ensure that there are no technical reasons that preclude the use on hopper dredges. For COE permitted dredging, permits will include the permit condition that dredging will cease anytime a take occurs and a risk assessment is being performed. Dredging may resume after any corrections, as determined by the risk assessment and included in the risk management plan as necessary to reduce lethal takes, have been implemented.

h. **MSC Oversight and Responsibilities - COE Permitted Dredging.**

(1) Each District will implement all Reasonable and Prudent Measures to minimize incidental take on COE permitted dredging. As takes occur and are reported, the respective District, the District POC, and the assigned Project Manager for the particular project on which the take occurs will assess potential causes for the take and potential risk for additional takes for each project. All incidental takes associated with the dredging activity and relocation trawling will be reported as specified in paragraph 1e above by the District POC.

(2) The EAG will make a recommendation on whether dredging operations will continue or be stopped based on an overall view of the Corps' compliance with the GRBO. The District Commander, in consultation with the EAG, will make the final decision on whether or not dredging will cease or continue. E-mail notification of recommendations will be sufficient. The District POC will be responsible for communication and coordination among the various functional elements within each District.

i. **Operational Protocol for COE Permitted Projects.**

(1) A hopper dredge inspection will be performed using the "COE Sea Turtle Inspection Checklist for Hopper Dredges for COE Projects or COE/Army Permitted Projects" (attachment 1). The Regulatory Project Manager will be responsible for ensuring that the hopper dredge inspection has been performed and that all

recommendations have been implemented or addressed, prior to giving the Permittee approval to proceed.

(2) Silent Inspector (SI) will be activated and operational in accordance with Regulatory Guidance Letter No. 06-04, 2 October 2006, subject: Guidance for the Implementation of the Silent Inspector (SI) for Dredging Projects Requiring Department of the Army (DA) Permits. The Permittee or its designee will be provided the opportunity to receive SI training and be certified that they are qualified to interpret SI monitoring data.

(3) Sea turtle deflecting dragheads, sea turtle observers, and inflow and overflow screens will be used during all dredging operations. Variations from these provisions may be granted by the MSC, but any approved variation must be justified from a technical perspective. All corrective actions proposed during the hopper dredge inspection will be made prior to initiation of dredging.

(4) Based on project conditions, pre-trawling condition and abundance surveys may be performed prior to initiation of dredging in accordance with the Conservation Recommendations in the GRBO. The need for relocation trawling during the project may include assessments of pre-trawling surveys and conditions as found in paragraph 4 below, and/or historical records for the project.

(5) At the first take of a sea turtle on a particular project, work will cease and a risk assessment will be performed by the Permittee or its designated consultant and the results provided to the COE. When the risk assessment is done and the results implemented, dredging may continue with Corps concurrence. The risk assessment will include a review of the circumstances which contributed to the take, a review of the Silent Inspector (SI) data, and a physical inspection of the dredge and its operating procedures. A risk management plan will be developed. This plan will address what occurred and suggested changes to the hopper dredge operations in order to minimize the likelihood of additional sea turtle takes and to ensure compliance with the terms and conditions of the GRBO. E-mail notification of recommendations and documentation will be sufficient.

(6) If a second take of sea turtle on the same project occurs, project work will cease and a risk assessment will be performed by the Permittee or its designated consultant, and the results provided to the Corps of Engineers. When the risk assessment is completed and the results implemented dredging may continue with Corps concurrence.

(7) Should a total take of three sea turtles occur on any particular project, work will cease. A risk assessment will be performed. A risk management plan will be developed and recommendations implemented. A copy of the risk assessment plan and corrective actions taken will be transmitted to the COE. Dredging may continue with approval of the COE Regulatory Project Manager or other designated representative. Additionally, the findings will be forwarded to the EAG for information.

(8) At the first take of a Gulf sturgeon, project work will cease. A risk assessment will be performed. A risk management plan will be developed and recommendations implemented. A copy of the risk assessment plan and corrective actions taken will be transmitted to the COE. Dredging may continue with approval of the COE Regulatory Project Manager or other designated representative. The results of the risk assessment and recommendations in the risk management plan will be provided to the EAG for information.

(9) Should a total of four sea turtles or two sturgeons occur on any particular project, work will cease. A risk assessment will be performed. A risk management plan will be developed. A copy of the risk assessment plan and corrective actions taken will be transmitted to the COE. The District Commander, in consultation with the EAG, will make the decision as to whether dredging may continue. Should permission to continue be given, the EAG will remain engaged until such time as the project is completed or the District Commander, in consultation with the EAG, makes a decision to stop work on that project.

j. **Reinitiation of Consultation.** If the overall allotted takes assigned to COE permitted dredging projects for one or more species are reached in any given FY, the Executive Advisory Group will reinitiate formal Section 7 consultation with NMFS. Formal reinitiation documentation in draft form will be coordinated with each Gulf Division/District. During reinitiation of consultation, the COE is not necessarily required to suspend dredging or relocation trawling operations pending the conclusion of the reinitiated consultation, so long as the continuation of operations (by all Districts) would not violate Section 7(a)(2) or 7(d) of the ESA. The COE will document its determination that these provisions will not be violated by continuing activities covered by the GRBO during the reinitiation period and will notify NMFS of its findings.

4. **Relocation Trawling for both COE Conducted and COE Permitted Projects.**

a. There is no separation between the authorized Relocation Trawling Take level between COE conducted and COE permitted projects. Relocation trawling will be initiated based on pertinent "triggers" or conditions requiring relocation trawling as contained in the Reasonable and Prudent Measures of the GRBO. When circumstances dictate that a high risk of turtle take is present at the beginning of a dredging project, a decision may be made to initiate trawling prior to reaching the GRBO "triggers." A Plan for Sea Turtle Relocation Trawling will be submitted to the COE Project Manager by the contractor or to the Regulatory Project Manager by the Permittee, prior to initiation of trawling. The Relocation Trawling Plan must be in compliance with the Reasonable and Prudent Measures as found in the GRBO.

b. Any incidental takes associated with relocation trawling, non-lethal and injurious/lethal, will be reported as specified in paragraph 1e above.

c. **Trawling Incidental Take Limits.** The EAG will be engaged if the overall non-lethal and injurious/lethal incidental take limits assigned to relocation trawling are reached in any given FY. The EAG will take the lead in initiating formal Section 7 consultation with NMFS. Reinitiation of consultation will be coordinated with all Gulf Districts.

Approved by the Executive Advisory Group:

Elisa D. Pellicciotto

ELISA D. PELLICCIOTTO
Chief, Operations and Regulatory Community of Practice
Southwestern Division

Date: 17 Jan 07

James R. Hannon

JAMES R. HANNON
Chief, Operations and Regulatory Community of Practice
Mississippi Valley Division

Date: 10 JAN 07

George R. Prince

GEORGE R. PRINCE, JR., PE, CPE
Chief, Operations and Regulatory Community of Practice
South Atlantic Division

Date: 9 Jan 07

ATTACHMENT 1

COE SEA TURTLE INSPECTION CHECKLIST FOR HOPPER DREDGES
for
COE Conducted or COE Permitted Projects

1. Read contract plans and specs and/or all applicable permits (Dept. of the Army Permit, State Permits) to determine the contract or permit requirements for the protection of endangered sea turtles (each District specs or permit may be different).

2. Read the Biological Opinion and any COE Sea Turtle Protocol if available.

3. Develop a list of inspection requirements:

a. Leading edge angle (90 degrees or less).
b. Approach angle or leading edge plowing depth (6 inches or more).
c. Aft rigid attachment of deflector to the draghead (hinged or trunnion).
d. Forward deflector attachment point (adjustable pinned or cable/chain with stop).
e. Opening between drag head and deflector (4"X 4" max).
f. Is screening of dredged material required?
g. Are inflow screens or overflow screens or both required?
h. Are inflow basket screen openings 4"X 4" max and is 100% of the dredged material being screened.
i. Lighting of inflow and overflow screens and proper access for cleaning (must meet EM 385-1-1).
j. Structural design of deflector (per approved deflector submittal).
k. Dredge operational requirements (starting/stopping dredge pump, draghead plugging, razing draghead, and turning the dredge).
l. Is dredging data recording, Silent Inspector, (drag elevation, slurry density and velocity) required by specs or permit? If so, is it being collected or is Silent Inspector turned on and is data being submitted?
m. Is turtle trawling required by specs or permit? If so is it being performed?
n. Turtle observers requirements (12 or 24 hours).

4. Review turtle deflector submittal (do not allow dredging to start until submittal is approved):

a. Structural soundness.
b. Leading edge angle (90 degrees or less).
c. Approach angles for dredging depths.
d. 4"X 4" opening between deflector and draghead.
e. Aft rigid deflector attachment to draghead (hinged or trunnion).
f. Forward deflector attachment point (adjustable pinned or cable/chain with stop).

5. Assure the Contractor Quality Control (CQC) performs a pre-dredging inspection. The CQC is required to review and inspect all items in paragraph 3a-n.

6. Assure the CQC performs a startup-dredging inspection:

a. CQC is required to check the turtle deflector to see if the deflector is installed and adjusted for the required dredge depth of this project in accordance with the approved deflector submittal.

b. CQC is required to assure the drag tenders are operating the dredge pump and draghead in accordance with the specs/permit.

c. CQC should perform a paint test to assure deflector is plowing at least 6" into the dredge material.

7. COE Quality Assurance (QA) should perform dredging operation inspection:

a. Review and inspect all items in paragraph 3a-n.

b. Inspect the turtle deflector to see if the deflector is installed and adjusted for the required dredge depth of this project in accordance with the approved deflector submittal.

c. Require the contractor to perform paint test to assure deflector is plowing at least 6" into the dredge material (over penetration of the deflector will reduce production and increase fuel consumption of the dredge).

d. Ride the dredge though at least one dredging cycle (dredging, to the dump, and back to the dredge site).

e. Watch the drag tender to assure he is operating the dredging equipment in accordance with the plans and specs (starting/stopping dredge pump, lower dragarm angle, swell compensator, slurry specific gravity, plugging of the draghead, ship crabbing).

f. Lockout/tagout procedure for cleaning the inflow and overflow screens (must meet EM 385-1-1).

g. Talk to turtle observers to assure they are aware of contract and permit requirements and are performing inspection of screens and deflectors and reporting any maintenance required to the dredge personnel. Assure that correct turtle observer forms are being used and filled out properly.

h. Talk to Dredge Captain about maintaining the screens and deflectors.

i. Picked up Silent Inspector data and emailed to ERDC at lease once a week or more.

j. All pre-dredge/post-dredge and follow up inspections should be noted in the CQC Daily Reports.

Contractor CQC Inspector:

Name: ____

COE Inspector:

Name: ____

Office Symbol: ________________ **Date of Inspection:** ________________

COMMENTS: ____

____

____

____

____

____

____

____

____

____

____

Contractor CQC Inspector:

Name: ____

COE Inspector:
Name: ____

Office Symbol: ________________ **Date of Inspection:** ________________

14 APPENDIX B
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 in (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 in (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.

15 APPENDIX C

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 % dimethyl sulfoxide (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.

<u>Method for Live Turtles</u>

<<< 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 % 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, <u>C. mydas</u>, 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 % 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

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 % 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

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
263 13th Avenue South
St. Petersburg, Florida 33701-5505
http://sero.nmfs.noaa.gov

F/SER31:NB

JUN 02 2014

Colonel Richard Pannell
Commander, Galveston District
Galveston District, Corps of Engineers
Department of the Army
P.O. Box 1229
Galveston, Texas 77558

Ref.: U.S. Army Corps of Engineers, Brazos Island Harbor Channel Improvement Project, Cameron County, Texas

Dear Colonel Pannell:

NOAA's National Marine Fisheries Service (NMFS) provided the U.S. Army Corps of Engineers (USACE) with a Biological Opinion ("Opinion") for the Brazos Island Harbor Channel Improvement Project (BIH) on May 13, 2014. Upon receiving it, the USACE contacted NMFS with questions about the Opinion. This letter addresses those 2 questions regarding the clarification of the incidental take statement (ITS) for sea turtles and the absence of a sentence in the document that had been requested by the USACE. Neither of the 2 questions requires changing the Opinion, and this letter is for clarification only.

First, the Opinion provides the amount of authorized observed take in the ITS of 19 turtles during the project as shown in Table 10 on page 58 (also shown below), but the paragraph before Table 10 states that the original take estimate was 18, which was rounded up to 19. To clarify, the second row of Table 10 shows the calculated estimate of the number of turtles to be taken by the dredge, including fractions of turtles. The sum of the individual species estimates is 17.99, but was incorrectly shown as 18.00. In the next line of the table, the individual species estimates are rounded up to the next integer, which then sum to 19. The individual species estimates in this "Rounded Up" row are the anticipated incidental take levels for the ITS of this opinion. The previous row was intended to show the basis of the anticipated take levels in greater detail.

Table 10. Amount of authorized observed take during the BIH project and associated relocation trawling

During Dredging		Loggerhead	Green	Kemp's Ridley
Total Sea Turtles Observed Taken	18.00	2.90	13.35	1.74
Rounded Up	19.00	3.00	14.00	2.00
During Relocation Trawling				
Total Sea Turtles Relocated	285.00	46	211	28

The second question concerned the omission of a sentence requested by the USACE to be added to the Opinion. The USACE made the following request by email on May 2, 2014:

> *HQ has asked if you would consider adding the following to the end of the "Rationale" paragraph under Reasonable and Prudent Measures # 2: "Compilation of these data will confirm species identification for take compliance for this project." HQ believes this more explicitly ties the tissue sampling requirement to our efforts to monitor impacts to incidental takes.*

The omission of this addition was not intentional but merely an oversight as we worked quickly to get this Opinion to the USACE by the pending deadline of May 13, 2014. We apologize for this oversight.

If you have any questions, please contact Nicole Bonine, Consultation Biologist, at (727) 824-5336, or by email at Nicole.Bonine@noaa.gov. Thank you for your continued cooperation in the conservation of ESA-listed species.

Sincerely,

Roy E. Crabtree, Ph.D.
Regional Administrator

File: 1514-22.F.8
Ref: SER-2013-11766