U.S. Army Corps of Engineers

Galveston District
Southwestern Division

Draft

Environmental Impact Statement for the Proposed Corpus Christi Ship Channel Deepening Project

Volume III – Appendices D-P

June 2022

Volume III Contents

Appendices:

Appendix D

Endangered Species Act Biological Assessment

Note: The Section 508 amendment of the Rehabilitation Act of 1973 requires that the information in Federal documents be accessible to individuals with disabilities. The USACE has made every effort to ensure that the information in this appendix is accessible. However, this appendix is not fully compliant with Section 508, and readers with disabilities are encouraged to contact Mr. Jayson Hudson at the USACE at (409) 766-3108 or at SWG201900067@usace.army.mil if they would like access to the information.

Job No. PCA20166

APPENDIX D

DRAFT
BIOLOGICAL ASSESSMENT
FOR THE
PROPOSED CORPUS CHRISTI SHIP CHANNEL DEEPENING PROJECT

Prepared for:

U.S. Army Corps of Engineers

Prepared by:

Freese and Nichols, Inc.
10431 Morado Circle, Suite 300
Austin, Texas 78759

June 2022

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Acronyms and Abbreviations

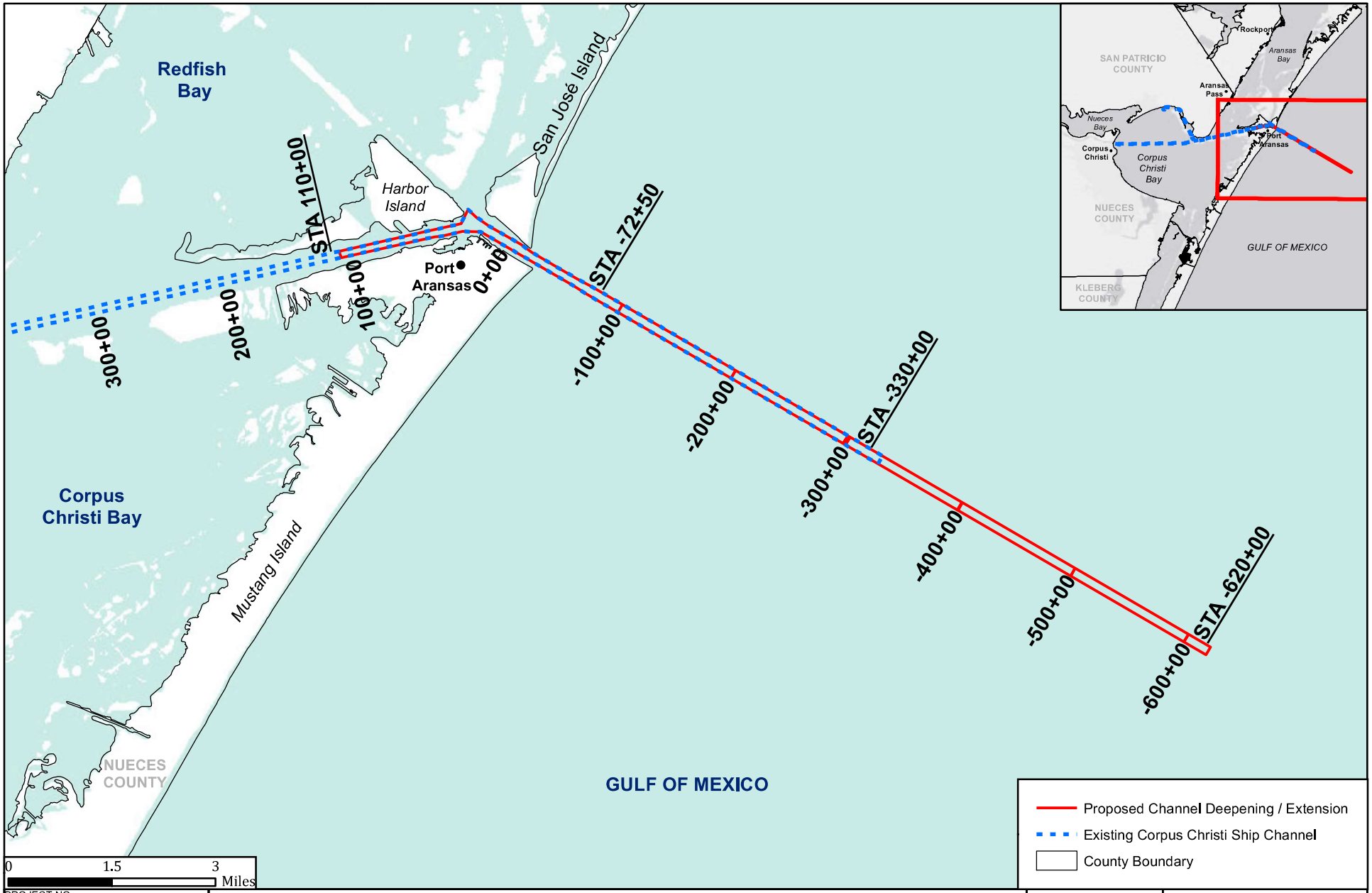
°F	Degrees Fahrenheit
BA	Biological Assessment
CCSC	Corpus Christi Ship Channel
CDP	Channel Deepening Project
CEA	Cumulative Effect Analysis
CFR	Code of Federal Regulations
CWS	Canadian Wildlife Service
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FR	Federal Register
Gulf	Gulf of Mexico
MLLW	Mean Lower Low Water
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NWR	National Wildlife Refuge
PCCA	Port of Corpus Christi Authority
STSSN	Sea Turtle Stranding and Salvage Network
TPWD	Texas Parks and Wildlife Department
USACE	U.S. Army Corp of Engineers
USFWS	U.S. Fish and Wildlife Service
VLCC	Very Large Crude Carrier

1.0 INTRODUCTION

1.1 PURPOSE OF THE BIOLOGICAL ASSESSMENT

This biological assessment (BA) was prepared to fulfill the U.S. Army Corp of Engineers (USACE), Galveston District requirements as outlined under Section 7(c) of the Endangered Species Act of 1973, as amended, for activities related to the proposed channel improvements to the Corpus Christi Ship Channel (CCSC). The proposed Port of Corpus Christi Authority (PCCA) Channel Deepening Project (CDP) is located in Port Aransas, Nueces County, Texas within the existing channel bottom of the CCSC near the southeast side of Harbor Island, and traversing easterly through Aransas Pass and extending an additional 5.5 miles beyond the existing terminus of the channel (Figure 1). The proposed Federal action consists of a channel deepening alternative. This BA evaluates the potential impacts the CDP may have on Federally listed threatened and endangered species listed by the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS).

The NMFS and USFWS Information for Planning and Consultation websites were referenced to determine species protected under the Endangered Species Act (ESA) with the potential to occur within the counties of the study area that should be included in this BA. The NMFS website identified six species: Blue Whale (*Balaenoptera musculus*), Fin Whale (*Balaenoptera physalus*), Humpback Whale (*Megaptera novaeangliae*), Sei Whale (*Balaenoptera borealis*), Sperm Whale (*Physeter macrocephalus*), and Giant Manta Ray (*Manta birostris*). The five species of whales receive additional protection under the Marine Mammal Protection Act of 1972 (National Oceanic and Atmospheric Administration [NOAA], 2019). The USFWS website identified the following 17 species as endangered or threatened: Ocelot (*Leopardus pardalis*), West Indian Manatee (*Trichechus manatus*), Northern Aplomado Falcon (*Falco femoralis septentrionalis*), Piping Plover (*Charadrius melodus*), Rufa Red Knot (*Calidris canutus rufa*), Whooping Crane (*Grus americana*), Eastern Black Rail (*Laterallus jamaicensis jamaicensis*), Attwater's Greater Prairie Chicken (*Tympanuchus cupido attwateri*), Green Sea Turtle (*Chelonia mydas*), Hawksbill Sea Turtle (*Eretmochelys imbricata*), Kemp's Ridley Sea Turtle (*Lepidochelys kempii*), Leatherback Sea Turtle (*Dermochelys coriacea*), Loggerhead Sea Turtle (*Caretta caretta*), Slender Rush-pea (*Hoffmannseggia tenella*), South Texas Ambrosia (*Ambrosia cheiranthifolia*), and Black Lace Cactus (*Echinocereus reichenbachii var. albertii*). There are two mussel species with proposed federal listing as endangered and one insect as a candidate, the False Spike (*Fusconaia mitchelli*) and Guadalupe Orb (*Cyclonaias necki*) are proposed endangered. The Monarch Butterfly (*Danaus plexippus*) is a candidate species for listing. Federally designated Critical Habitat for Piping Plover is also addressed. Table 1 presents a list of threatened and endangered species addressed in this BA (USFWS, 2022a).



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Port of Corpus Christi Authority
Corpus Christi Ship Channel Deepening Project

Project Location Map

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Table 1
Federally Listed Endangered and Threatened Species within Nueces, San Patricio, Refugio, and Aransas Counties[1]

Common Name	Scientific Name[2]	Status[3]	
		USFWS	NMFS
MAMMALS			
Ocelot	*Leopardus pardalis*	E	N/A
Blue Whale	*Balaenoptera musculus*	N/A	E
Fin Whale	*Balaenoptera physalus*	N/A	E
Humpback Whale	*Megaptera novaeangliae*	N/A	E
Sei Whale	*Balaenoptera borealis*	N/A	E
Sperm Whale	*Physeter macrocephalus*	N/A	E
West Indian Manatee	*Trichechus manatus*	T	N/A
FISH			
Giant Manta Ray	*Manta birostris*	N/A	T
BIRDS			
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	E	N/A
Piping Plover	*Charadrius melodus*	T w/CH	N/A
Red Knot (Rufa)	*Calidris canutus rufa*	T w/proposed CH	N/A
Whooping Crane	*Grus americana*	E w/CH	N/A
Eastern Black Rail	*Laterallus jamaicensis jamaicensis*	T	N/A
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	E	N/A
REPTILES			
Green Sea Turtle	*Chelonia mydas*	T	T
Hawksbill Sea Turtle	*Eretmochelys imbricata*	E	E
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	E	E
Leatherback Sea Turtle	*Dermochelys coriacea*	E	E
Loggerhead Sea Turtle	*Caretta caretta*	T	T
CLAMS			
False Spike	*Fusconaia mitchelli*	PE	N/A
Guadalupe Orb	*Cyclonaias necki*	PE	N/A
INSECT			
Monarch Butterfly	*Danaus plexippus*	C	N/A
PLANTS			
Slender Rush-pea	*Hoffmannseggia tenella*	E	N/A
South Texas Ambrosia	*Ambrosia cheiranthifolia*	E	N/A
Black Lace Cactus	*Echinocereus reichenbachii var. albertii*	E	N/A

[1] According to the USFWS (2022a) and NOAA (2022a).
[2] Nomenclature follows American Ornithological Society (2020), USFWS (2022a), and NOAA (2022a).
[3] E – Endangered; T – Threatened; PE– Potentially Threatened; C– Candidate; w/CH – with designated Critical Habitat.

The American Peregrine Falcon (*Falco peregrinus anatum*), Arctic Peregrine Falcon (*Falco peregrinus tundrius*), Brown Pelican (*Pelecanus occidentalis*), Interior Least Tern (*Sterna antillarum*), and Bald Eagle (*Haliaeetus leucocephalus*) have been removed from the ESA but continue to receive protection under the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act and therefore, not referenced in this BA.

This BA also describes the avoidance, minimization, and conservation measures proposed for this project relative to habitat and species referenced in the BA. The BA is offered to assist the NMFS and USFWS in fulfilling their obligations under the ESA. An Environmental Impact Statement (EIS) has also been prepared to further address the potential effects resulting from the proposed CDP.

For the BA, the study area encompasses a larger area for which environmental effects of the proposed CDP have been analyzed (Figure 2). The study area includes Nueces, San Patricio, Refugio, and Aransas counties. The project area provides spatial boundaries for evaluation of species that may be more-directly impacted by the construction and operation of the proposed project in Nueces and Aransas counties. Therefore, the project area is a smaller area, more immediate to the proposed project features (Figure 3).

1.2 PROJECT AREA HABITAT DESCRIPTION

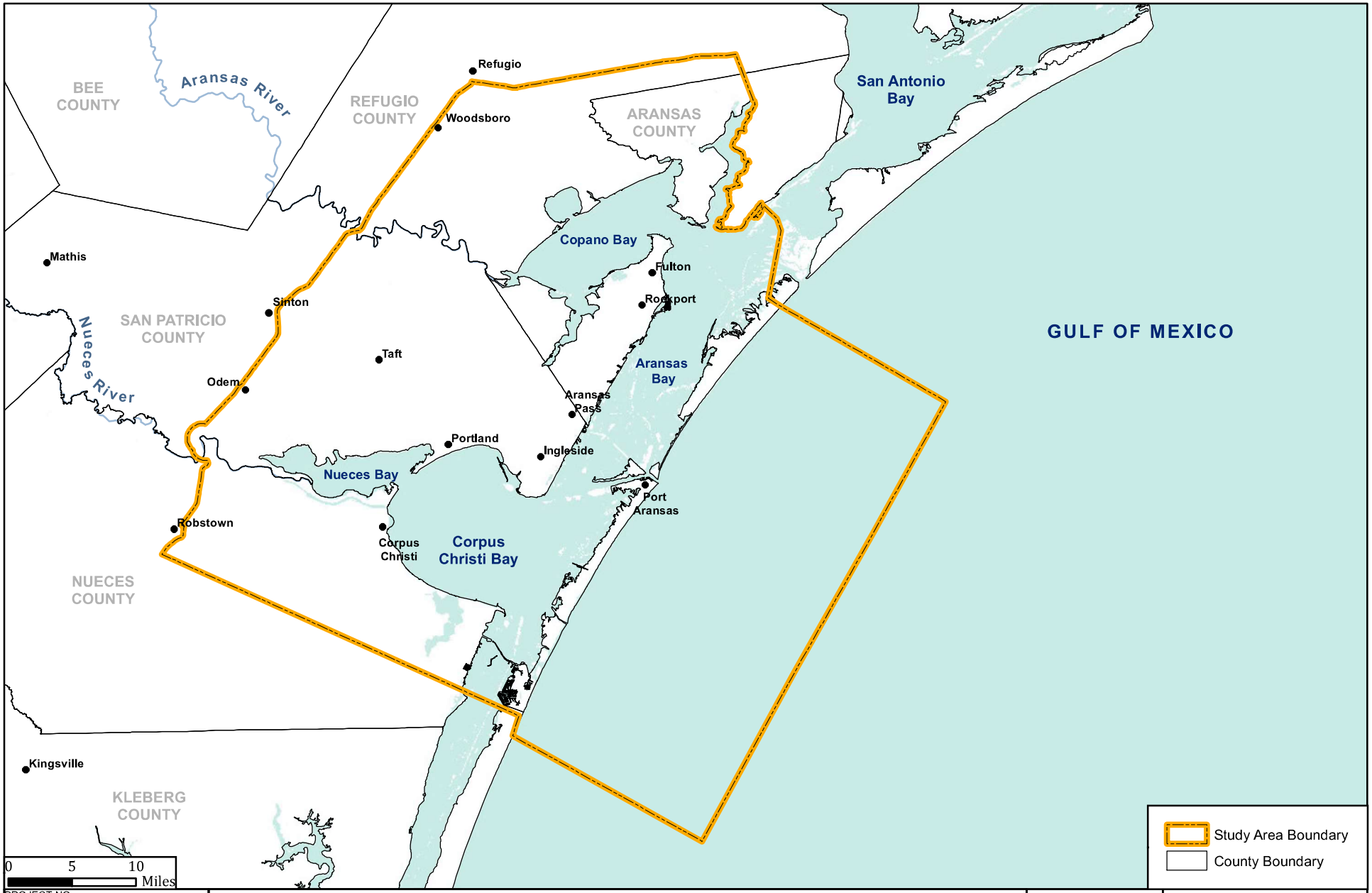
The project area is located within the Tamaulipan biotic provinces (Blair, 1950). The project area is in the Western Gulf Coastal Plains region and includes Mid-Coast Barrier Islands and Coastal Marshes. The project area habitat includes barrier islands, coastal dunes, coastal grasslands, tidal flats, estuaries, fresh to saline marshes, bays, and open water habitats (Griffith et al., 2007).

The project area is located within the Corpus Christi Bay, a 96,000-acre bay on the Texas central coast. The average depth is 11 feet (Texas Parks and Wildlife Department [TPWD], 2021a). The Corpus Christi Bay estuary habitat types include uplands, wetlands, open-bay water, open-bay bottom, sea grass meadows, and intertidal mud flats. Existing habitat within the proposed project footprint includes developed and urbanized land, armored and natural shorelines, beaches, tidal flats, open water, brackish to saltwater wetlands, submerged aquatic vegetation, oyster reefs, uplands, sand dunes, coastal prairie and mud flats (USFWS, 2017a).

1.3 ALTERNATIVES CONSIDERED

1.3.1 No-Action Alternative

The No-Action Alternative provides a means to evaluate the environmental impacts that would occur if the proposed CDP were not constructed. The characterization of the No-Action Alternative provides a baseline for comparison of performance and impacts of the Proposed Action Alternative. Under the No-Action Alternative, the CCSC would not be deepened and would remain at –54 Mean Lower Low Water (MLLW). The CCSC will continue to be maintained and dredged to the approved depth. Very Large



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Port of Corpus Christi Authority
Corpus Christi Ship Channel Deepening Project

Study Area Boundary

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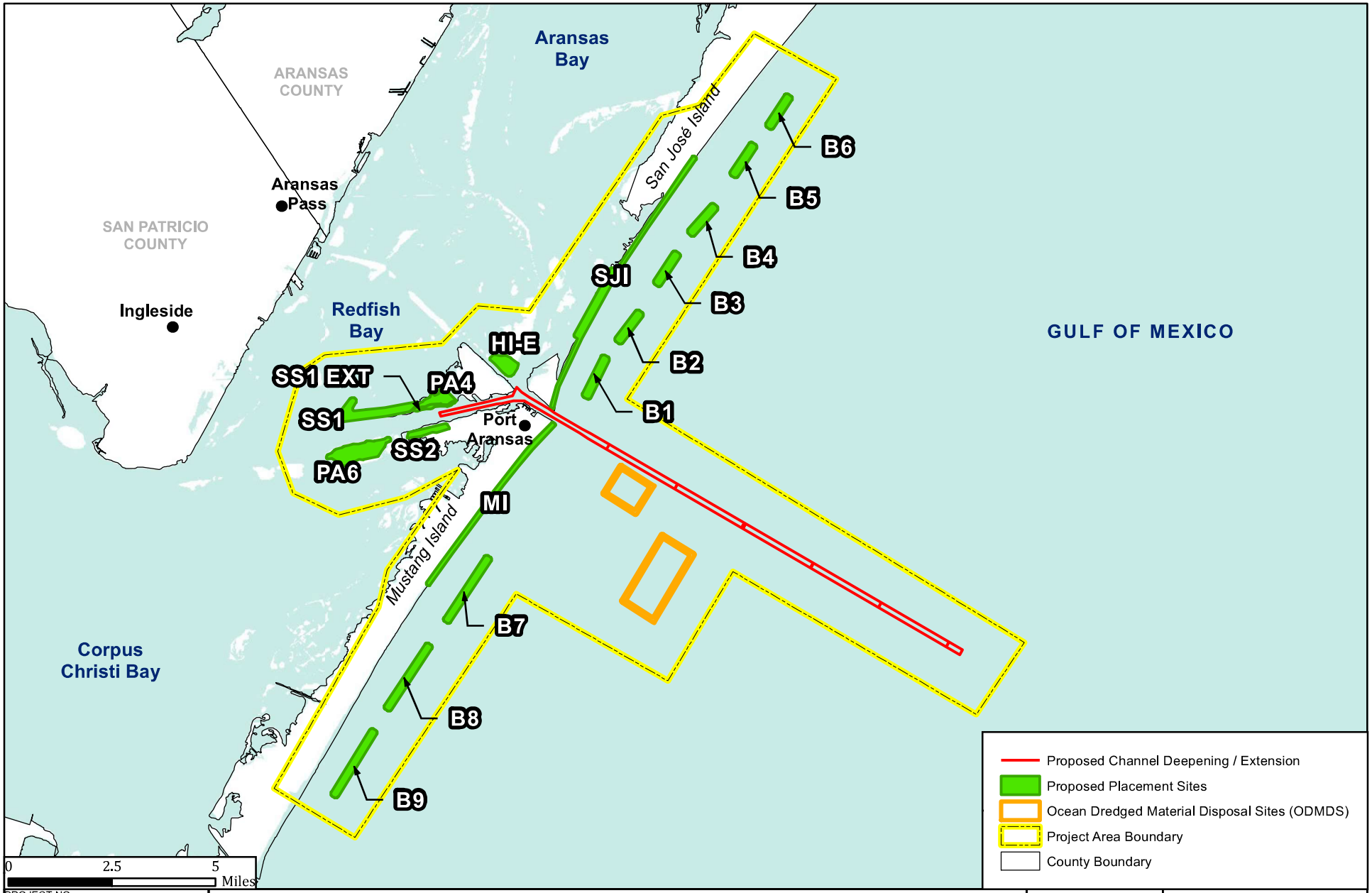

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Port of Corpus Christi Authority
Corpus Christi Ship Channel Deepening Project

Project Area Boundary

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Crude Carriers (VLCCs) would continue to be partially loaded and reverse-lightered offshore. The No-Action Alternative does not meet the project purpose and need but is carried forward for detailed analysis in this EIS for comparison purposes.

1.3.2 Alternative 1: Proposed Action Alternative – Channel Deepening

Alternative 1 consists of deepening the CCSC to –75 MLLW from the Gulf of Mexico (Gulf) to station 110+00 near Harbor Island, including the approximate 10-mile extension to the Entrance Channel necessary to reach sufficiently deep waters. Deepening would take place largely within the footprint of the currently authorized –54-foot MLLW channel. Dredging approximately 46.3 million cubic yards would be required with inshore and offshore placement of the material. Under this alternative, only berths at Harbor Island would be capable of fully loading VLCCs. Partially loaded VLCCs at Ingleside could top off at Harbor Island thereby reducing or eliminating reverse lightering. All dredged material would be placed in inshore and offshore actions targeting BU.

1.3.3 Alternative 2: Offshore Single Point Mooring

Under Alternative 2, the CCSC would not be deepened to a –75 MLLW and would remain at –54 MLLW. To meet the project purpose, multiple deep-water port facilities (Single Point Moorings) capable of sustaining all projected oil exportation would be constructed. VLCCs would be fully loaded offshore eliminating the need to traverse the channel and reverse-lighter. This alternative would also eliminate dredging of the channel and the impacts associated with dredged material placement.

1.3.4 Alternative 3: Inshore/Offshore Combination

Under Alternative 3, the CCSC would not be deepened to a –75 MLLW and would remain at –54 MLLW. To meet the project purpose, VLCC vessels would be partially loaded at inshore facilities in Ingleside and Harbor Island then traverse the channel to the offshore facility to be fully loaded. This alternative would eliminate the need to reverse-lighter and would also eliminate dredging of the channel and the impacts associated with dredge material placement.

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2.0 STATUS OF THE LISTED SPECIES

Species identified by USFWS (2022a) and NMFS (NOAA, 2022a) for this BA are listed in Table 1. The following section present the natural history of each species relevant to its potential occurrence in the counties of the study area. Section 3.0 presents the potential of the proposed actions to affect these species.

2.1 OCELOT

The Ocelot is a small, spotted, feline found within a wide range of habitat from South America to isolated populations in Arizona and south Texas. The Ocelot was Federally listed as endangered by the USFWS in July 1982 (47 *FR* 31670–31672, USFWS, 1982). Ocelots are nocturnal hunters, about twice the size of an average house cat. Threats to the ocelots include habitat loss and fragmentation, loss of genetic diversity, and illegal hunting. Ocelots are nocturnal predators, and their diet consists of small mammals, reptiles, birds, and rodents (USFWS, 2016).

2.1.1 Habitat

Ocelots inhabit a wide range of habitat from thorn scrub woodlands, coastal grasslands in Texas, and tropical forests, rainforests, and cloud forests in its range in South America. Ocelots in Texas require dense vegetation (greater than 75 percent canopy cover) with 95 percent shrub cover. Typical vegetation includes brasil, honey mesquite, granjeno (*Celtis pallida*), and elbowbush (*Forestiera angustifolia*) (USFWS, 2016).

2.1.2 Range and Distribution

Ocelot range extends from southern Texas and southern Arizona through Central America, Ecuador, and Argentina. There are historical records of ocelots in Florida and California. In Texas, recent live trapping and camera surveys found populations of ocelots on the Yturria Ranch and East El Sauz Ranch in Willacy County, the Laguna Atascosa National Wildlife Refuge in Cameron County, and in Jim Wells, Kleberg, and Kenedy counties. In the U.S., they are primarily found in Cameron County, Texas. There are an estimated 19 individual ocelots within the Laguna Atascosa National Wildlife Refuge and 38 total individuals within Cameron County. The USFWS has not designated any Critical Habitat for the Ocelot. Habitat fragmentation and lack of range connectivity is a large concern for populations of ocelots. Many dispersing ocelots are victims of vehicle collisions (USFWS, 2016).

2.1.3 Presence Within the Study Area

Ocelots and their associated habitat are not found within the study area counties (TPWD, 2022). It is highly unlikely that Ocelots occur within the study area.

2.2 BLUE WHALE

The Blue Whale is the largest whale species in the world and can weigh over 330,000 pounds. Blue Whales have long, slender bodies with variable mottling pattern. They are found worldwide and migrate thousands of miles between foraging areas where they feed primarily on krill (NOAA, 2021b).

2.2.1 Habitat

Blue Whales are found in all oceans except for the Arctic Ocean. They primarily occur in waters where krill is concentrated (NOAA, 2021a).

2.2.2 Range and Distribution

Blue Whales migrate seasonally between their summer feeding ground in the polar waters to winter breeding grounds in the equatorial waters. In the North Atlantic, their range extends from the subtropics to Greenland. They occur infrequently in the Gulf and Caribbean Ocean (NOAA, 2021a).

2.2.3 Presence Within the Study Area

There are only two documented records of Blue Whales in the Gulf. The only documented Texas record was an individual stranding between Freeport and San Luis Pass in 1940 (Schmidly, 2004). It is unlikely that the species would be found within the study area.

2.3 FIN WHALE

The Federally listed Fin Whale is the second largest whale in the world. Fin Whales are long and sleek with a V-shaped head and hooked dorsal fin. They were historically hunted but more recently face threats from vehicle collision, habitat degradation, and reduced prey abundance of krill, herring (Clupeidae), cod (Gadidae) and other schooling fishes from overfishing (Schmidly, 2004; NOAA, 2021b).

2.3.1 Habitat

Fin Whales are found in deep offshore waters, away from the coast, in all major oceans (NOAA, 2021b).

2.3.2 Range and Distribution

Fin Whales occur within a wide range of latitude. Most migrate from the feeding areas around the poles during the summer to the warmer waters of the tropics for breeding and calving (NOAA, 2021b).

2.3.3 Presence Within the Study Area

Fin Whales can be found year-round in the Gulf although there has only been one recorded observation near Texas in 1951 (Schmidly, 2004). It is unlikely that the species would be found within the study area.

2.4 HUMPBACK WHALE

The Humpback Whale has one of the longest migration routes of any whale species, travelling as much as 3,000 miles in the span of 36 days. Humpback Whales are primarily black with white markings on their fins, tail, and underbellies. Since the ban on commercial whaling the population of humpbacks have been steadily increasing. They face threats from ship strikes and entanglement in fishing gear (NOAA, 2021c).

2.4.1 Habitat

Humpback Whales are found in all the major oceans. They can be found in deep oceans and close to shore (NOAA, 2021c).

2.4.2 Range and Distribution

Humpback Whales are typically found in high latitude feeding grounds during the warmer months and migrate to tropical waters in the winter. The North Atlantic population of Humpback Whales are found from the Gulf of Maine to Norway during the summers. Humpbacks migrate to the West Indies and Cape Verde in the winter (NOAA, 2021c).

2.4.3 Presence Within the Study Area

The only documented observation of a Humpback Whale in Texas waters was in 1992 near the Bolivar Jetty in Galveston. The species is rare in the Gulf (Schmidly, 2004). This species is unlikely to occur in the study area.

2.5 SEI WHALE

This migratory species can commonly be found in higher latitudes during the summer and equatorial waters in the winter and fall. Individuals are long, sleek with dark blue-gray coloration and mottling. Sei Whales also have a hooked dorsal fin and grooves that extend from their mouth to their bellies. They currently face threats from ship collisions, entanglement with fishing gear, and habitat degradation (NOAA, 2021d).

2.5.1 Habitat

Sei Whales inhabit deeper waters away from the coastline (NOAA, 2021d).

2.5.2 Range and Distribution

Sei Whales are distributed in subtropical, tropical, and subpolar waters of the Atlantic, Indian, and Pacific Ocean. Their migration pattern and breeding grounds are not known (NOAA, 2021d).

2.5.3 Presence Within the Study Area

Sei Whales can be found in the Gulf and Caribbean Sea but no records exist for Texas (Schmidly, 2004). It is unlikely for Sei Whales to occur within the study area.

2.6 SPERM WHALE

Sperm Whales are the largest tooth whales in the world. Sperm Whales are mostly dark gray with a large head and single blowhole. They are proficient divers and often spend most of their time in deep waters feeding. The average dive can last for 35 minutes and can reach depths of over 1,312 feet. Sperm Whales currently face threats from vessel strikes, entanglement on fishing gear, ocean noise, marine debris, and oil spills (NOAA, 2021e).

2.6.1 Habitat

Sperm Whales inhabit deep ocean waters where they dive and feed on squid, sharks, and fish (NOAA, 2021e).

2.6.2 Range and Distribution

Sperm Whales are the most common species of whale in the Gulf. Sightings and stranding have been known to occur along the Texas Gulf (NOAA, 2021e).

2.6.3 Presence Within the Study Area

Although Sperm Whales are known to occur in the Gulf, they typically inhabit deep offshore waters (Schmidly, 2004). The species is common with in the Gulf but would be rare within the study area.

2.7 WEST INDIAN MANATEE

The West Indian Manatee was Federally listed as endangered in 1967 (USFWS, 1967), the manatee was reclassified as a threatened in May 2017 (82 *FR* 16668, USFWS, 2017b). Adult manatees are typically 9.8 feet long and can weigh around 2,200 pounds. They have two front flippers and a wide tail. Human threats to the manatee include collisions with boats and ships, entrapment in gillnets and floodgates, poaching, and ingesting marine debris. Natural mortality of manatees is caused by cold stress and outbreaks of red tide caused by algal blooms (USFWS, 2001).

2.7.1 Habitat

West Indian Manatee are found in bays, estuaries, lakes, rivers, and shallow coastal waters. They are intolerant of prolonged exposure to waters cooler than 68 degrees Fahrenheit (°F). During the winter, they seek out and congregate in warmer waters at spring-fed rivers and power plant outfalls. They tend to avoid areas with strong currents. Manatees are herbivores and feed on a variety of submerged, floating, and

emergent vegetation (USFWS, 2001). Critical Habitat is designated in Florida, but none have been designated in Texas (USFWS, 2022b).

2.7.2 Range and Distribution

The United States is believed to have the largest population of manatees. Most of the United States population of manatees reside in Florida. During the warm summer months, manatees have been known to migrate towards Rhode Island or Texas. Historically, manatees have been found in the Laguna Madre area. Outside of the United States, West Indian Manatees occur in the Greater Antilles, Trinidad, on the east coast of Mexico and Central America, and along the northern coast of South America (USFWS, 2001).

2.7.3 Presence Within the Study Area

Manatees have historically been an uncommon visitor along the Texas Gulf coast. Although extremely rare, recent records of manatees in Texas exists for Cow Bayou, Copano Bay, Bolivar Peninsula, near Sabine Lake, and at the mouth of the Rio Grande (Schmidly, 2004). Manatee sightings were observed near Rockport as recently as 2004, West Galveston Bay in 2012, and Trinity Bay in 2014 (TPWD, 2004; Rice, 2012; Hooper, 2014). Within the Corpus Christi area, manatees were observed near Shoreline Boulevard in the Corpus Christi Bay in 2009, 2014, and 2019 (Ren, 2019; Dawson, 2019). In 2021, manatees were observed in Laguna Madre and South Padre Island (Aguirre, 2021; Von Preysing, 2021). The USFWS has not designated Critical Habitat for the West Indian Manatee along the Texas coastline (USFWS, 2022b). The occurrence of West Indian Manatees in the study area is possible, but not likely.

2.8 GIANT MANTA RAY

Giant Manta Rays are Federally listed threatened species and are known as the world's largest species of rays. Manta Rays have a large diamond shaped body with black backs, mostly white bellies, elongated pectoral fins and two long lobes which extends from their mouth. Adult Manta Rays can have a wingspan of 29 feet and weigh up to 5,300 pounds. The main threat to Giant Manta Rays is commercial fishing, bycatch, and habitat loss (NOAA, 2021f).

2.8.1 Habitat

Giant Manta Rays are filter feeders and can often be found foraging in shallow coastal waters or open oceans where they feed on zooplankton within the water column. Manta Rays can dive to depths of 3,280 feet (NOAA, 2021f). Nearshore, Manta Rays have been observed along sandy bottom areas, reefs, and seagrass beds (USFWS, 2020a).

2.8.2 Range and Distribution

Giant Manta Rays are migratory and found worldwide in tropical, subtropical, and temperate waters and commonly found offshore and inshore near coastlines. Within U.S. waters, Giant Manta Rays can be found as far north as Long Island, New York, the Gulf, and the Caribbean Islands (NOAA, 2021f). The Flower

Garden Banks National Marine Sanctuary, located approximately 100 miles from the Texas coastline, is habitat and nursery for juvenile Manta Rays (Stewart et al., 2018).

2.8.3 Presence Within the Study Area

Manta Rays are common within the Gulf and around the Corpus Christi area. The Flower Garden Banks National Marine Sanctuary is located approximately 190 miles from the study area. Barring a catastrophic incident, the proposed project would not have any effect on the marine sanctuary or the Manta Ray nursery habitat.

2.9 NORTHERN APLOMADO FALCON

The Northern Aplomado Falcon was Federally listed as endangered in 1986 (51 *FR* 6686, USFWS, 1986). The Northern Aplomado Falcon subspecies is generally larger with a darker cummerbund than other Aplomado Falcons (USFWS, 1990). The number of Aplomado Falcons began to decline through the 1900s. The cause of the Northern Aplomado Falcon decline has been linked to the use of pesticides such as the earlier use of DDT (dichloro-diphenyl-trichloroethane) causing thinning egg shells, habitat loss, the effects of climate change on prey populations, and the increased presence of Great-horned Owls (*Bubo virginianus*), which predate on the falcons (USFWS, 2014a).

2.9.1 Habitat

Habitat for the Northern Aplomado Falcon is typically coastal prairie and desert grasslands. In Texas, the falcons can be found in open honey mesquite, oak (*Quercus* sp.), acacia (*Acacia* sp.) and yucca (*Yucca* sp.) woodlands, grassland savannahs, and coastal prairie dunes. The falcons hunt in pairs over grasslands with low cover and an abundance of small mammals and insects. The Northern Aplomado Falcon pairs prefer nesting on stick platforms abandoned by other raptors and corvids. Breeding pairs have also been known to nest on the ground, and on powerlines, trees, and yucca (USFWS, 2014a). No Critical Habitat has been designated for the Northern Aplomado Falcon (USFWS, 2022b).

2.9.2 Range and Distribution

Historically, the Northern Aplomado Falcon was found from Trans-Pecos and south Texas, southern New Mexico, and southeastern Arizona. In Mexico, the Aplomado Falcons can be found along the Atlantic region of Mexico from northern Veracruz to the Yucatan Peninsula (USFWS, 2014a). Since their listing, there have been reintroduction efforts of Northern Aplomado Falcon in west Texas, the King Ranch in Kleberg County, Matagorda Island, and Laguna Atascosa National Wildlife Refuge (NWR) (TPWD, 2021b). There are established nesting populations in Brownsville and on Matagorda Island in Texas (USFWS, 2014a).

2.9.3 Presence Within the Study Area

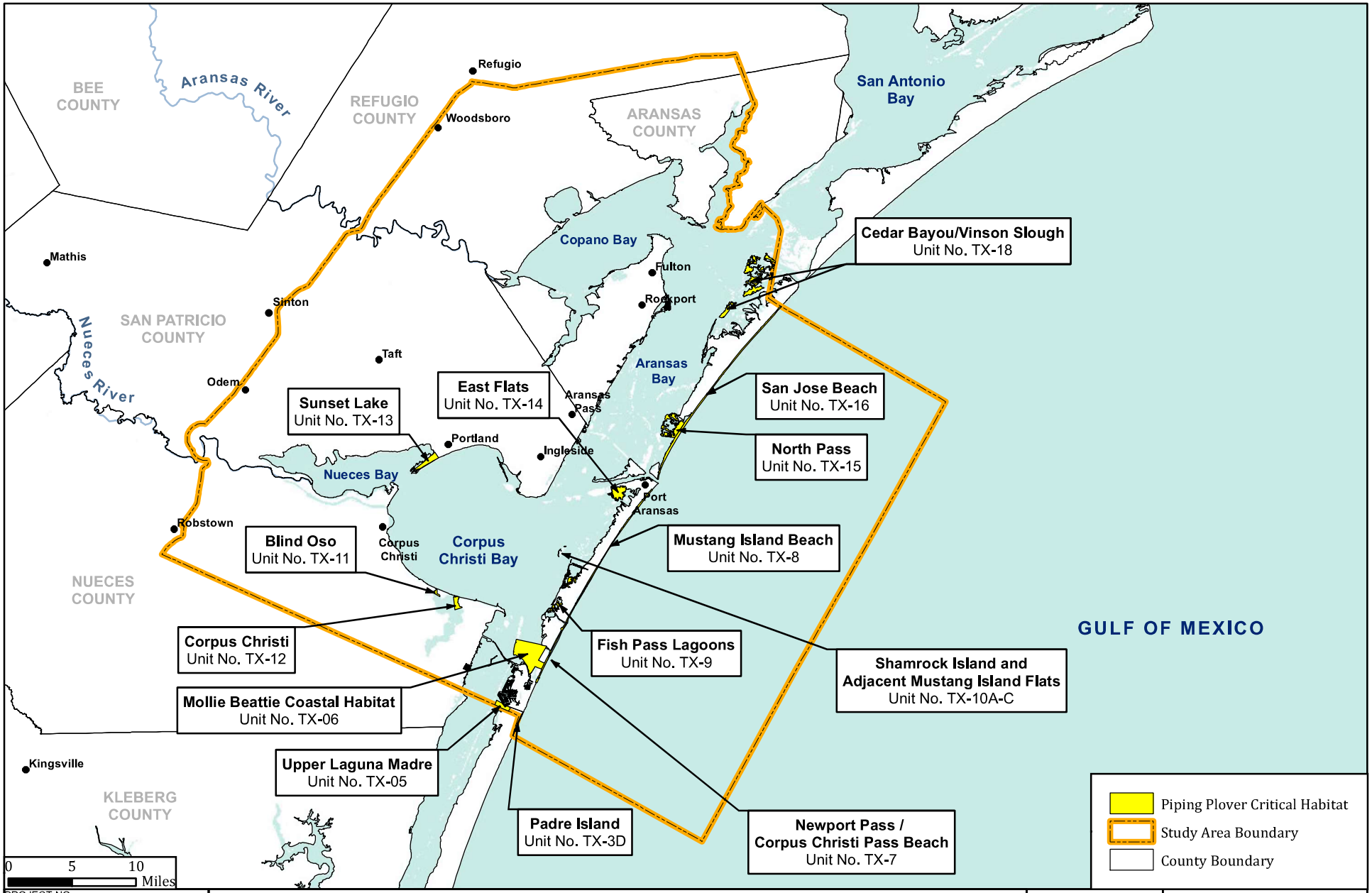
The Northern Aplomado Falcon have been observed within the study area (eBird, 2022a). It is likely populations of Aplomado Falcons occur throughout the study area including Mustang Island, Port Aransas, and San Jose Island. Since the falcons are known to nest on San José Island and hunt along upland areas along coastal barrier islands and coast, it is likely that the dredging or material placement activities along the shoreline will affect the falcons (eBird, 2022a; pers. comm., M.K. Skoruppa [USFWS], 2022).

2.10 PIPING PLOVER

Piping Plovers are small, white to gray-colored shorebirds with a thin, solid black neck band. The Atlantic Coast/Northern Great Plains population was Federally listed as threatened in 1985 (50 *FR* 50726–50734, USFWS, 1985b). Piping Plovers that winter in Texas and Louisiana are from both the Northern Great Plains and Great Lakes populations. Approximately 35 percent of the global population of Piping Plovers winter along the Texas Gulf coast (USFWS, 2003). Piping Plover populations are threatened due to habitat loss and degradation from commercial, residential, and recreational development on the coast. In addition, they are also impacted by wetland drainage, damming and channelization of rivers, and egg depredation by predators (USFWS, 1996).

2.10.1 Habitat

From September to March, Piping Plovers are typically found along the Gulf coast shoreline using beaches, sandflats, tidal mudflats, dunes, and dredge islands as loafing and foraging areas (Haig and Elliott-Smith, 2004). Along their summer range in the Great Lakes, populations were found utilizing sparsely vegetated beaches, sandy substrates, unvegetated dunes, and inter-dune wetlands. The Northern Great Plains Piping Plover population prefer gravelly substrates, alkali lakes, rivers, and reservoirs (USFWS, 2009a). Although all populations winter along the Gulf coast, their summer ranges include the Great Lakes, Northern Great Plains, and Atlantic Coast (USFWS, 1996). There are fourteen USFWS-designated Critical Habitats for Piping Plover within the study area (Figure 4). Piping Plover Critical Habitat within the study area include TX-3D: Padre Island, TX-5: Upper Laguna Madre, TX-6: Mollie Beattie Coastal Habitat, TX-7: Newport Pass/Corpus Christi Pass Beach, TX-8: Mustang Island Beach, TX-9: Fish Pass Lagoons, TX-10A-C: Shamrock Island and Adjacent Mustang Island Flats, TX-11: Blind Oso, TX-12: Corpus Christi, TX-13: Sunset Lake, TX-14: East Flats, TX-15: North Pass, TX-16: San José Beach, and TX-18: Cedar Bayou/Vinson Slough (USFWS, 2022b). However, not all designated Critical Habitat listed would be directly affected by project construction or beneficial use.



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PREPARED BY	KLC

Port of Corpus Christi Authority
Corpus Christi Ship Channel Deepening Project

Piping Plover Critical Habitat

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FIGURE

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2.10.2 Range and Distribution

Piping Plovers breed on the northern Great Plains (Iowa, Minnesota, Montana, Nebraska, North and South Dakota, Alberta, Manitoba, and Saskatchewan), the Great Lakes (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario), and the Atlantic Coast from Newfoundland to Virginia. Wintering grounds are found along the Southern Atlantic and Gulf Coast from North Carolina to Mexico (USFWS, 1986b).

2.10.3 Presence Within the Study Area

There are wintering populations of Piping Plovers that occur within the designated Critical Habitats and study area (eBird, 2022b). Construction activities related to the project could temporarily disturb Piping Plovers during construction. Placement of dredge material could potentially disturb the shorebird along their foraging and roosting habitat. However, beneficial use of dredged material will eventually benefit Piping Plovers by increasing wintering habitat and stabilizing the shoreline.

2.11 RUFA RED KNOT

Red Knots of the *rufa* subspecies (*Calidris canutus rufa*) are medium-sized sandpiper known for their red plumage, bold eye stripe, and long migration route from the arctic to the southern tip of South America, a migratory route of approximately 18,500 miles. The Rufa Red Knot was Federally listed as a threatened species in 2014 (79 *FR* 73705–73748, USFWS, 2014b). Threats to the Rufa Red Knot include habitat loss in wintering and breeding areas, reduction of food sources such as Horseshoe Crab eggs, and climate change (USFWS, 2013a).

2.11.1 Habitat

Along the Texas coast, Rufa Red Knots use coastal marine and estuarine habitats such as large exposed intertidal flats on the bay sides of barrier islands, beaches, and oyster reefs (NatureServe, 2021). Red Knots forage for bivalves, gastropods, and crustaceans on beaches, oyster reefs, exposed bay bottoms (Baker et al., 2013). In the evening, they roost on high sand flats and reefs protected from high winds and tides (NatureServe, 2021). Their nesting grounds in northern Canada are in dry, slightly elevated tundra locations. Nests are scraped patches on low vegetation containing lichen, moss, and leaves (USFWS, 2013a). The USFWS does not have any designated Critical Habitat for the Rufa Red Knot. However, USFWS is considering Critical Habitat designation of coastal habitats along the Atlantic and Gulf. Along the Gulf, this includes Gulf beaches, back bays, flats, and intermittently exposed seagrasses in Texas (USFWS, 2021a).

2.11.2 Range and Distribution

Worldwide, there are six distinct subspecies of Red Knot, each with various morphological differences and distinct migration routes. The migratory route for the Rufa Red Knot ranges from its breeding grounds in

northern Canada to Tierra del Fuego on the tip of South America. Rufa Red Knots are found in Texas during the wintering period, arriving in late July and staying on the coast until mid-May (USFWS, 2020b). The wintering population in Texas occurs near Bolivar Flats in Galveston County, Mustang Island, and South Padre Island (USFWS, 2007, 2015a). Estimates for the wintering population of Red Knots in Texas are about 2,000 individuals (USFWS, 2013a, 2015a).

Delaware Bay is the largest and most important spring stopover site. It corresponds with the timing of horseshoe crab (*Limulus polyphemus*) spawning which provides an important diet before their migration to breeding ground in the Arctic. The population of Horseshoe Crabs in Delaware are also declining due to harvesting of eggs for bait and adults for biomedical research. With low prey resources and lower body masses, Red Knots could have difficulty completing their migration to the arctic for nesting (USFWS, 2013a).

2.11.3 Presence Within the Study Area

According to eBird (2022c), wintering populations of red knots are regularly observed within the study area. Populations of Rufa Red Knots could be temporarily disturbed by construction activities related to the project. However, beneficial use of dredged material placement areas is expected to improve roosting and foraging habitats near the study area.

2.12 WHOOPING CRANE

Whooping Crane are the tallest birds in North America and are known for their call, size, and white plumage. They were Federally listed as endangered on March 11, 1967 (32 *FR* 4001, USFWS, 1967). Threats to whooping cranes include habitat loss, powerline collision, illegal hunting, and human disturbances (Canadian Wildlife Service [CWS] and USFWS, 2007). Whooping Cranes have responded positively to recovery efforts since their listing. The Aransas-Wood Buffalo population, which migrates between Canada's Wood Buffalo National Park and Aransas NWR, has increased from less than 50 individuals in 1941 to 506 individuals in 2020 (USFWS, 2020c).

2.12.1 Habitat

The wintering habitat in Texas within the Aransas NWR near Rockport and adjacent areas on the Gulf coast are comprised of salt flats, marshes, and grasslands. Typical vegetation of these habitats includes salt grass (*Distichlis spicata*), smooth cordgrass (*Spartina alterniflora*), Gulf cordgrass (*Spartina spartinae*), and sea ox-eye (*Borrichia frutescens*). The refuge also maintains oak savannahs which contains live oak (*Quercus virginiana*), redbay (*Persea borbonia*), and bluestem (*Andropogon* sp.) as habitat. Whooping Crane winter diet consists of Carolina wolfberry (*Lycium carolinianum*), Blue Crab (*Callinectes sapidus*), and clams (*Tagelus plebeius, Ensis minor, Rangia cuneate, Cyrtopleura costada, Phacoides pectinate, Macoma constricta*) (Allen, 1952; Chavez-Ramirez, 1996). During the summer and migration period, they feed primarily on frogs, crayfish, insects, berries, and fish (USFWS, 2012). The USFWS designated Aransas

NWR and adjacent lands including San Antonio Bay, Mesquite Bay, portions of Matagorda Island, and Espiritu Santo Bay as Critical Habitat (43 *FR* 20942, USFWS, 1978a).

2.12.2 Range and Distribution

Historically, the Whooping Crane was once thought to number 10,000 individuals with a historical range extending from central Mexico to the Arctic coast, and from Utah to New Jersey (CWS and USFWS, 2007). More recently, the population rebounded from an all-time low of 15 individuals in 1941 to 442 wild individuals in 2015 (USFWS, 2012, 2017a). There were several migration routes across the United States from the Central Plains to Louisiana, Hudson Bay in Canada to the Atlantic Coast, and a route alongside Sandhill Cranes through west Texas and into Mexico (CWS and USFWS, 2007). Currently there are several populations of Whooping Cranes in Canada and the United States. There are non-migratory populations in Louisiana and Florida and two migratory populations that winters in central Florida and Texas. The migratory Texas population breeds and nests in Wood Buffalo National Park in northern Alberta, Canada during the summer and flies south to Aransas NWR where they spend the winter (USFWS, 2012).

2.12.3 Presence Within the Study Area

According to eBird (2022d) data, Whooping Cranes have been observed within the study area. Populations of Whooping Cranes could be temporarily disturbed by construction related activities near the shoreline. However, beneficial use of dredged material is expected to stabilize shoreline and protect foraging habitat for the cranes.

2.13 EASTERN BLACK RAIL

The Eastern Black Rail are small black birds with white speckling on their back and wings with long dark legs and red eyes. The species was listed by the USFWS in 2020. Black Rails are threatened by habitat loss, invasive species, changes to hydrology, mangrove encroachment, and habitat fragmentation. Due to its small and cryptic nature, little is known about the species (USFWS, 2020d).

2.13.1 Habitat

Black Rails occupy salt, brackish, and freshwater marshes. The Gulf coast subspecies can be found in higher elevation wetland areas with shrubby vegetation and dense cover. Their habitats included high elevation zones dominated by Gulf cordgrass (*Spartina spartinae*), salt meadow cordgrass (*S. patens*), eastern baccharis (*Baccharis halimifolia*), salt grass (*Distichlis spicata*), and sea oxeye *(Borrichia frutescens*) (USFWS, 2020d).

2.13.2 Range and Distribution

Black Rails are partially migratory and are found within the U.S., Caribbean, and South America. Within the United States, they were historically found in inland states such as Colorado, Arkansas, Nebraska, Oklahoma, and Ohio. Black Rails are found year-round in Texas, Florida, South Carolina, and North

Carolina from March to August (USFWS, 2020d). No Critical Habitat was designated for the species (USFWS, 2022b).

2.13.3 Presence Within the Study Area

It is likely that Eastern Black Rails are found within the study area. There are no planned actions that would directly impact coastal marshes where black rails inhabit. Black rails could be temporarily disturbed by construction activities related to the project. However, beneficial use of dredged material is expected to stabilize shorelines and increase marsh habitats.

2.14 ATTWATER'S GREATER PRAIRIE CHICKEN

The Attwater's Greater Prairie Chicken is a subspecies of the Greater Prairie Chicken (*Tympanuchus cupido*). The Attwater's Greater Prairie Chicken was Federally listed as an endangered in 1967 (32 *FR* 4001, USFWS, 1967). The birds are well known for their unique mating display where the males congregate at breeding grounds called leks in the springtime. Their mating behavior includes inflating their air sacs and producing low 'booming' calls to attract females. The main threats to the Attwater's Greater Prairie Chicken are loss of grassland prairie habitat, depredation, invasive fire ants, and poor brood survival (USFWS, 2010a).

2.14.1 Habitat

The Attwater's Greater Prairie Chicken require unfragmented tallgrass prairie habitat maintained by periodic wildfires. Common plant species associated in suitable habitat include little bluestem (*Schizachyrium scoparium*), big bluestem (*Andropogon gerardi*), and switchgrass (*Panicum virgatum*). Optimal habitat contains abundant open spaces and little to no woody cover or artificial structures (USFWS, 2010a). No Critical Habitat has been designated by the USFWS (2022b).

2.14.2 Range and Distribution

Historical accounts of the Attwater's Greater Prairie Chicken suggested a population of more than 1 million individuals on approximately 6 million acres of native coastal prairie from south Texas to Louisiana. Historically found in all counties along the Texas-Louisiana Gulf coast, the prairie chickens were extirpated from Louisiana in 1919. The population of the prairie chickens has steadily decreased from 8,000 individuals in 1937 to approximately 90 individuals in 2009. A small population was introduced to the Texas City Prairie Preserve in 2008, but subsequent reintroduction efforts were discontinued. There are presently only two populations of the Attwater's Greater Prairie Chicken in Texas: Attwaters Prairie Chicken NWR in Colorado County and at release sites in Goliad, Refugio, and Victoria counties (Williams and Harrell, 2009).

2.14.3 Presence Within the Study Area

The prairie chicken current range exist further inland within upland habitats. They are extremely rare outside of their known areas. It is highly unlikely that the Attwater's Prairie Chicken occur within the study area. There is no preferred habitat within the study area.

2.15 GREEN SEA TURTLE

The Green Sea Turtle was Federally listed as threatened in 1978, except for the Florida and the Pacific Coast of Mexico (including the Gulf of California) where it is listed as endangered (43 *FR* 32800–32811, USFWS, 1978b). In 2015, the USFWS identified 11 distinct population segments worldwide (80 *FR* 15272–15337, USFWS, 2015b). The proposed distinct population segments rule would continue to list the North Atlantic Population (which includes Texas) as threatened. Primary threats to worldwide populations of Green Sea Turtle includes harvesting of adults and eggs, capture in fishing gear, and incidental take from dredging activities (NOAA, 2021g).

2.15.1 Habitat

Green Sea Turtle utilize shallow habitats such as lagoons, bays, inlets, coral reefs, shoals, estuaries, and other areas with an abundance of marine algae and sea grasses. Female Green Sea Turtles prefer nesting on high energy beaches with deep sand. Green Sea Turtle nests are common in Texas. National Park Service (NPS) biologists located 28 Green Sea Turtle nests on the Padre Island National Seashore, one on Mustang Island in 2020, and one on South Padre in 2021 (NPS, 2021). Green Sea Turtles are omnivores and consume seagrasses, algae, jellyfish, crustaceans, and mollusks (USFWS, 1991).

2.15.2 Range and Distribution

Green Sea Turtles are found worldwide in tropical and subtropical waters. The North Atlantic population includes species within the U.S. Virgin Islands, Puerto Rico, and the continental United States from Massachusetts to Texas. Many Green Sea Turtles nest on the east coast of Florida while relatively small numbers nest in Georgia, North Carolina, and Texas (USFWS, 1991). The USFWS has not designated any Critical Habitat in Texas (USFWS, 2022b).

2.15.3 Presence Within the Study Area

Green Sea Turtles are common within the Corpus Christi Bay and the study area. Dredging for channel widening and maintenance, overnight lighting, and the increase in turbidity from construction operations could have a negative effect on the species. After the project is complete, vessel traffic is expected to decrease within the CCSC which may result in lower collision rates. Sea turtles may also benefit from having additional beach nesting habitat from beneficial use of dredged materials (beach nourishment), compared to beaches that do not receive nourishment (Gallaher, 2009).

2.16 HAWKSBILL SEA TURTLE

The Hawksbill Sea Turtle was Federally listed as endangered by the USFWS in 1970 (35 *FR* 8491–8498, USFWS, 1970a). The species is named after its distinctive sharp, curved beak and decorative shell. The primary global threat to the species is loss of coral reef habitat and associated communities, recreational use of nesting beaches, capture from fishing nets, and vessel strikes. Because of their unique sunburst carapace, individuals are harvested for their shells as well as for leather, oils, and other goods (NOAA, 2021h).

2.16.1 Habitat

Hawksbill Sea Turtles occupy a variety of different habitat at different life stages. Post-hatchling sea turtles are commonly found in pelagic waters among *Sargassum* rafts in convergence zones. Juvenile and adult hawksbills are more commonly found in coastal waters, estuaries, and mangrove bays where the turtles feed primarily on sponges (USFWS, 1993). The USFWS designated Critical Habitat near Mona Island and Isla Monito in Puerto Rico, no Critical Habitat has been designated in Texas (USFWS, 2022b).

2.16.2 Range and Distribution

Hawksbill Sea Turtles are circum-tropical and found within the Indian, Pacific, and Atlantic oceans. Nesting locations are widely distributed, scattered, low in number, and poorly documented (USFWS, 1998). Along the continental United States, the Hawksbill Sea Turtles can be regularly found in Florida and Texas (USFWS, 1993). Primary nesting areas in the United States are in Puerto Rico, U.S. Virgin Islands, southeast coast of Florida, and the Florida Keys. The first and only Hawksbill Sea Turtle nest in Texas was discovered in 1998 on the Padre Island National Seashore (NPS, 2021).

2.16.3 Presence Within the Study Area

The likelihood of encountering a Hawksbill Sea Turtle within the study area would be uncommon but possible. Dredging for channel widening and maintenance, overnight lighting, and the increase in turbidity from construction operations could have a temporary negative effect on the species. The turtles may benefit from having improved beach nesting habitat from beneficial use of dredged materials (beach nourishment), compared to beaches that do not receive nourishment (Gallaher, 2009). Vessel traffic is expected to decrease after completion of the project which may result in lower vehicle collision with sea turtles.

2.17 KEMP'S RIDLEY SEA TURTLE

The Kemp's Ridley Sea Turtle was Federally listed as endangered in 1970 (35 *FR* 18319–18322, USFWS, 1970b). They are the smallest known species of sea turtle. Adults are usually 2 feet in length and weigh up to 100 pounds. Threats to the Kemp's Ridley Sea Turtle include collection of eggs and adults for meat and other products, habitat loss, incidental take from shrimp trawlers and dredge hoppers, ship collision, and use of explosives to clear debris (NOAA, 2021i). Populations of nesting Kemp's Ridley Sea Turtles in

Texas have steadily increased due to nest protection and the use of Turtle Excluder Devices on fishing trawlers and dredging ships (USFWS, 2011a).

2.17.1 Habitat

Kemp's Ridley Sea Turtles occupy a variety of habitat at different life stages. Post-hatch sea turtles occupy the oceanic zone, foraging around *Sargassum* rafts, and are passive migrants in the Gulf Loop Current. Juvenile and adult sea turtles are more commonly found in shallow coastal and estuarine waters feeding on crabs, bivalves, jellyfish, and other crustaceans (Campbell, 2003; USFWS, 2011a). The USFWS has not designated any Critical Habitat in Texas (USFWS, 2022b).

2.17.2 Range and Distribution

Kemp's Ridley Sea Turtles are found throughout the Gulf and western Atlantic from New England to eastern Mexico. They gather for nesting in large groups called an "arribada." Kemp's Ridley Sea Turtle nest areas are primarily found on the beaches near Tamaulipas, Veracruz, and Campeche, Mexico (Campbell, 2003). In the United States, nesting occurs throughout Texas with the greatest numbers on the Padre Island National Seashore, and occasionally in Florida, Alabama, Georgia, South Carolina, and North Carolina (USFWS, 2011a). In 2021, 198 Kemp's Ridley Sea Turtle nests were recorded in Texas (NPS, 2021).

2.17.3 Presence Within the Study Area

The likelihood of encountering a Kemp's Ridley Sea Turtle within study area is common. Dredging for channel widening and maintenance, overnight lighting, and the increase in turbidity from construction operations could have a temporary negative effect on the species. Vessel traffic is expected to decrease after completion of the project, which may result in lower vehicle collision with sea turtles. The turtles may benefit from having improved beach nesting habitat from beneficial use of dredged materials (beach nourishment), compared to beaches that do not receive nourishment (Gallaher, 2009).

2.18 LEATHERBACK SEA TURTLE

The Leatherback Sea Turtle was Federally listed as an endangered in 1970 (35 *FR* 8491–8498, USFWS, 1970a) by the USFWS and NMFS. They are the largest turtle species in the world, reaching up to 6 feet in length and 650 to 1,200 pounds, and the only sea turtle without a bony shell. Major threats to the species include egg collection, fishing bycatch, and nesting habitat loss (NOAA, 2021j).

2.18.1 Habitat

Leatherback Sea Turtles are pelagic and spend most of their time in open oceans, but forage in coastal waters during nesting season. The turtles feed primarily on jellyfish and tunicates. In the Gulf they commonly feed on cabbagehead (*Stomolophus* sp.) and moon jellyfish (*Aurelia* sp.). Due to their large body mass and insulating fat layer, Leatherback Sea Turtles can be found in colder waters as far north as

Newfoundland and the Pacific northwest and can dive as deep as 4,200 feet (NOAA, 2021j; NPS, 2020a). The USFWS has not designated Critical Habitat for the Leatherback Sea Turtle in Texas (USFWS, 2022b).

2.18.2 Range and Distribution

Leatherbacks have one of the largest migratory distributions of any reptile. They are found in tropical and temperate waters in the Atlantic, Pacific, and Indian oceans. Leatherback Sea Turtles can be found in the Gulf, Puerto Rico, U.S. Virgin Islands, and along the Atlantic coast to Maine. In the United States, leatherbacks nest on Puerto Rico, U.S. Virgin Islands, and southeast Florida (USFWS, 1992). Leatherback nesting in Texas is extremely rare. Leatherback Sea Turtle nests were recorded on Padre Island in the 1930's and 40's. Most recently, a Leatherback Sea Turtle nest was located at Padre Island National Seashore in 2008 (NPS, 2021). No Leatherback Sea Turtle nests have been known to occur anywhere in Texas since then (NPS, 2020a).

2.18.3 Presence Within the Study Area

The likelihood of encountering a Leatherback Sea Turtle within the study area is very rare. Two Leatherback Sea Turtles were stranded in 2020 off the Texas coast and reported in the Sea Turtle Stranding and Salvage Network (STSSN, 2020). There have been documented Leatherback Sea Turtle nests in Texas in 2008 and 2021 (Shaver et al., 2019; pers. comm., Donna Shaver [NPS], 2021). Dredging for channel widening and maintenance, overnight lighting, and the increase in turbidity from construction operations could have a temporary negative effect on sea turtle species. Sea turtles may benefit from having improved beach nesting habitat from beneficial use of dredged materials (beach nourishment), compared to beaches that do not receive nourishment (Gallaher, 2009).

2.19 LOGGERHEAD SEA TURTLE

In 2011, the NMFS and USFWS determined that Loggerhead Sea Turtles were composed of nine distinct population segments. The Northwest Atlantic population segment, which includes Texas, was Federally listed as threatened (76 *FR* 58868–58952, USFWS, 2011b). The Loggerhead Sea Turtle is known for their large head and powerful jaw, which they use to break coral and shellfish. Threats to Loggerhead Sea Turtles include bycatch from shrimp trawling, incidental take from dredging activities, nesting habitat loss, direct harvest, and pollution (NMFS, 2008; NOAA, 2021k).

2.19.1 Habitat

Female Loggerhead Sea Turtles typically nest on high energy, steeply sloped, coarse-grained subtropical beaches in the summer. Post-hatchlings are typically found associated with *Sargassum* rafts in convergence zones within the Gulf and North Atlantic. Juvenile and adult Loggerhead Sea Turtles occupy the neritic zone where they feed primarily on mollusks and benthic crabs (USFWS, 2011b). In 2013, NMFS and USFWS finalized Critical Habitat for the Loggerhead Sea Turtle. The proposed Critical Habitat is located along coastal areas in North Carolina, South Carolina, Georgia, Florida, Alabama, and Mississippi

(USFWS, 2013b). The USFWS has not designated Critical Habitat for loggerheads in Texas (USFWS, 2022b).

2.19.2 Range and Distribution

Loggerhead Sea Turtles are circumglobal and inhabit temperate and tropical waters of the Atlantic, Pacific, and Indian oceans. In the Atlantic, they can be found as far north as Newfoundland and as south as Argentina (NOAA, 2021k). Two Loggerhead nests were discovered along the Padre Island National Seashore in 2020 and two nests were discovered in 2021 (NPS, 2020b, 2021).

2.19.3 Presence Within the Study Area

The likelihood of encountering a Loggerhead Sea Turtle within the study area is uncommon but possible. According to STSSN (2020), 77 Loggerhead Sea Turtles were stranded or incidentally captured in Texas in 2020. Dredging for channel widening and maintenance, overnight lighting, and the increase in turbidity from construction operations could have a temporary negative effect on the species. The turtles may benefit from having improved beach nesting habitat from beneficial use of dredged materials (beach nourishment), compared to beaches that do not receive nourishment (Gallaher, 2009). Vessel traffic is expected to decrease after completion of the project which may result in lower vehicle collisions with sea turtles.

2.20 FALSE SPIKE

The False Spike is a medium-sized freshwater mussel species proposed by the USFWS for listing as an endangered species (86 *FR* 47916-48011). The exterior shell shape is elongate-oval; color is olive, brown to black sometimes with greenish rays (Howells, 2014). Host fish include Blacktail Shiners (*Cyprinella venusta*), Red Shiners (*C. lutrensis*), and other minnow species (86 *FR* 47916-48011).

2.20.1 Habitat

The False Spike occurs in larger creeks and rivers with sand, gravel, or cobble substrates with slow to moderate flows. The species is not found in impoundments or deep waters (Howells, 2014).

2.20.2 Range and Distribution

Currently, the False Spike is known to occur in four populations: the Little River and some tributaries within the Brazos River basin, lower San Saba and Llano Rivers within the Colorado River basin, and lower Guadalupe River (Howells, 2014).

2.20.3 Presence Within the Study Area

False Spikes are found further inland and beyond any construction activities or impacts. The mussel species are intolerant of brackish or saline waters. It is unlikely that the False Spike would be found within the study area.

2.21 GUADALUPE ORB

The Guadalupe Orb is a small-sized freshwater mussel species proposed by the USFWS for listing as endangered (86 *FR* 47916-48011). The species was recently separated from the Texas Pimpleback (*C. petrina*). The exterior shell shape is round or suboval and can reach up to 2.5 inches in length. Shell color is yellow to tan, brown to black sometimes with greenish rays or concentric blotches (Howells, 2014). Guadalupe Orb shell is generally thinner and more compressed than Texas Pimpleback. Host fish include Channel Catfish (*Ictalurus punctatus*), Flathead Catfish (*Pylodictis olivaris*), and Tadpole Madtom (*Noturus gyrinus*) (86 *FR* 47916-48011).

2.21.1 Habitat

Guadalupe Orbs occur in moderate to larger creeks and rivers with mud, sand, or gravel substrates at depths less than 2 meters. The species is not found in impoundments (Howells, 2014).

2.21.2 Range and Distribution

The Guadalupe Orb only occurs within the Guadalupe River basin (Howells, 2014).

2.21.3 Presence Within the Study Area

Guadalupe Orbs are found further inland and beyond any construction activities or impacts. The mussel species are intolerant of brackish or saline waters. It is unlikely that the Guadalupe Orb would be found within the study area.

2.22 MONARCH BUTTERFLY

The Monarch Butterfly is a candidate species for federal listing. USFWS has determined that listing the species was warranted, but a timeline on when listing is undetermined (85 *FR* 81813-81822). Adult Monarch Butterflies are large with bright orange wings with black borders and white spots. During the breeding season, monarch butterflies lay their eggs on milkweed (*Asclepias sp*.) plants. Larval caterpillars feed on the milkweed for a few weeks before pupating into a chrysalis and emerging 6-14 days later as an adult butterfly. Due to their short lifespan, there are multiple generations of Monarch Butterflies within a breeding season and along their 3,000-mile migratory route. Monarch migration begins in early spring from February to March (USFWS, 2019).

2.22.1 Habitat

Due to their long migratory routes, monarch butterflies can be found in a variety of habitats. During their breeding season, Monarchs are typically found in open grass areas and plains. Important nectar sources include *Coreopsis* sp., goldenrods (*Solidago* sp.), Asters (*Carlquistia* sp.), gayfeathers (*Latris* sp.), coneflowers (*Echinacea* sp.), and milkweeds (*Asclepias* sp.). Monarchs also utilize deciduous and evergreen trees to roost overnight. Monarch butterflies migrate to Mexico where they overwinter from

August to November. At their overwintering sites, they may roost on eucalyptus trees (*Eucalyptus globulus*), Monterey pines (*Pinus radiata*), and Monterey cypress (*Cupressus macrocarpa*) or narrow-leaved trees such as willows (*Salix* sp.) and pines (*Pinus* sp.) (USFWS, 2019).

2.22.2 Range and Distribution

Monarch butterflies are found throughout North America and in various locations around the globe. The eastern population (east of the Rocky Mountains) in North America migrates north from central Mexico to the US and Canada. The western population migrates from Baja California to northern California (USFWS, 2021b).

2.22.3 Presence Within the Study Area

The eastern population of monarch butterflies can be found throughout Texas during its migratory season. Individuals have been observed along the coast and within the study area. The project is not expected to impact monarch butterfly habitat. The monarch butterfly host plant, milkweed is not commonly found along the shoreline. It is unlikely that the project will affect populations of monarch butterfly.

2.23 SLENDER RUSH-PEA

The slender rush-pea was Federally listed as endangered in 1985 (50 *FR* 45614–45618, USFWS, 1985c). Slender rush-pea is a small, perennial legume with compound leaves and delicate yellow-orange flowers (TPWD, 2021c). Much of its historical range has been converted to croplands and individuals must compete with non-native grasses such as the Kleberg and King Ranch bluestem (USFWS, 2008). Additional threats to the plant include cattle grazing, herbicide use, habitat loss, and climate change.

2.23.1 Habitat

Slender rush-pea is commonly found in patches of native short- and mid-grass prairie adjacent to permanent or intermittent creeks (USFWS, 2008). There is no Federally designated Critical Habitat for the slender rush-pea.

2.23.2 Range and Distribution

The slender rush-pea is found in two Texas counties, Kleberg and Nueces in coastal prairie habitat. The largest population can be found at the St. James cemetery in Bishop, Texas. There have been no other populations reported outside of the two counties (USFWS, 2008).

2.23.3 Presence Within the Study Area

The slender rush-pea is found in a few well-documented locations within Nueces County, farther inland than any construction related activities. It is unlikely that the project impacts would affect the plant.

2.24 SOUTH TEXAS AMBROSIA

The South Texas ambrosia was Federally listed as endangered in 1994 (59 *FR* 43648–43652, USFWS, 1994). The South Texas ambrosia is a perennial herbaceous plant with gray-green leaves and yellow inflorescence flowers. The primary threat to the south Texas ambrosia is habitat loss, agricultural conversion of prairie, competition with non-native grasses, and urban development (USFWS, 2010b).

2.24.1 Habitat

The South Texas ambrosia is commonly found in lower elevations in well-drained, heavy soils in association with subtropical woodlands with coastal prairies and savannahs. Extant populations are found in sites with native grasses such as Texas grama (*Bouteloua rigidiseta*) and buffalograss (*Buchloe dactyloides*) and maintained with regular mowing and minimal tilling. There is no Federally designated Critical Habitat for the South Texas ambrosia (USFWS, 2010b).

2.24.2 Range and Distribution

Historically, populations of the South Texas ambrosia have been found within Cameron, Jim Wells, Kleberg, and Nueces counties in South Texas, and the state of Tamaulipas in Mexico. More recently, there are six documented sites with the species in fragmented habitats within Kleberg and Nueces counties (USFWS, 2010b).

2.24.3 Presence Within the Study Area

The South Texas ambrosia is presently located inland in Nueces County, away from the coast. Outside of their known sites, the presence of other populations is unknown due to private property restrictions and lack of historical documentation. It is unlikely that South Texas ambrosia is found within the study area.

2.25 BLACK LACE CACTUS

The black lace cactus was Federally listed as endangered in 1979. The black lace cactus is a small columnar-shaped cactus with pink flowers. Individuals can be found with single stem or with multiple branches. The primary threat to the cactus species is habitat loss from brush clearing, collection, and encroachment of non-native grasses (USFWS, 1987)

2.25.1 Habitat

The black lace cactus is found in sandy-loam brush tracts in saline soils (USFWS, 1987). Habitat for the cacti can be found in mesquite brush openings along streams within the coastal plains at low elevation (USFWS, 2009b). The black lace cactus is associated with thorn scrub species such as honey mesquite, huisache (*Acacia farnesiana*) and Texas pricklypear (*Opuntia* sp.). There is no Federally designated critical habitat for the black lace cactus (USFWS, 2022b).

2.25.2 Range and Distribution

The population of black lace cacti are known in only three Texas counties: Jim Wells, Kleberg, and Refugio. All the known populations are found on private lands.

2.25.3 Presence Within the Study Area

The black lace cactus is found in a few well-documented locations within Refugio County, farther inland than any construction related activities. No suitable habitat for the cactus exists within the study area, it is unlikely that the black lace cactus would be affected by the project.

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3.0 DIRECT, INDIRECT, AND CUMULATIVE EFFECTS FROM THE PROPOSED PROJECT

This section details the direct, indirect, and cumulative effects of the Proposed Action Alternative described in Section 1.3. Proposed CDP activity includes dredging and fill placement and maintenance dredging. The effects of the proposed CDP on listed species and their habitat include noise, water quality, and habitat modification. Noise, turbidity, and water quality impacts would be short-term and limited to the duration of dredging and construction activities. Conservation measures would be applied to minimize these effects.

3.1 NOISE

Sound waves can be used by fish, sea turtles, and marine mammals to interpret their surrounding environments, detect predators and prey, orient themselves during migration, attract mates, aggregate, engage in territorial behavior, and for acoustic communication. Excessive underwater noise could lead to communication impairment, disturbance, and potentially increase predation, disease, starvation, and death (Peng et al., 2015). Behavioral changes could cause marine species to alter their movements and foraging patterns. On land, noise from construction activity can potentially disturb birds, mammals, and other wildlife. There are a variety of noise from underwater activities associated with the project including from dredging, pile driving, and general construction. Dredge-related noise are produced from the rotating cutterhead, pumps, generators, ship propulsion, and from the sound of the sediment slurry moving through the pipe. Noise from dredging activities is dependent on the type of dredge used. A cutter suction dredge can produce noise from 168 to 175 decibels. A trailing suction hopper dredge can produce noise ranging from 172 to 190 dB (McQueen et al., 2018). Vibratory or impact hammers used to drive piles into the sediment can produce noise up to 180 to 200 dB (NRC, 2012).

Anthropogenic noise can cause auditory masking and changes in individual and social behaviors. Noise impact is expected to be temporary. Disturbed wildlife would be able to move to adjacent habitats and recolonize the project area once construction is completed. Construction noise can be reduced by utilizing air bubble curtains, temporary noise attenuation piles, filled fabric barriers, or cofferdams (NRC, 2012). Since the deepening of the channel is expected to decrease vessel traffic throughout the ship channel and Corpus Christi Bay, it is expected that the level of ocean noise within the area will decrease after the completion of the channel deepening project. Offshore vessel traffic and noise is expected to remain generally the same.

3.2 ENTRAINMENT IN DREDGING EQUIPMENT

Operation of hopper dredges, suction dragheads, and relocation trawlers are potential sources of mortality and injury to sea turtles and manatees. Impacts may also include avoidance of the project area from dredging activities for beach nourishment material and marsh fill. To reduce the potential for incidental take, the USACE would adhere to the proposed avoidance and minimization measures provided by NMFS (2007). The avoidance, minimalization, and conservation measures that would be implemented include onboard

observers, physical screening, sea turtle deflecting dragheads and pumps, Sea Turtle Stranding and Salvage Network notification and relocation trawling (more detail in Section 4.8 below) (NMFS, 2007). Stranded or injured marine mammals should be reported to the Texas Marine Mammal Stranding Network. Any harm to individuals would be reported as take. Should incidental take occur because of the proposed CDP, the USACE and the PCCA has an incidental take allotment.

3.3 TURBIDITY AND RESUSPENDED SEDIMENTS

Dredging, dredge material placement, and construction activity on the water can affect water quality by increasing turbidity within the water column. Generally, the amount of suspended sediments would be highest next to dredging and placement areas. The amount and extent of resuspension is a result of sediment properties, site conditions, obstructions, and operational considerations of the dredging equipment and operator.

Increased turbidity can affect fish, sea turtles, manatees, and shorebirds by interfering with foraging activities, gill tissue or respiratory damage, physical stress, and behavioral changes (Wilber and Clarke, 2001) (see Section 4.2.2 [Aquatic Resources] of the Draft Environmental Impact Statement). The level of impact would be limited to the exposure time and the concentration of suspended sediments. An increase in suspended sediments from dredging may cause sea turtles and marine mammals to alter their movements. Fish, sea turtles, manatees, and other marine mammals are mobile and can relocate to adjacent undisturbed areas (Johnson, 2018). Increases in turbidity would be temporary, lasting only a few days after dredging and placement operations and would not extend far beyond the area of disturbance. Control measures, such as silt curtains, could be used if turbidity levels are excessive. Regular maintenance dredging to maintain the depth of the channel is also expected to cause temporary and localized turbidity.

3.4 DISSOLVED OXYGEN, SALINITY, AND WATER TEMPERATURE

Water quality in the Corpus Christi Bay and along the Texas Gulf coast is highly variable depending on the season, weather, and water depth. Construction activities associated with the project are expected to cause temporary changes to the water quality. Based on hydrodynamic and salinity modeling analysis by W.F. Baird and Associates (2022), minor increases in salinity are anticipated because of Alternative 1 compared to the No-Action. Average salinity levels are anticipated to increase less than 1 parts per thousand in the Corpus, Nueces, Redfish, and Aransas Bays with up to a 3 ppt change at the outlet of Nueces Bay and in the vicinity of the deepened channel. Some localized changes in salinity of less than ±3 ppt in the proposed dredge area and connected navigation channels may occur (W.F. Baird and Associates, 2022). Activities associated with offshore placement and placement actions targeting BU of dredged material are not anticipated to impact salinity levels in the project area. Average salinities in the study area range from 30 to 36 ppt, with dry years having salinity levels above 32 ppt and wet years around 25.5 ppt (Montagna et al., 2021). This salinity increase is not expected to alter fauna. This minor increase in salinity is not expected to impact fauna as most organisms occupying these environments are ubiquitous along the Gulf coast and

can tolerate a wide range of salinities (Pattillo et al., 1997). Temporary decreases in dissolved oxygen associated with dredging activity is anticipated to be localized to the project area and last a couple of days.

3.5 CUMULATIVE EFFECTS

A cumulative impacts assessment takes into consideration the impact on the environment, which results from the incremental impact of the proposed action when added to other past, present, and reasonably foreseeable actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a given period of time. Impacts include both direct and indirect effects. Direct effects are caused by an action and occur at the same time and place as the proposed action. Indirect effects are caused by the action, occur later in time, and are farther removed in distance; however, they are still reasonably foreseeable. Ecological effects refer to effects on natural resources and the components (including listed species), structures, and functioning of affected ecosystems, whether direct, indirect, or cumulative.

The Proposed Action Alternative would have several effects on listed species. The proposed action would result in temporary and localized increases in turbidity which can reduce sea turtle and shorebirds feeding efficiency. Dredging can also impact sea turtles and manatees with direct impacts. Associated construction noise and light could also affect listed species. By utilizing biological observers or other best management practices, harm to threatened and endangered species can be avoided or minimized. Other methods such as using turtle deflector, turtle excluder devices, relocation trawling, or limiting the use of hopper dredging from December to March can avoid and minimize impacts. Noise related to construction activities such as dredging and pile driving can interfere with acoustic communication and harm auditory organs in wildlife species such as marine mammals, sea turtles and fish. Noise impact is expected to be temporary and localized. Construction noise can be reduced by utilizing air bubble curtains, temporary noise attenuation piles, filled fabric barriers, or cofferdams (NRC, 2012). Any spills can impact several Federally listed species. If it is uncontained, an oil spill can harm wildlife and aquatic species. If not immediately contained, the spill can spread to nearby shorelines and impact sea turtles, shorebirds, and wildlife. Dredging and placement actions may disturb shorebirds such as Piping Plover and Red Knots. Triton Environmental Solutions (2021, 2022) observed Piping Plovers and Red Knots utilizing PAs and BU sites within the project area. Placement actions would temporarily impact foraging grounds and construction activities may disturb shorebirds via lights, turbidity, and noise. Scheduling dredge and placement actions targeting BU outside of the wintering period of listed shorebirds and nesting period for sea turtles can avoid and minimize these disturbances. Additional beneficial use placement actions could potentially benefit Federally listed species such as Piping Plovers and Red Knots by nourishing or restoring habitats. Designated Piping Plover Critical Habitat can be found throughout the project area on Mustang Island, San José Island, Port Aransas, and along Corpus Christi Bay. Placement actions could potentially increase shoreline habitat within designated Critical Habitat on San José Island and Mustang Island. These beach nourishment actions may also benefit nesting sea turtles. Whooping Crane habitat may benefit from placement actions targeting BU as well.

Past, present, and reasonably foreseeable actions with dredging or construction activities, and resultant ship traffic, can potentially impact listed shorebirds, marine mammals, and sea turtles. Noise and light during construction can also result in impacts these species, although these effects would be minor and temporary. If any of these projects undergo construction in timeframes that overlap with the Proposed Action Alternative, there could be minor, temporary, and localized cumulative effects to listed species. Various infrastructure can convert potential habitats for listed species, and any habitat conversions associated with placement actions may contribute to cumulative impacts of habitat loss. Ecosystem restoration initiatives typically yield beneficial effects on listed species, and in conjunction with the proposed actions, PAs could result in beneficial cumulative effects.

Most actions were identified primarily through a comprehensive review of the USACE regulatory permit database for permits within the four counties within the study area (Nueces, San Patricio, Refugio, and Aransas counties). Individual project documents, such as public notices, draft and final Environmental Assessments and EIS's, Records of Decision, newspaper articles, planning documents, and project websites or fact sheets, were also reviewed for impacts to the resource areas. Some of the projects are undergoing revisions that may alter their eventual environmental impact, but it has relied upon the best available information in existing published documents. Table 2 includes the projects included within the Cumulative Effect Analysis (CEA).

Table 2
Past, Present, and Reasonably Foreseeable Projects

Project ID	Project Name	CEA Project Group*	Action Type
1	Bluewater Texas Terminal/Midway Tank Terminal	1	Deepwater Port/ Storage Terminal/Pipeline
2	Texas Gulf Terminals Inc./Laguna Madre and Gulf of Mexico	1	Deepwater Port/Storage Terminal/Pipeline
3	Ingleside Ethylene LLC/La Quinta Channel	2	Ethylene Pipeline Installation
4	Corpus Christi LNG, LLC/Terminal Project	2	Liquid Natural Gas Terminal
5	Cheniere Liquids Terminal LLC/La Quinta Channel	2	Dredging/Boat Slip/Bank Stabilization/Dock
6	Flint Hills Resources/Corpus Christi Ship Channel	2	Maintenance Dredging
7	Moda Midstream/Corpus Christi Ship Channel	2	Dredging/Boat Slip
8	Corpus Christi Liquefaction, LLC/La Quinta Channel	2	Private Navigation Dredging
9	Port of Corpus Christi/La Quinta Channel	2	Container Terminal
10	Oxy Ingleside Energy Center (Moda)/Corpus Christi Bay	2	Commercial Development
11	Plains All American LP/Corpus Christi Terminal	2	Liquid Petroleum Storage Terminal
12	Gulf Coast Growth Venture	2	Petrochemical Complex
13	Newfield Exploration Company/Gas Pipeline	3	Gas Pipeline/Abandonment

Project ID	Project Name	CEA Project Group*	Action Type
14	Infinity Engineering & Consulting/Trilogy Midstream	3	Direction Drill Pipeline
15	Epic Y-Grade Pipeline LP/Robstown to Ingleside	3	Pipeline
16	Corpus Christi Infrastructure LLC/Nueces Bay)	3	Pipeline
17	Enterprise Products Operating LLC/Dean Expansion	3	Pipeline
18	Harvest Midstream/Kinney Bayou	3	Utility Line
19	Flint Hills Resources, LLC/Corpus Christi Ship Channel	3	Pipeline
20	Kiewit Offshore/La Quinta Channel	4	Dredging/Bulkhead
21	AccuTRANS Inc./Corpus Christi Ship Channel	4	Bulkhead/Dredging
22	Corpus Christi Ship Channel Deepening and Widening Project	4	Dredging
23	Corpus Christi Ship Channel Project	4, 5	Dredging/Breakwaters
24	City of Aransas Pass/Conn Brown Harbor	5	Boat Ramp/Dredging/ Pier/Docking Structures
25	PA Waterfront/Corpus Christi Bay	5	Residential Development/ Marina
26	City of Port Aransas/Corpus Christi Ship Channel	5	Rock Revetment
27	City of Port Aransas/Corpus Christi Ship Channel	5	Marina
28	TxDOT Port Aransas Ferry	6	Transportation Project
29	TxDOT/Harbor Bridge/Corpus Christi Ship Channel	6	Transportation/Bridge
30	De Ayala Properties/Redfish Bay	7	Residential Development
31	Pelican Cove Development, LLC	7	Residential Development/Commercial
32	Seven Seas Water Corporation/Harbor Island	8	Desalination Plant
33	Port of Corpus Christi/Corpus Christi Ship Channel	8	Desalinization Plant
34	City of Corpus Christi/Inner Harbor Desal Project	8	Desalinization Plant
35	Texas Parks and Wildlife Department/Dagger Island	9	Breakwater/Bank Stabilization
36	Texas General Land Office/Texas Coastal Resiliency Masterplan	9	various restoration projects and actions
37	Coastal Bays Bend and Estuaries/Various Restoration Projects	9	various restoration projects and actions
38	Axis Midstream/Midway to Harbor Island	2, 3	Storage Terminal/Pipeline
39	South Texas Gateway Terminal LLC/Redfish Bay	2, 4	Dredging/Industrial Development
40	Subsea 7 (US) LLC/Loadout Facility	2, 4	Facilities and Maintenance Dredging

Project ID	Project Name	CEA Project Group*	Action Type
41	Port of Corpus Christi/Harbor Island Terminal	2, 4	Dock/Turning Basin/Terminal
42	City of Corpus Christi/Packery Channel Dredging	4, 9	Maintenance Dredging/ Beach Nourishment

* 1 = Offshore Oil and Gas Terminals; 2 = Onshore Storage and Fabrication Terminals; 3 = Utility, Gas, and Petroleum Pipelines; 4 = Maintenance and Navigation Dredging; 5 = Bulkheads, Breakwaters, Boat Ramps, and Marinas; 6 = Transportation Projects; 7 = Commercial and Recreational Development; 8 = Desalination Facilities; 9 = Ecosystem Restoration

To organize discussions on the cumulative analysis, projects have been compiled into the nine CEA project groups below:

1. Offshore Oil and Gas Terminals
2. Onshore Storage and Fabrication Terminals
3. Utility, Gas, and Petroleum Pipelines
4. Maintenance and Navigation Dredging
5. Bulkheads, Breakwaters, Boat Ramps, and Marinas
6. Transportation Projects
7. Commercial and Recreational Development
8. Desalination Facilities
9. Ecosystem Restoration

Despite the potential for cumulative effects on listed species, most effects from projects are assumed to occur primarily during construction or during routine maintenance activities, and those impacts are typically localized, temporary, and minor. Construction impacts of other projects could contribute to cumulative impacts if actions occur concurrently. If these projects are temporally staggered or spatially distant from one another, cumulative impacts to federally listed species can be lessened. Some projects are also assumed to have permanent impacts associated with their physical footprint, such as noise, air emissions, or induced traffic and growth. Examples of these would include offshore and oil and gas terminals, pipelines, marinas, and fabrication terminals. Technologies or BMPs such as horizonal directional drilling, secondary containment, and chemical spill prevention plans can avoid or minimize these impacts. The cumulative effects of extreme drought conditions, deepened channel and desalinization facilities within the bay can contribute to hydrosalinity gradient impacts.

Beneficial cumulative impacts may be expected when considering the proposed action's placement areas in combination with restoration actions that are planned within the study area by State and Federal agencies, non-governmental organizations, and private entities. These include actions outlined in the Texas Coastal Resilience Master Plan, Coastal Bay Bends and Estuaries Program, and TPWD Dagger Island restoration projects. Bird islands, beach nourishment, and DMPA will provide additional loafing and nesting habitat

for federally listed species such as Piping Plover, Red Knot, and Eastern Black Rail. Restoration actions can result in long term improvements and decrease adverse cumulative impacts.

The Proposed Action Alternative's impacts could contribute to cumulative effects where they overlap with impacts of past, present, and reasonably foreseeable actions. Even though potential temporary and permanent impacts may be associated with past, present, and reasonably foreseeable actions, it is also assumed that these projects were, or would be, implemented in compliance with applicable laws and regulations that exist to avoid and minimize project impacts, particularly Endangered Species Act, Marine Mammals Protection Act, and the Magnuson-Steven's Act.

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4.0 CONSERVATION MEASURES

The following conservation measures would be implemented to reduce potential impacts to marine and terrestrial wildlife during construction activities.

4.1 CHANNEL DREDGING

As part of the Proposed Action Alternative, the following conservation measures would be implemented by the PCCA and their contractors to minimize impacts to Federally listed species during beach nourishment activities.

Avoidance measures have been developed to avoid and minimize adverse impacts to Sperm Whales, West Indian Manatees, Giant Manta Rays, and sea turtles from dredging and disposal of dredged material in the ODMDS during construction of the CDP. These avoidances include reasonable and prudent measures that have largely been incorporated in USACE regulatory and civil works projects throughout the Gulf for more than a decade. These measures are:

- Training: All contracted personnel involved in operating dredges must receive thorough training (as specified by NMFS or USFWS) on measures of dredge operation that will minimize impacts to Sperm Whales, West Indian Manatees, and sea turtle takes.
- Observers: The PCCA 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 percent monitoring (i.e., two observers) of hopper dredging operations will be implemented. If a manatee is sighted, project observers should contact the Texas Coastal Ecological Services Field Office at (361) 533-6765 and the Texas Marine Mammal Stranding Network at 800-962-6625 (800-9MAMMAL).
- Staff and crew should not feed or water manatees. All in-water operations, including vessels, must be shut down if a manatee comes within 50-feet (15 meters) of the operation. Activities will not resume until the manatee has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee has not reappeared within 50-feet of the operation. Animals must not be herded away or harassed into leaving the area.
- Dredge Take Reporting: Observer reports of incidental take by hopper dredges will be submitted by e-mail (takereport.nmfsser@noaa.gov) to NMFS Southeast Regional Office by onboard protected species observers within 24 hours of any observed sea turtle take. Reports shall contain information on location, start-up and completion dates, cubic yards of material dredged, problems encountered, incidental takes, and sightings of protected species, mitigative actions taken, screening type, and daily water temperatures. 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.
- Seasonal Hopper Dredging Window: Hopper dredging activities shall be completed between December 1st and March 31st, when sea turtle abundance is lowest throughout Gulf coastal waters.

- 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).
- Non-hopper Type Dredging: Pipeline or hydraulic dredges, which are not known to take turtles, must be used whenever possible between April 1st and November 30th.
- Dredge Lighting: From March 15th through September 30th, sea turtle nesting and emergence season, all lighting aboard hopper dredges and support vessels operating within three nautical miles of sea turtle nesting beaches shall be limited to the minimal lighting necessary to comply with U.S. Coast Guard and Occupational Safety and Health Administration requirements. Non-essential lighting shall be minimized through reduction, shielding, lowering, and appropriate placement.
- STSSN Notification: PCCA or its representative will notify the STSSN state representative of start-up and completion of dredging and relocation trawling operations. The STSSN will be notified of any turtle strandings in the project area that may bear the signs of interaction with a dredge. Dredge relevant stranding information will be reported in the end-of-project summary report and end of year annual report.
- Relocation Trawling: Relocation trawling will be undertaken by a NMFS-approved protected species observer retained by the PCCA where any of the following conditions are met: (a) two or more turtles are taken in a 24-hour period in the project or (b) four or more turtles are taken in the project. The purpose of the trawling would be to capture sea turtles that may be in the dredge path and relocate them away from the action area. An end-of-project report would be generated upon completion and incorporated into the dredging annual summary report.
- Sperm Whales and Giant Manta Rays: Observers shall report Giant Manta Ray and Sperm Whale sightings to the NMFS Southeast Region Protected Resources Division. Observations should be photographed and include the latitude/longitude, date, and environmental conditions at the time of the sighting.

4.2 PLACEMENT OF DREDGED MATERIAL

Avoidance measures have been developed to avoid and minimize adverse impacts to Piping Plovers, Red Knots, Eastern Black Rail, Whooping Crane, and nesting sea turtles from placement of dredged material during construction of the CDP. These avoidances include reasonable and prudent measures that have largely been incorporated in USACE regulatory and civil works projects throughout the Gulf for more than a decade. These measures are:

- Species Training and Monitoring – The following measures apply to species training and on-site monitoring during placement of dredged material for beneficial use in beach nourishment and in-water placement and construction activities:
    - The PCCA will ensure all crew members (contractors, work crews, drivers, wildlife monitors, etc.) attend a half-day training session training prior to the initiation of, or their participation in, project work activities. Qualified biologist will conduct training and the

scope of training will include: 1) recognition of sea turtles, Eastern Black Rail, Piping Plovers, Whooping Cranes, and Red Knots, their habitats, and tracks; 2) avoidance and minimization measures; 3) reporting criteria; and 4) contact information for different rescue agencies in the area. Documentation of this training, including a list of attendees, will be submitted to the USACE and USFWS prior to the start of placement of dredged materials, including beach nourishment, and as new members are trained.

- A minimum of one qualified wildlife monitor, separate from the equipment operator, will be assigned to each active work area. The wildlife monitor will inspect the active work areas prior to the start of work and continuously throughout the workday. Wildlife monitor qualifications will be submitted to the USACE and USFWS prior to the start of each beach nourishment project.
- The PCCA will provide the USACE with the name of a single point of contact responsible for communicating with the crew and wildlife monitors and reporting on endangered species issues during the life of the project. The wildlife monitors will be on-site to ensure listed species are not affected by placement of dredged materials, including beach nourishment activities.
- Prior to the start of work each day, the PCCA will ensure that the wildlife monitors inspect the work area and surrounding areas before construction begins each morning. Wildlife monitors will communicate all activities to the point of contact and the point of contact will coordinate that information with the USACE and USFWS as required.
- Prior to the start of work each day, all contractors, work crews, drivers, etc., will attend a brief training on the recognition of sea turtles, , Piping Plovers, and Red Knots, Whooping Cranes, Eastern Black Rail (and their habitats) and updated on any previous day encounters, if any, with nesting or injured wildlife.

4.2.1 Piping Plovers and Red Knots

The Piping Plovers and Red Knots wintering season begins July 15th, extending through May 15th. To minimize potential impacts to Piping Plovers, Red Knots, and other migratory birds during beach nourishment activities, the PCCA and their contractors will implement the following measures:

- Wildlife monitors will be on-site to ensure Piping Plovers and Red Knots are not affected during beach nourishment activities. The wildlife monitors will ensure that beach nourishment activities will not begin until Piping Plovers and Red Knots leave the project area.
- Wildlife monitors will escort equipment operating on to the beach. No equipment will be powered on or working until the wildlife monitors is present and the equipment inspections are complete.
- Wildlife monitors will check under and around vehicles and heavy equipment before they are moved. Wildlife monitors should be aware that Piping Plovers and Red Knots are especially vulnerable during periods of cold temperature, inclement weather, and when roosting. Birds are more susceptible to injury or disease during inclement winter weather. Careful consideration of construction activities and monitoring should be considered when winter winds exceed 20 mph and temperature drops below 40 degrees. These conditions can cause the birds to roost to conserve energy. Birds can be found in vehicle ruts or next to debris which can make them difficult to see. Construction workers will immediately notify the point of contact or wildlife

monitor if listed species occur in the immediate vicinity of the active work area. If Piping Plovers or Red Knots are found in the active work area, work will be stopped within an area specified by monitors until the birds leaves the construction site. Equipment will remain powered off and all personnel will be vacated from the work area until the birds has left. If the bird does not relocate (e.g., injured bird), the USFWS will be contacted to solicit additional guidance.

- Disturbed areas of the beach (e.g., ruts, tread marks, etc.) will be smoothed out and loosened upon the completion of each workday.

4.2.2 Eastern Black Rail

In Texas, breeding populations of Eastern Black Rails are found along the Gulf Coast from March to August. To minimize potential impacts, the PCCA and their contractors will implement the following Best Management Practices (USFWS, 2022c):

- Where known black rail habitat exists, disturbance activities should be avoided from March 1 to September 30.
- If potential black rail habitat is proposed for removal or impact, a black rail species surveys should be conducted prior to construction activity. The survey period for the species is from March 15 to June 15.
- Limit project activity to daytime hours. If nighttime work is required, lighting in work zones should be limited and turned off when not in use. Permanent lighting should be pointed away from potential black rail habitat, down shielded, and follow Texas Bird City guidelines.
- Black rail habitat should not all be removed within a day. Some pockets of herbaceous cover (refugia, approximately 10 feet by 20 feet) should be maintained. Refugia remaining within the project area may be cleared after two days.
- Biological monitors should ensure that equipment and vehicles moving through potential black rail habitat should follow a sufficiently slow pace to allow birds to escape ahead of equipment. Black rails run to escape oncoming disturbance and are unlikely to fly.
- Revegetation of disturbed areas should use native plants to mimic the local site composition.

4.2.3 Whooping Cranes

To protect Whooping Cranes, which winter in the Action Area and surrounding vicinity between November 1st and April 30th; the PCCA and their contractors shall lower any equipment (taller than 15 feet) at night. If equipment cannot be laid down at dusk or overnight, then such equipment will be marked using surveyors flagging tape, red plastic balls or other suitable marking devices and lighted during inclement weather conditions when low light and/or fog is present. If a Whooping Crane is observed within 1,000 feet of dredge material placement activities, the PCCA shall immediately halt work until the Whooping Crane leaves the area.

4.2.4 Sea Turtles

Peak nesting season for sea turtles begins March 15th, extending through October 1st. To minimize potential impacts to sea turtles during placement of dredged material, including beach nourishment activities, the PCCA and their contractor will implement the following measures:

- The PCCA, in coordination with the USACE, will ensure that daily turtle patrols of the proposed beach nourishment area by wildlife monitors are conducted prior to the start of work each day and continuously throughout the workday. No equipment will be powered on or working until the wildlife monitor is present and the equipment inspections are complete.
- If a sea turtle (dead or alive), sea turtle tracks, or nest is located or identified, the siting will be documented, and beach nourishment activities will immediately cease within 100 feet of the nest, tracks, or turtle. The wildlife monitor will then call Padre Island National Seashore at 1-361-949-8173 X 226 or 1-866-TURTLE5 (1-866-887-8535) or the ARK at 361-749-6793.
- All turtles, turtle tracks, turtle nests, or turtle eggs found during beach nourishment activities will be safeguarded until they can be re-located by properly permitted individual(s).
- Contractors will use the minimum amount of light necessary through reduced wattage, shielding, lowering, and the use of low-pressure sodium lights during project construction to minimize the potential effects of artificial lighting on sea turtles.

4.3 CONSTRUCTION SITE, ACCESS, AND EQUIPMENT FOR BEACH NOURISHMENT ACTIVITIES

Beach nourishment activities will be conducted mechanically by means of trucks, backhoes, front-end loaders, bulldozers, cranes, and ATVs. Other equipment could include a dredge pipe, booster pumps, generators, lighting, and fuel trucks. The following measures apply to construction access and equipment usage during beach nourishment activities.

- Materials and equipment required for the Proposed Action Alternative will be staged in upland areas and transported as needed to the proposed work sites. Staging areas will be designated before work begins and will be solely within the construction footprint.
- Construction vehicles will access the beach from public roads closest to the work sites to reduce the unnecessary vehicle traffic on the beach.
- Ingress/egress routes will be flagged/marked with wooden laths/stakes to ensure that work activities remain within the approved project work area. These items will be removed once work is complete in designated areas.
- Contractors will coordinate and sequence the work to minimize the frequency and density of vehicular traffic on the beach to the greatest extent practicable. Construction crews and vehicles will avoid the swash zone and the wrack line closest to the swash zone when possible. The swash zone is defined as the area of the beach intermittently covered and uncovered by wave run-up. The wrack line is defined as the vegetative area made up of but not limited to *Sargassum*, shell hash, vegetation, and some light trash, and litter.

- Sand placement areas will be confined to a maximum 1,000-foot-long segment within the active work corridor. Vehicle access corridors could include up to an additional 2,000 feet. Work activities will run parallel to the shoreline and will shift linearly along the work corridor as sections of the beach template are completed to allow for birds to migrate to undisturbed portions of the beach.
- The ends of the 1,000-foot-long segment within the active work area will be clearly marked with orange wooden barricades (or other temporary barriers) for the duration of project construction. Barricades will be shifted down the active work area as work is completed.
- The number of vehicles transiting from upland areas to the active work sites will be kept to a minimum. All vehicles will use the same pathways and access will be confined to the closest access point to the immediate work area. Beach nourishment activities will occur from the landward side of the beach placement area whenever possible.
- Vehicles will adhere to a reduced speed of 15 miles per hour.
- Use of construction lighting at night will be minimized, directed toward the construction activity area, and shielded from view outside of the project area to the maximum extent practicable.

4.4 BEACH-QUALITY SAND AND PLACEMENT

Measures that apply to beach-quality sand placement during beach nourishment activities include:

- Only sand that meets the specifications of the local beach quality sand (i.e., consistent in grain size, color, composition, and mineralogy) and free of hazardous substances (as defined in Volume 40 of the Code of Federal Regulations, Part 302.4) will be used for beach nourishment activities. Detail on sediment testing can be found in Sections 3.2.5 and 4.1.4 of the EIS and is briefly summarized here. The proposed dredge area does not have heavy industry located on its banks and past maintenance material testing has not shown any signs of contamination (Montgomery and Bourne, 2018). Further testing for the CCSCIP ruled out several volatile and semivolatile chemical groups including VOC, ethers, and organonitrogens, and nonvolatiles like dioxin. Testing for the remaining chemicals at the CCSC in the lower bay, Entrance Channel, and proposed channel extension, did not indicate issues with metals, polycyclic aromatic hydrocarbons, pesticides, or other chemical groups. Only beach quality sands from the CCSC should be placed as direct beach nourishment at locations previously breached by Hurricane Harvey.
- Sand will be placed and maintained at a gradual slope to minimize scarping.
- After project construction in an active work zone is complete, the project site will be regraded, and all vehicular ruts leveled.

5.0 EFFECTS ANALYSIS, AVOIDENCE, AND MINIMIZATION

The USACE presents their determination about each species potentially occurring within the study area, using the language recommended by the USFWS:

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

Following the effect determinations for the project on Federally listed species, the USFWS and NMFS will review the information and complete the Section 7 consultation process under the ESA.

5.1 OCELOT

The Ocelot are rare cats found in thornscrub forest of south Texas. The proposed CDP activities are in the bay or along the coast away from their typical habitat. There is no Federally designated Critical Habitat for the species. It would be very rare to find Ocelots along the coastal barrier island or bays. Ocelots are not expected to be impacted by the project.

Effect Determination

The CDP will have no effect on the Ocelot.

5.2 BLUE WHALE, FIN WHALE, HUMPBACK WHALE, SEI WHALE, AND SPERM WHALE

Whales are rare visitors to the Texas Gulf. Isolated observations have been made in recent years along the shallow waters near the coast, but populations of the species remain rare in Texas. Marine mammal species could be impacted by collision with ships, decreased water quality, and disorientation from vessel traffic and sonar. Conservation measures to protect any whales or marine mammals within the construction area would include the use of NMFS-approved observers on dredge vessels, reporting protocols to NMFS, and dredging operational changes (additional information can be found in Section 4.0). However, if incidental take occurs, it would not jeopardize the continued existence or recovery of the species.

Effect Determination

The likelihood of adverse effects, including incidental take, during channel dredging and construction would be greatly reduced by full implementation of avoidance, minimization, and conservation measures outlined above. Of the five species of whales with the potential of occurrence within the project area, only sperm whales are sighted near the Texas coast. Sperm Whales are considered rare within the Gulf. The CDP is expected to decrease the volume of vessel traffic traversing the CCSC. This would lower the risk of a collision between marine mammals and ships within the CCSC. Offshore vessel traffic is expected to remain the same after completion of the project. Therefore, the risk of vessel collision offshore with marine mammals are expected to stay the same. The effect determinations are presented in Table 3. Incidental take, if it occurs, would not jeopardize the continued existence or potential recovery of any of the whale species.

Table 3
Effect Determinations for Whales Relative to the Proposed Action Alternative

Common Name	Scientific Name	Dredging Activity Determination	Placement of Dredged Material Determination
Blue Whale	*Balaenoptera musculus*	No Effect	No Effect
Fin Whale	*Balaenoptera physalus*	No Effect	No Effect
Humpback Whale	*Megaptera novaeangliae*	No Effect	No Effect
Sei Whale	*Balaenoptera borealis*	No Effect	No Effect
Sperm Whale	*Physeter macrocephalus*	May affect, but not likely to adversely affect	May affect, but not likely to adversely affect

5.3 WEST INDIAN MANATEE

West Indian Manatees are uncommon migrants to the Texas Gulf coast. Isolated observations have been made in recent years along the coast, but populations of the species remain rare in Texas. Manatees could be impacted by ship collisions, incidental take from the operation of dredge hoppers, decreased water quality, and habitat modification. Vessel traffic within the project area is projected to decrease after completion of the CDP compared to the No-Action Alternative. Therefore, the likelihood of injury or mortality from ship collision is expected to decrease. During channel deepening, conservation measures to protect any manatees within the construction area would include the use of NMFS-approved observers on hopper dredges, reporting to USFWS, and dredging operational changes (additional information can be found in Section 4.0). However, incidental take, if it occurs, would not jeopardize the continued existence or recovery of the species.

Effect Determination

The project may affect, but not likely to adversely affect West Indian Manatees.

5.4 GIANT MANTA RAY

Giant Manta Rays are common within the Gulf and around the Corpus Christi Bay area. Giant Manta Rays are found in shallow coastal waters and in open oceans. Manta Rays could be impacted by vessel collision, decreased water quality from dredging, trawling, and habitat modifications. The CDP is expected to decrease the volume of vessel traffic traversing the CCSC. This would in effect, lower the risk of a collision between marine species and ships within the CCSC. During construction, conservation measures to protect Manta Rays within the construction area can include the use of NMFS-approved observers, reporting protocols to NMFS, and best management practices (additional information can be found in Section 4.0).

Effect Determination

The project may affect, but not likely to adversely affect Giant Manta Rays.

5.5 NORTHERN APLOMADO FALCON

There is no designated Critical Habitat for Northern Aplomado Falcons along the Texas coastline. According to eBird data (2022a), Northern Aplomado Falcons have been observed throughout the project area. The placement of dredge material would not impact the species or their habitat. After construction is completed, falcons are expected to benefit from the stabilized shoreline for additional or improved habitat.

Effects Determination

The proposed project would not affect Northern Aplomado Falcons.

5.6 PIPING PLOVER

Dredging activity offshore or nearshore would not directly impact Piping Plover. The greatest potential for impacts to Piping Plovers would be associated with placement of fill material for beneficial use near potential habitat. Dredge material placement and construction on the beach and in inshore areas could disturb and impact Piping Plover foraging, roosting and loafing areas where they overwinter on the Texas coast. Wintering Piping Plovers have been observed using uplands for resting between placement areas. A pre-construction survey should be conducted to determine presence or absence of Piping Plovers. Noise from construction operations, placement of sediments on habitat, and earth moving would temporarily disturb individuals and bury some Critical Habitat. Birds would likely become acclimated to the noise and vessel traffic or relocate to adjacent habitats. According to eBird data (2022b), Piping Plovers have been observed throughout the Texas Gulf coast. This includes Federally designated Critical Habitat units TX-6, 7, 8, 14, 15, and 16 where the project area is located (see Figure 4).

Conservation measures include survey for presence or absence prior to construction, construction outside of Piping Plover wintering season, and avoidance of Critical Habitat. Additional information can be found in Section 4.0.

After construction is completed, dredge material placement areas would result in a positive effect on Piping Plovers by increasing the extent of suitable habitat within the project area. Disturbance of Piping Plovers along the project area would not jeopardize the continued existence or the potential recovery of the species.

Effect Determination

The proposed project may affect, but not likely to adversely affect Piping Plover and their Critical Habitat.

5.7 RUFA RED KNOT

Rufa Red Knots would not be directly impacted by open-water dredging. Rufa Red Knots typically utilize large areas of wide exposed intertidal flats, beaches, and oyster reefs similarly used by piping plovers. Rufa Red Knots are anticipated to be directly impacted by placement of sediments, construction activity and noise, and buried foraging resources. Some beneficial use placement actions would impact tidal habitats but would also create or improve tidal habitats. There is no Federally-designated Critical Habitat associated with Rufa Red Knots in Texas. A survey should be performed prior to construction to determine the presence or absence of Rufa Red Knots within the project area.

After dredge material placement, Rufa Red Knots are expected to benefit from the increased habitat and stabilized shoreline. The disturbance of Rufa Red Knots along the project area would not jeopardize the continued existence or the potential of recovery for the species.

Effect Determination

The proposed project may affect, but not likely to adversely affect Rufa Red Knot.

5.8 WHOOPING CRANE

There will be project related construction activities located near Port Aransas, Corpus Christi Bay, and other wintering areas where Whooping Cranes are common. Whooping Cranes may occur in brackish bays, marshes, and salt flats along the mid-Texas coast. Some beneficial use placement actions would impact tidal habitats but would also create or improve tidal habitats. A survey should be performed prior to construction activity to determine the presence or absence of Whooping Cranes within the project area. During dredging activities, noise, and turbidity may indirectly impact wintering Whooping Cranes. Changes in water quality from dredging and fill placement may also affect the foraging ability of Whooping Cranes in marshes and bays. Impacts from the project are expected to be temporary.

After dredge material placement, Whooping Cranes are expected to benefit from restored marshes and stabilized shorelines for additional or improved foraging and wintering habitat.

Effect Determination

The proposed project may affect, but not likely to adversely affect Whooping Cranes.

5.9 EASTERN BLACK RAIL

Eastern Black Rails may occur in brackish bays, marshes, and tidal wetlands along the mid-Texas coast, and tidal wetlands would be directly impacted by placement actions. Dredging, noise, and turbidity may indirectly impact Eastern Black Rails near tidal marshes. A survey should be performed prior to construction activity to determine the presence or absence of Eastern Black Rails within the project area. Some beneficial use placement actions would impact tidal habitats but would also create or improve tidal habitats. Other impacts from the project are expected to be temporary.

After dredge material placement, Eastern Black Rails are expected to benefit from restored marshes and stabilized shorelines for additional or improved habitat.

Effect Determination

The proposed project may affect, but not likely to adversely affect Eastern Black Rail.

5.10 ATTWATER'S GREATER PRAIRIE CHICKEN

There is no designated Critical Habitat for Attwater's Greater Prairie Chicken along the Texas coast. According to eBird data (2022e), Attwater's Greater Prairie Chickens have not been observed within the project area. Suitable habitat for the prairie chicken is not found within the vicinity of the project.

Effect Determination

The proposed project will have no effect on the Attwater's Greater Prairie Chicken.

5.11 SEA TURTLES

The responsibility for agency coordination on marine reptiles is divided between two Federal agencies: the NMFS for sea turtles in the water and the USFWS for nesting sea turtles. Juvenile and adult sea turtles may be present in the water within the project area during certain times of the year. There are five sea turtle species with the potential to be found in Texas Gulf waters: Hawksbill Sea Turtle, Green Sea Turtle, Kemp's Ridley Sea Turtle, Leatherback Sea Turtle, and Loggerhead Sea Turtle.

5.11.1 In-water Impacts

Dredging could result in impacts to the sea turtles, if they are present in the project area. The effects of these impacts are expected to be localized and temporary in terms of construction. It is assumed that the deepening of the channel would be constructed with a cutterhead suction hydraulic or single large-capacity hopper dredge. However, the construction contractor may opt to employ two or more mid-capacity hopper dredges, or a cutterhead hydraulic pipeline dredged, or a mix of hopper and cutterhead dredges. Sea turtles can easily avoid pipeline dredges because of the slow movement of the dredge. The use of hopper dredges can increase the potential of mortality or injury for sea turtles. If hopper dredging is utilized, additional best

management practices, like deflectors or relocation trawls, would be required to avoid impacts (Ramirez et al., 2017). Dredging the ship channel is expected to take 3 years. Between 1995 and 2021, the Galveston District of USACE has recorded 155 incidental takes of sea turtles along the entire Texas Gulf coast including 72 Green, 58 Loggerhead, and 25 Kemp's Ridley Sea Turtles (Operations and Dredging Endangered Species System, 2021). Other types of impacts to sea turtle from dredging activity include noise, increased turbidity, lighting from dredging vessels, resuspension of heavy metal and contaminants, and decreased dissolved oxygen around the dredge and placement area. The increased work boat traffic associated with construction activity could potentially increase vessel collision, contaminant spills and debris and trash, which could potentially impact sea turtles. Cutter suction dredging has been shown to be less harmful to sea turtles than hopper dredging. However, there have been rare incidences where cold-stunned sea turtles were unable to move away from the cutterhead (Ramirez et al., 2017). Sea turtles can become lethargic and less mobile when water temperatures fall below 50°F. Cold stunning can lead to shock, pneumonia, frostbite, and death if the sea turtle is unable to swim to warmer waters (Turtle Island Restoration Network, 2018; Shaver et al., 2017). The potential for incidental take of sea turtles by cutter suction dredges would be minimized using sea turtle observers, relocation trawling, seasonal dredging window, and other conservation measures. The likelihood of adverse effects during construction can be greatly reduced when avoidance, minimalization, and conservation measures are performed. A summary of avoidance, minimization, and conservation measures to reduce incidental take of sea turtles during dredging operations provided by NMFS (2007) can be found in Section 4.0.

The CDP is expected to decrease the volume of lightering vessel traffic traversing the CCSC. This would lower the risk of a collision between sea turtles and ships within the CCSC.

5.11.2 Nesting Impacts

Sea turtle nesting season in Texas extends from April to September (Palmer, 2017). Sea turtles arriving on shore during the nesting season may be impacted by dredge material placement activities. Beach nourishment can affect aspects of a beach, including sand density, shear resistance, moisture content, slope, sand color, grain size, and sand shape. Changes in the physical nature of the beach can in turn affect nest site selection, digging behavior, cultch viability, and hatching emergence (Gallaher, 2009). During the actual dredge material placement activities, sea turtles can be impacted by noise, ship collision, obstruction of the beach from dredge piping, and excess sand over nests (Crain et al., 1995).

Methods such as restricting beach nourishment activities during sea turtle nesting season, testing sand grains before placement, beach tilling to reduce compaction, and grading the beach to its original profile can prevent or reduce impacts to nesting sea turtles (Crain et al., 1995; Gallaher, 2009). Beach nourishment can reduce nesting success for the first season after nourishment but can return to normal levels in subsequent years (Crain et al., 1995). Nesting success is expected to return to pre-nourishment levels following material placement. Brock et al. (2009) found that nesting success for Loggerhead and Green Sea Turtles returned to pre-nourishment rates two seasons after beach nourishment. Beach nourishment is expected to increase available sea turtle nesting habitat. While a Leatherback Sea Turtle nest was located in South Padre Island

in 2021, this is the first instance of a viable nest in Texas within 100 years, the likelihood of the species nesting within the project area is extremely low. The likelihood of adverse effects during beach nourishment activities can be greatly reduced if avoidance, minimalization, and conservation measures are performed. A summary of avoidance, minimization, and conservation measures to reduce incidental take of nesting sea turtles can be found in Section 4.0.

Beneficial placement of dredge material can lead to sediment transport of material to the shoreline and an accretion of beachfront habitat. Additional nesting habitat and stabilized shorelines would be available for nesting sea turtles and hatchlings. Constructed beach profile should mimic the natural slope and sand composition (grain size, shell content, etc.) as the original beach to promote sea turtle nesting (Brock et al., 2007). The net benefit from the project will include increased nesting habitat availability, increased submerged aquatic vegetation and foraging habitat, and improved bay and Gulf hydrology (Sea Turtle Conservancy, 2021). In the absence of the project, habitat quality would continue to diminish over time due to sea level rise.

Effect Determination

The likelihood of adverse effects, including incidental take, during channel dredging and construction would be greatly reduced by full implementation of avoidance, minimization, and conservation measures outlined above during dredging and beach nourishment activities. Leatherback Sea Turtles are less likely to be impacted since they are less likely to occur in the proposed project area. Hawkbill sea turtles would be less likely impacted by beach nourishment activities since the species has not been known to next on Texas beaches since 1998 (NPS, 2021). The effect determinations are presented in Table 4. Incidental take, if it occurs, would not jeopardize the continued existence or potential recovery of any of the sea turtle species.

5.12 FALSE SPIKE AND GUADALUPE ORB

There are no Federally designated Critical Habitats for the False Spike or Guadalupe Orb within the project area. Freshwater mussels are intolerant of brackish or saltwater and would not be found near the project area. It is highly unlikely that the species would be affected directly or indirectly from channel dredging or construction activity.

Effect Determination

The proposed project will have no effect on the False Spike or Guadalupe Orb.

Table 4
Sea Turtle Effect Determination Relative to the Proposed Action Alternative

Common Name	Scientific Name	Dredging Activity Determination	Beach Nourishment Determination
Green Sea Turtle	*Chelonia mydas*	Likely to adversely affect	Likely to adversely affect
Hawksbill Sea Turtle	*Eretmochelys imbricate*	Likely to adversely affect	May affect, but not likely to adversely affect
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Likely to adversely affect	Likely to adversely affect
Leatherback Sea Turtle	*Dermochelys coriacea*	May affect, but not likely to adversely affect	May affect, but not likely to adversely affect
Loggerhead Sea Turtle	*Caretta caretta*	Likely to adversely affect	Likely to adversely affect

5.13 MONARCH BUTTERFLY

There are no Federally designated Critical Habitats for the Monarch Butterfly. Populations of the plant species are well-documented throughout Texas and within the project area. However, the project will not affect monarch butterfly habitat or milkweed, its host plant.

Effect Determination

The proposed project will have no effect on the Monarch Butterfly or its associated habitats.

5.14 SLENDER RUSH-PEA, SOUTH TEXAS AMBROSIA, AND BLACK LACE CACTUS

There are no Federally designated Critical Habitats for the slender rush-pea, South Texas ambrosia, or black lace cactus. Populations of the plant species are well-documented and exist further inland in upland habitats, away from the project area. It is highly unlikely that the species would be affected directly or indirectly from channel dredging or construction activity.

Effect Determination

The proposed project will have no effect on the slender rush-pea, South Texas ambrosia, black lace cactus or their associated habitats.

6.0 SUMMARY

Table 5 presents a summary of effects determination for the Federally threatened and endangered species covered in this BA.

Table 5
Effects Determinations Summary for the Proposed Action Alternative

Common Name	Scientific Name	Effects Determination – USFWS
MAMMALS		
Ocelot	*Leopardus pardalis*	No Effect
Blue Whale	*Balaenoptera musculus*	No Effect
Fin Whale	*Balaenoptera physalus*	No Effect
Humpback Whale	*Megaptera novaeangliae*	No Effect
Sei Whale	*Balaenoptera borealis*	No Effect
Sperm Whale	*Physeter macrocephalus*	May affect, but not likely to adversely affect
West Indian Manatee	*Trichechus manatus*	May affect, but not likely to adversely affect
FISH		
Giant Manta Ray	*Manta birostris*	May affect, but not likely to adversely affect
BIRDS		
Northern Aplomado Falcon	*Falco femoralis septentrionalis*	No Effect
Piping Plover	*Charadrius melodus*	May affect, but not likely to adversely affect
Red Knot (Rufa)	*Calidris canutus rufa*	May affect, but not likely to adversely affect
Whooping Crane	*Grus americana*	May affect, but not likely to adversely affect
Eastern Black Rail	*Laterallus jamaicensis jamaicensis*	May affect, but not likely to adversely affect
Attwater's Greater Prairie Chicken	*Tympanuchus cupido attwateri*	No Effect
REPTILES		
Green Sea Turtle	*Chelonia mydas*	Likely to adversely affect[1]
Hawksbill Sea Turtle	*Eretmochelys imbricata*	Likely to adversely affect[2]
Kemp's Ridley Sea Turtle	*Lepidochelys kempii*	Likely to adversely affect[1]
Leatherback Sea Turtle	*Dermochelys coriacea*	May affect, but not likely to adversely affect
Loggerhead Sea Turtle	*Caretta caretta*	Likely to adversely affect
CLAMS		
False Spike	*Fusconaia mitchelli*	No Effect
Guadalupe Orb	*Cyclonaias necki*	No Effect
INSECT		
Monarch Butterfly	*Danaus plexippus*	No Effect
PLANTS		
Slender rush-pea	*Hoffmannseggia tenella*	No Effect
South Texas ambrosia	*Ambrosia cheiranthifolia*	No Effect
Black lace cactus	*Echinocereus reichenbachii albertii*	No Effect

[1]Effect determination for NMFS in-water impacts – likely to adversely affect

[2]Effect determination for NMFS in-water impacts – may affect, but not likely to adversely affect

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Attachment 1

U.S. Fish and Wildlife Service
County Species List

IPaC **U.S. Fish & Wildlife Service**

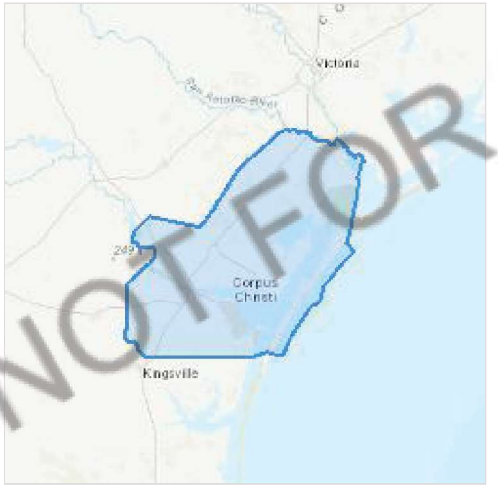
IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

Location

Texas



Local office

Texas Coastal Ecological Services Field Office

(281) 286-8282
(281) 488-5882

4444 Corona Drive, Suite 215
Corpus Christi, TX 78411

http://www.fws.gov/southwest/es/TexasCoastal/
http://www.fws.gov/southwest/es/ES_Lists_Main2.html

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

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1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).
2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Ocelot Leopardus (=Felis) pardalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4474	Endangered
West Indian Manatee Trichechus manatus Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/4469	Threatened Marine mammal

Birds

NAME	STATUS
Attwater's Greater Prairie-chicken Tympanuchus cupido attwateri Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/7259	Endangered
Eastern Black Rail Laterallus jamaicensis ssp. jamaicensis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/10477	Threatened
Northern Aplomado Falcon Falco femoralis septentrionalis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1923	Endangered
Piping Plover Charadrius melodus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/6039	Threatened
Red Knot Calidris canutus rufa Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1864	Threatened
Whooping Crane Grus americana There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/758	Endangered

Reptiles

NAME	STATUS
Green Sea Turtle Chelonia mydas There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/6199	Threatened
Hawksbill Sea Turtle Eretmochelys imbricata Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3656	Endangered
Kemp's Ridley Sea Turtle Lepidochelys kempii Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/5523	Endangered
Leatherback Sea Turtle Dermochelys coriacea Wherever found There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1493	Endangered
Loggerhead Sea Turtle Caretta caretta There is **final** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/1110	Threatened

Clams

NAME	STATUS
False Spike Fusconaia mitchelli Wherever found There is **proposed** critical habitat for this species. The location of the critical habitat is not available. https://ecos.fws.gov/ecp/species/3963	Proposed Endangered
Guadalupe Orb Cyclonaias necki There is **proposed** critical habitat for this species. The location of the critical habitat is not available.	Proposed Endangered

Insects

NAME	STATUS
Monarch Butterfly Danaus plexippus Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Black Lace Cactus Echinocereus reichenbachii var. albertii Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5560	Endangered
Slender Rush-pea Hoffmannseggia tenella Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/5298	Endangered
South Texas Ambrosia Ambrosia cheiranthifolia Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/3331	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Piping Plover Charadrius melodus https://ecos.fws.gov/ecp/species/6039#crithab	Final
Whooping Crane Grus americana https://ecos.fws.gov/ecp/species/758#crithab	Final

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern http://www.fws.gov/birds/management/managed-species/birds-of-conservation-concern.php
- Measures for avoiding and minimizing impacts to birds http://www.fws.gov/birds/management/project-assessment-tools-and-guidance/conservation-measures.php
- Nationwide conservation measures for birds http://www.fws.gov/migratorybirds/pdf/management/nationwidestandardconservationmeasures.pdf

MIGRATORY BIRD INFORMATION IS NOT AVAILABLE AT THIS TIME

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the migratory birds potentially occurring in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the AKN Phenology Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets .

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering, migrating or present year-round in my project area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may refer to the following resources: The Cornell Lab of Ornithology All About Birds Bird Guide, or (if you are unsuccessful in locating the bird of interest there), the Cornell Lab of Ornithology Neotropical Birds guide. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

Marine mammals

Marine mammals are protected under the Marine Mammal Protection Act. Some are also protected under the Endangered Species Act[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora[2].

The responsibilities for the protection, conservation, and management of marine mammals are shared by the U.S. Fish and Wildlife Service [responsible for otters, walruses, polar bears, manatees, and dugongs] and NOAA Fisheries[3] [responsible for seals, sea lions, whales, dolphins, and porpoises]. Marine mammals under the responsibility of NOAA Fisheries are **not** shown on this list; for additional information on those species please visit the Marine Mammals page of the NOAA Fisheries website.

The Marine Mammal Protection Act prohibits the take (to harass, hunt, capture, kill, or attempt to harass, hunt, capture or kill) of marine mammals and further coordination may be necessary for project evaluation. Please contact the U.S. Fish and Wildlife Service Field Office shown.

1. The Endangered Species Act (ESA) of 1973.
2. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is a treaty to ensure that international trade in plants and animals does not threaten their survival in the wild.
3. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following marine mammals under the responsibility of the U.S. Fish and Wildlife Service are potentially affected by activities in this location:

NAME
West Indian Manatee Trichechus manatus https://ecos.fws.gov/ecp/species/4469

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

This location overlaps the following National Wildlife Refuge lands:

LAND	ACRES

ARANSAS NATIONAL WILDLIFE REFUGE 115,882.14 acres

Fish hatcheries

THERE ARE NO FISH HATCHERIES AT THIS LOCATION.

Wetlands in the National Wetlands Inventory

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

WETLAND INFORMATION IS NOT AVAILABLE AT THIS TIME

This can happen when the National Wetlands Inventory (NWI) map service is unavailable, or for very large projects that intersect many wetland areas. Try again, or visit the NWI map to view wetlands at this location.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.